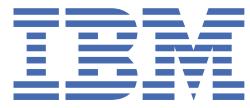


IBM Storage Insights



Tables of Contents

Welcome	1
Accessibility	2
Notices	3
Privacy policy considerations	5
Trademarks	5
What's new	6
Change log	9
Release notes	21
Sponsor user program	22
Beta program	23
Product overview	23
Tour the key features	25
How it works	26
Ready, steady, go	26
Dashboard overviews	27
Integrated support experience	31
Cost savings	31
Capacity planning	32
Performance, capacity, and configuration troubleshooting	33
Reporting overview	34
Supported devices	35
IBM Storage Insights	36
Deploying data collectors to get capacity and performance insights and to upload logs	38
IBM Storage Insights vs IBM Storage Insights Pro	39
Want to try or buy IBM Storage Insights Pro?	41
Determining the capacity to be licensed	41
Licensing examples	44
Social media	45
Videos	45
Blogs	51
Dashboards	53
NOC dashboard	54
Operations dashboard	55
Capacity overview charts	56
Capacity by pool	57
Capacity by volume	59
Notifications dashboard	60
Navigation	60
Keyboard navigation	62
Tracking tasks	63
Units of measurement for storage data	63
Service updates and maintenance	64
IBM Storage Insights for IBM Spectrum Control	65
Getting started	68
Before you begin checklist	69
Downloading and installing data collectors	72
Installing data collectors on Windows	74
Installing data collectors on AIX or Linux	76
Adding, changing, or removing connections to proxy servers	78
Adding or changing the connection to the proxy server	78
Removing the connection to the proxy server	79
Learn more about installing data collectors	79
Metadata collection with multiple data collectors	83
Enabling the collection of metadata for devices that use TLS 1.0 or 1.1	84
Adding and removing users	86
Roles and access rights	87
Adding storage systems	88
Preparing to add storage systems	91
Ports for collecting metadata from storage systems	91

User roles for collecting metadata from storage systems	92
DS8000	93
Adding DS8000 storage systems that use SSLv3 and MD5 signed certificates	94
IBM FlashSystem family	94
IBM Spectrum Accelerate	95
SAN Volume Controller or IBM Spectrum Virtualize	96
Planning for IBM Spectrum Virtualize for Public Cloud	97
Monitoring IBM Spectrum Virtualize for Public Cloud with on-premises data collection (Site to Site VPN IPsec)	99
Monitoring IBM Spectrum Virtualize for Public Cloud with off-premises data collection (in AWS and installed on the bastion host)	100
Probing a SAN Volume Controller cluster fails when the cluster ID changes	101
User roles for collecting performance metadata from IBM Spectrum Virtualize	101
Storwize family	102
Storwize V7000 Unified	102
How to fix IBM Storwize V7000 Unified authentication errors	103
XIV	104
IBM Spectrum Scale [Pro]	104
Monitoring IBM Spectrum Scale without requiring root privileges	105
Verifying that probe data can be collected for object storage	106
Configuring the collection of performance data for IBM Spectrum Scale	107
Configuring OpenStack access to monitor the object storage system	108
Cloud Object Storage System [Pro]	108
Dell EMC [Pro]	109
Planning for Dell EMC storage systems	111
Planning for Dell EMC Solutions Enabler and Dell EMC SMI-S Provider	112
Adding multiple instances of SMI-S Provider or Solutions Enabler	113
Hitachi VSP [Pro]	114
Planning for Hitachi storage systems	115
Installing the Hitachi Export Tool	117
NetApp [Pro]	118
Planning for NetApp device support	118
Adding multiple instances of SMI-S providers	120
Pure Storage [Pro]	120
Planning for Pure Storage systems	121
Adding switches and fabrics	123
Planning for Brocade switches and fabrics	123
Configuring Brocade switches for monitoring	124
Adding Brocade switches and fabrics	125
Planning for Cisco switches and fabrics	127
Adding Cisco switches and fabrics	129
Removing chassis, switches, and fabrics	131
Adding servers [Pro]	131
Monitoring resources with Call Home	132
Enabling Call Home	132
Acknowledging Call Home events	134
Creating applications [Pro]	135
Application models	135
Creating an application hierarchy	137
Creating an application	137
Creating subcomponents for an application	138
Filters for associating storage resources with applications and subcomponents	138
Creating departments [Pro]	140
Department models	140
Creating a department hierarchy	142
Creating departments and adding applications to departments	143
Adding departments as subdepartments to departments	144
Creating general groups [Pro]	145
Creating a general group hierarchy	145
Creating general groups and adding resources	146
Adding general groups as subgroups	146
Viewing information about resources	147
Creating customized dashboards	147
Viewing capacity information	148
Viewing performance information for storage systems	148

Viewing performance information for fabrics	149
Removing storage systems	149
Removing enclosures and nodes	149
Configuring	150
Managing data collectors	150
Assigning data collectors	154
Stopping and starting the data collector service	154
Removing and uninstalling data collectors	155
Upgrading data collectors	156
Upgrading data collectors automatically	156
Upgrading data collectors manually	156
Upgrading data collectors individually	157
Resolving upgrading issues	157
Resolving connection issues	158
Restoring your dashboard after a service update or interruption	159
Monitoring the status of data collectors	160
Renaming data collectors	161
Uploading the data collector's log packages	161
Uploading the data collector's log packages to ECuRep	162
Uploading the data collector's log packages to Blue Diamond	162
Giving IBM Support permission to collect log packages	163
Specifying which users are emailed about service outages	164
Checking the collection of metadata for devices	165
Administering the collection of metadata	166
Restarting the collection of metadata	167
Starting and stopping the collection of performance metadata for IBM Spectrum Scale	168
Enabling and disabling the collection of performance metadata for Hitachi VSP storage systems	168
Modifying the schedules for collecting metadata	169
Aggregation and retention periods for the metadata that is collected	169
Assigning pools to tiers	170
Renaming tiers	171
Modifying applications and departments [Pro]	171
Adding applications as subcomponents to applications	172
Adding subcomponents to applications	172
Adding storage resources to applications	173
Adding storage resources to subcomponents	174
Adding applications to departments	174
Adding applications to subdepartments	175
Removing applications	175
Removing subcomponents	175
Removing departments	176
Removing subdepartments	176
Changing the owner of IBM Storage Insights	176
Exporting information to a file	177
Customizing lists	177
Filtering lists	178
Filtering storage systems using pattern matching	178
Sorting lists	178
Showing, hiding, and reordering columns in lists	179
Modifying the properties of resources [Pro]	179
Properties of resources that can be modified	180
Settings	181
Gaining insights [Pro]	181
Viewing insight charts	182
Performance views	182
Viewing the performance of storage systems	183
Reclamation views	184
Reclamation storage overview	185
Reclamation views of storage systems	186
Monitoring recommended actions	187
Acknowledging recommended actions	188
Monitoring resources	188
Resource overview	189

Capacity views	191
Viewing capacity charts	192
Viewing dashboard capacity charts	193
Storage systems	194
Storage system details	195
Administering storage systems	196
Viewing charts and information about storage systems	197
Viewing information about enclosures	198
Block storage systems	200
Overview charts	207
Setting capacity limits	208
Tutorial: Investigating compliance with the capacity limit	209
Removing the capacity limit	210
Capacity limit metrics	210
Block internal resources	211
Nodes, modules, and directors	212
Drives and disks	213
Enclosures	214
External disks	215
FC ports	215
Host connections	216
I/O groups	217
IP ports	218
Managed disks, external volumes, and array LUNs	219
Pools, aggregates, and common provisioning groups	220
Host adapters	228
RAID arrays	228
Device adapters	230
Volumes	231
Block storage copy data resources	236
File storage systems	237
Capacity and capacity usage charts	239
Viewing the capacity of external storage	241
Identifying shortfall before data is recalled from external storage	242
File internal resources	243
Clusters and nodes	243
Disk controllers	244
Filesets	244
File systems and file provisioning groups	245
Network Shared Disks	246
Nodes	247
File system pools	249
Quotas for IBM Spectrum Scale clusters	250
Shares	251
Snapshots of GPFS file systems or filesets	251
Object storage systems	252
Capacity and failure tolerance charts	254
Object internal resources	256
Access Pools	256
Accesser Nodes	257
Mirrors	257
Sites	258
Slicestor Nodes	259
Storage Pools	260
Vaults	260
Calculating the failure tolerance for vaults	262
Object resources	263
Accounts	263
Containers	264
Storage system related resources	265

Applications	267
Administering applications	269
Application details	271
Application Related Resources	272
Departments	273
Administering departments	274
Viewing information and charts about departments	275
Department details	276
General groups	277
General group hierarchies	278
Adding resources to general groups	278
Viewing and administering general groups	279
General Group details	282
Servers	283
Administering servers	284
Server details	285
Server internal resources	286
Server related resources	288
Tiers	289
Investigating capacity trends	290
Investigating capacity trends for block storage systems	291
Investigating capacity trends for file storage systems	291
Investigating capacity trends for object storage systems	292
Investigating capacity trends for block storage pools	293
Investigating capacity trends for volumes	293
Investigating capacity trends for file systems	294
Investigating capacity trends for file system pools	295
Investigating capacity trends for filesets	296
Investigating capacity trends for containers	297
Investigating capacity trends for tiers	298
Controls for capacity views	298
Capacity and space metrics	299
Capacity metrics for block storage systems	299
Key capacity concepts	310
Key capacity concept: Shortfall	316
Capacity metrics for file storage systems	316
Capacity metrics for object storage systems	317
Capacity metrics for tiers	318
Performance views	318
Investigating the performance of storage resources	319
Investigating the performance of storage systems	321
Tutorial: Comparing the performance of storage systems	321
Investigating the performance of a storage system	323
Investigating the performance of applications	323
Investigating the performance of application subcomponents	324
Investigating the performance of applications and subcomponents added to departments	325
Investigating the performance of applications and subcomponents added to subdepartments	325
Identifying performance issues for IBM Spectrum Virtualize storage systems	326
Tutorial: Identifying the source of slow drain problems caused by depletion of buffer credits	326
Controls for performance views	328
Performance metrics	330
Performance metrics for Dell EMC storage systems	331
Performance metrics for IBM FlashSystem 900	337
Performance metrics for Hitachi VSP storage systems	339
Performance metrics for NetApp storage systems	340
Performance metrics for Pure storage systems	343
Performance metrics for IBM Spectrum Scale	344
Performance metrics for DS8000	345
Performance metrics for resources that run IBM Spectrum Virtualize	353
Performance metrics for XIV, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R	365

Exporting performance data for storage systems	368
Tutorial: Exporting performance data for a SAN Volume Controller system	368
IBM Spectrum Virtualize guideline values for key performance indicators	370
Tutorial: Viewing the aggregated workload for an application	371
Monitoring switches and fabrics through chassis	373
Switches	374
Switch details	376
Switch Internal Resources	377
Switch Related Resources	380
Performance metrics for switches	381
Chassis	383
Chassis details	385
Chassis Internal Resources	387
Chassis Related Resources	392
Tutorial: Creating an inventory report for switches	393
Tutorial: Creating an inventory report for switch ports	393
Tutorial: Creating an inventory report for chassis	394
Fabrics	394
Fabric details	395
Fabric Internal Resources	396
Fabric Related Resources	401
Tutorial: Creating a report about fabrics	402
Monitoring the status and condition of resources	402
How the condition of a resource is determined	404
Viewing the condition of specific types of resources	405
Viewing the status of resources	406
Acknowledging the condition of top-level resources	407
Acknowledging the status of internal resources	407
Opening the management GUI for the storage system	408
Opening the management GUI for DS8000 storage systems	409
Opening, updating, and tracking IBM Support tickets	409
Call Home and IBM Support tickets	411
Information that you add to tickets	411
Identifying the locations of devices	412
Monitoring notifications	413
Acknowledging notifications	414
Creating notification reports	414
Alerting [Pro]	414
How alerts work	416
Viewing and administering alerts	417
Viewing and administering alert definitions	421
Alert policies	422
Viewing alert policies	423
Creating alert policies	424
Modifying alert policies	424
Modifying which resources are managed by an alert policy	425
Adding a resource for management by an alert policy	426
Removing resources from alert policies	426
Deleting alert policies	427
Defining alerts for attributes, capacity, and performance changes	427
Defining alert definitions for general attributes and capacity changes	427
Defining alert definitions for performance changes	429
Defining custom alerts for resources	430
Scenarios for custom alerts	433
Defining alerts for applications	437
Defining application alerts for attribute and capacity changes	438
Defining application alerts for performance metrics	439
Defining custom alerts for applications	441
Defining alerts for general groups	442
Defining general group alerts for attribute and capacity changes	443
Defining general group alerts for performance metrics	444
Defining custom alerts for general groups	446

Defining notification settings for alerts	447
Alert notifications	448
Triggering conditions for alerts	450
Triggering conditions for storage system alerts	450
Triggering conditions for storage system internal resource alerts	453
Triggering conditions for server alerts	466
Triggering conditions for fabric alerts	466
Triggering conditions for switch alerts	467
Triggering conditions for chassis alerts	469
Reporting	471
Creating predefined capacity reports	473
Tutorial: Creating a predefined capacity report about storage systems	476
Tutorial: Creating a predefined capacity report about pools	477
Tutorial: Creating a predefined capacity report about tiered pools	478
Tutorial: Creating a predefined capacity report about the volumes assigned to servers	479
Tutorial: Creating a predefined capacity report about managed disks by storage systems	479
Adding resources to applications to generate large reports	480
Creating predefined inventory reports	480
Tutorial: Creating an inventory report about block storage systems	481
Creating custom reports	482
Tutorials: Creating custom capacity and performance reports for applications	483
Creating the application for the capacity report	484
Creating the capacity report for the application	485
Creating the performance report for the application	486
Custom capacity and performance view reports	486
Creating chargeback and consumer reports	488
Creating chargeback reports	490
Chargeback reports	491
Creating consumer reports	492
Consumer reports	492
Creating summary reports of the storage capacity	493
Capacity metrics for chargeback and consumer reports	494
Running reports	495
Editing reports	496
Deleting reports	496
Types of predefined capacity and inventory reports	497
Reports FAQ	497
Security	498
Summary	498
What is the data collector	499
How is the metadata protected	500
What types of metadata are collected	502
How long is the metadata kept	503
Who can access the metadata	504
Metadata access controls and authorization	504
Metadata access for resolving issues	505
IBM Support access for troubleshooting your tickets	505
Metadata access for quality improvements	505
Data backup and restore	505
Requesting the deletion of personal information	506
Asset, capacity, and configuration metadata	506
Block storage system metadata	507
Block volumes metadata	508
Block pools metadata	509
I/O groups, nodes, and ports metadata	510
Disks and managed disks metadata	511
Block device adapters metadata	512
Block host adapters metadata	512
Enclosures metadata	513
File storage system metadata	513
File system metadata	514
Fileset metadata	514
File shares metadata	514
File system pools metadata	515

Network shared disks metadata	515
File nodes metadata	515
Object storage systems metadata	516
Switches metadata	517
Fabrics metadata	518
Groups metadata	518
Servers metadata	520
Performance metadata	520
Performance metadata for storage systems that run IBM Spectrum Virtualize	521
Performance metadata for DS8000	524
Performance metadata for XIV, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R	525
Performance metadata for IBM Spectrum Scale	526
Performance metadata for Dell EMC Unity, VMAX, and VNX	527
Performance metadata for Hitachi VSP storage systems	529
Performance metadata for NetApp storage systems	530
Performance metadata for Pure Storage systems	531
Performance metadata for switches	531
FAQ	533
Troubleshooting	537
Getting started troubleshooting	537
General troubleshooting	540
Getting support	543
Subscribing to IBM announcements	544
Collaborating with the team	544
Messages	545
Introduction to messages	545
Message types	546
Call Home Messages	546
The power supply failed	546
A fan is operating outside the expected range	546
The fan status is unknown due to a communication error	547
The power supply has a direct current (DC) failure	547
The serial-attached SCSI (SAS) drive has error counts that exceed the warning thresholds	547
A storage pool is offline	547
BPCCA - Data collector installation messages	547
BPCCA0001E The data collector started, connected to the service_name, and is ready to process requests from the service_name	548
BPCCA0002E The data collector failed to connect or register to the service_name at server_url.	549
BPCCA0003E The data collector started but detected a problem with the directory directory_name and must stop.	549
BPCCA0004E The data collector cannot run because it is not configured correctly.	549
BPCCA0005E The data collector failed to connect to the storage management service at server_url because the host name could not be resolved.	550
BPCCA0006E The data collector failed to connect to the storage management service at server_url because of an unknown error.	550
BPCCA0007E The data collector failed to connect to a service from the storage management system.	550
BPCCA0008E The data collector failed to connect to the storage management service because of invalid credentials.	551
BPCCA0009I The data collector connected to the storage management service. The data collector had failed to connect since date_and_time.	551
BPCCA0010E The data collector in the directory_name directory of the host host_name was running and an attempt was made to start a second instance of the same data collector. The second instance of the data collector stopped.	551
BPCCA0011I The data collector stopped because a user requested it to shut down.	552
BPCCA0012I The data collector stopped to enable the installation of an upgraded version of the data collector.	552
BPCCA0013E The storage management service did not allow the data collector to connect because another data collector was already connected to the service.	552
BPCCA0100I The updateCollector utility started.	552
BPCCA0101E The collector directory was not specified in the collectorDirectory.properties file.	553
BPCCA0102E The collector directory directory_name that was specified in the collectorDirectory.properties file is invalid. The collector directory is the directory to which the updateCollector utility must copy the upgrade image files.	553
BPCCA0103E The collector directory directory_name that was specified in the collectorDirectory.properties file cannot be used as the collector directory.	553
BPCCA0104E The updateCollector utility started but there was a problem with the upgrade image directory current_directory.	553
BPCCA0105E The collector directory directory_name that was specified in the collectorDirectory.properties file is a subdirectory of the upgrade image directory upgrade_image_directory_name.	554

BPCCA0106E Cannot upgrade the data collector in the collector_directory directory because the directory contains the following locked files: locked_files_list	_554
BPCCA0107I The content of the directory collector_directory will be deleted and replaced with subdirectories and files from the upgrade_image_directory directory. Some configuration files, the log directory, and the contents of the log directory will not be deleted.	_554
BPCCA0108E The data collector service cannot be uninstalled from the operating system. The upgrade process cannot be completed.	_555
BPCCA0109E The updateCollector utility could not upgrade the data collector. The data collector service is now in an inconsistent state.	_555
BPCCA0110E The contents of the collector_directory directory could not be deleted. The upgrade process cannot be completed. The data collector might be in an inconsistent state.	_555
BPCCA0111E The files and directories of the data collector from the directory upgrade_image_directory could not be copied into the directory collector_directory. The upgrade process cannot be continued. The data collector might be in an inconsistent state.	_556
BPCCA0112I The data collector in the directory collector_directory was upgraded successfully to version downloaded_version.	_556
BPCCA0113E The data collector in the directory collector_directory could not be upgraded.	_556
BPCCA0114I The data collector was upgraded to the new version and will start automatically.	_556
BPCCA0115I The attempt to upgrade the data collector failed. The existing data collector will start automatically.	_557
BPCCA0116E The attempt to upgrade the data collector failed. You must download and install the latest version of the data collector.	_557
BPCCA0117E The upgraded data collector could not be installed as a service on the operating system. You must install the new data collector service manually.	_557
BPCCA0118I The data collector was upgraded to the new version and started successfully.	_557
BPCCA0119I The data collector could not be upgraded, but was not modified. The existing data collector was restarted successfully.	_558
BPCCA0120E The upgraded data collector did not start.	_558
BPCCA0121E The existing data collector did not restart.	_558
BPCCA0122E The data collector cannot authenticate to the HTTPS proxy server proxy_server_hostname. Therefore, the data collector cannot connect to the storage management service.	_558
BPCDP - Data processor messages	_559
BPCDP0000I Performance data for natural key resource at date and time timestamp was collected and processed successfully.	_559
BPCDP0001E Error while collecting and processing performance data for natural key resource at date and time timestamp. Performance data was not collected and processed.	_560
BPCDP0002E The processing of performance data for the resource could not be completed.	_560
BPCDP0003E No performance data is available at the current time for this resource.	_560
BPCDP0004I Performance data was retrieved and persisted but aggregation of data to higher-level components didn't complete because the relationship to the higher-level components couldn't be determined.	_560
BPCDP0005E Could not save the performance data that was collected from the resource.	_561
BPCDP0006I Performance data at date and time timestamp was processed and saved successfully for the resource.	_561
BPCDP0007E The resource is missing. The resource is required.	_561
BPCDP0008E Identifying information for the resource is missing. This information is required.	_561
BPCDP0009E Information identifying the resource type is invalid: system type .	_562
BPCDP0010E Information uniquely identifying the resource is missing. This information is required.	_562
BPCDP0011E Information uniquely identifying the resource is invalid.	_562
BPCDP0012E The UUID for the tenant's resource is invalid.	_562
BPCDP0013E The start time for the performance data is invalid: start time	_563
BPCDP0014E The end time for the performance data is invalid: end time	_563
BPCDP0015I Performance data at date and time timestamp was processed and saved successfully for the resource, but the data processing raised warnings.	_563
BPCDP0016W Performance data for natural key resource at date and time timestamp was collected and processed successfully, but the data processing raised warnings.	_564
BPCPD - Probe data processor messages	_564
BPCPD0001E Information identifying the resource type is invalid: system type .	_564
BPCPD0002E Information uniquely identifying the resource is missing. This information is required.	_564
BPCSS - Scheduler messages	_564
BPCSS0000E An error occurred while collecting performance data from the device. The collection is being attempted by a different collector.	_567
BPCSS0001W The data collection is taking longer than expected.	_567
BPCSS0002E Currently, there is no data collector available for this device.	_568
BPCSS0005I Performance monitor is starting at an interval of interval interval units. This action was requested by user name.	_568
BPCSS0008I Collection can no longer continue due to invalid credentials. Use the 'Modify Connection' dialog to fix the storage system credentials and resume collection.	_568

BPCSS0009E Failed to save the performance monitor schedule.	568
BPCSS0010E A job cannot be run for resource resourceName because there is a job already running for the resource.	569
BPCSS0011W The schedule change was saved but the update to the active collection did not happen.	569
BPCSS0012I Performance monitor is stopped. This action was requested by user name.	569
BPCSS0013I Performance monitor is stopped.	569
BPCSS0014I Performance monitor is starting at an interval of interval interval units.	570
BPCSS0015I Performance monitor collection interval was updated to interval interval units. This action was requested by user name.	570
BPCSS0016I Performance monitor collection interval was updated to interval interval units.	570
BPCSS0017I Performance monitor is enabled. This action was requested by user name.	570
BPCSS0018I Performance monitor is enabled.	570
BPCSS0019I Performance monitor is disabled. This action was requested by user name.	571
BPCSS0020I Performance monitor is disabled.	571
BPCSS0021W Performance monitor is starting. The initial attempt to start collection failed so it is retried. This action was requested by user name.	571
BPCSS0022W Performance monitor is starting. The initial attempt to start collection failed so it is retried.	571
BPCSS0023I Performance monitor collection interval is enabled and updated to interval interval units. This action was requested by user name.	571
BPCSS0024I Performance monitor collection interval is enabled and updated to interval interval units.	571
BPCSS0025E Access to the agent or device is denied. Ensure that valid credentials are specified for agent agent name.	572
BPCSS0026E New performance data is not yet available for the device. Statistics with time stamps later than time stamp could not be found.	572
BPCSS0027E The performance monitor failed due to an internal error.	573
BPCSS0028E The value that is specified as parameter (value) is invalid.	573
BPCSS0029E Cannot connect to the device with the address IP address.	573
BPCSS0030E Cannot connect to the SNMP data source IP address.	573
BPCSS0031E Cannot authenticate with the provided user credentials.	573
BPCSS0032E Passphrase is incorrect for subsystem param1.	574
BPCSS0033E Passphrase is required. Specify one for subsystem param1.	574
BPCSS0034E Verify that they private key that was provided for subsystem param1 was in the OpenSSH file format. If it is in another format, it needs to be converted before it can be used.	574
BPCSS0035E The user does not have the required authority to complete the task or command.	574
BPCSS0036E Cannot connect to the storage system or cluster.	575
BPCSS0037W The device cannot be reached.	575
BPCSS0038E The device or device agent did not respond within the allotted time.	575
BPCSS0039E The host name or IP address {0} is not valid.	576
BPCSS0040E The host name or IP address is not valid.	576
BPCSS0041E Cannot connect to the device.	576
BPCSS0042E Cannot connect to the SNMP data source.	576
BPCSS0043E Passphrase is incorrect.	576
BPCSS0044E Passphrase is required.	577
BPCSS0045E Access to the device is denied. Ensure that valid credentials are specified.	577
BPCSS0046E Verify that they private key that was provided was in the OpenSSH file format. If it is in another format, it needs to be converted before it can be used.	577
BPCSS0047E New performance data is not yet available for the device.	578
BPCSS0048E The parameter for the Performance Manager API is invalid.	578
BPCSS0049E Schedule is not enabled for the resource resource.	578
BPCSS0050W Performance data could not be collected for device device name because the device or data source cannot be reached (reason reason code). The current samples are skipped.	579
BPCSS0051E The device or device agent did not respond within the allotted time (timeout valueseconds).	579
BPCSS0052W Performance data continuity is broken. The device might have been reset or rebooted. record count performance data records were discarded.	580
BPCSS0053W No valid performance data was provided by the monitored resource. Zero performance data records were inserted into the database.	580
BPCSS0054E A timeout occurred while polling the performance statistics for this device: device name	581
BPCSS0055E Performance data was not collected for device device name due to error error trace. The current samples are skipped.	581
BPCSS0056E The last performance Data Collection was not readable for device device name, the collection failed with error error trace.	581
BPCSS0057E Cannot connect to the switch with the provided IP address, host name, protocol, and port.	582

BPCSS0058E Cannot authenticate to the switch with the provided user name and password.	582
BPCSS0059E The specified user name does not have the required permissions for the switch.	582
BPCSS0060E Performance monitoring is unavailable for resource resource_name because the ZiMon agent is not available.	582
BPCSS0061W Out of request count requests, only processed request count were successfully started.	583
BPCSS0062W The data collector monitoring system system is missing. Will attempt to switch to a new data collector.	583
BPCSS0063W Configuration data is already being collected for system system. A new collection can not be started till the current one finished.	583
BPCSS0064E The request encountered an internal error and could not be completed. Please try again.	584
BPCSS0065E The Data Collector Manager could not retrieve system actions for all devices being monitored by collector collector.	584
BPCSS0066E The firmware level on the switch is not supported.	584
BPCSS0067E The firmware level of the switch cannot be parsed.	584
BPCSS0068E The show hardware command failed.	585
BPCSS0069E The issued command is not supported by the device. The action can't be completed.	585
BPCSS0070E The device is returning invalid data.	585
BPCSS0105I Probe is starting at an interval of interval interval units. This action was requested by user name.	585
BPCSS0109E Can't save the schedule for the probe.	586
BPCSS0110E The download of Data Collector installer package failed.	586
BPCSS0111E The extraction of Data Collector installer package failed.	586
BPCSS0112I The probe was stopped. This action was requested by user name.	586
BPCSS0113I The probe is stopped.	587
BPCSS0114I The probe is starting at an interval of interval interval units.	587
BPCSS0115I The probe interval was updated to interval. This change was requested by user name.	587
BPCSS0116I The probe interval was updated to interval.	587
BPCSS0117I The probe is enabled. This action was requested by user name.	587
BPCSS0118I The probe is enabled.	587
BPCSS0119I The probe is disabled. This action was requested by user name.	588
BPCSS0120I The probe is disabled.	588
BPCSS0121W The probe started, but the initial attempt to collect metadata failed. This action was requested by user name.	588
BPCSS0122W The probe started, but the initial attempt to collect metadata failed.	588
BPCSS0123I The Probe collection interval is enabled and updated to interval. This action was requested by user name.	588
BPCSS0124I Probe interval is enabled and updated to interval.	588
BPCSS0125E The Data Collector upgrade operation failed with invalid parameters.	589
BPCSS0126E The Data Collector upgrade operation failed due to locked files detection.	589
BPCSS0127E The Data Collector upgrade operation failed during the uninstallation process of the existing Data Collector.	589
BPCSS0128E The Data Collector upgrade operation failed while trying to delete old files.	589
BPCSS0129E The Data Collector upgrade operation failed while trying to copy new files.	590
BPCSS0130E The upgrade operation failed to install the new Data Collector for unknown reasons.	590
BPCSS0131E The Data Collector upgrade failed.	590
BPCSS0132E The data collector was not upgraded because there wasn't enough space in the installation directory.	590
BPCSS0133E The data collector was not upgraded because the path to the compressed installation file is not valid.	591
BPCSS0134E The data collector was not upgraded because the upgrade process does not have the required permissions on the installation directory.	591
BPCSS0135E The data collector was not upgraded because the compressed file that contains the installation files could not be located.	591
BPCSS0136E The data collector wasn't upgraded because there wasn't enough space in the installation directory.	592
BPCSS0137E The data collector wasn't upgraded because the download of the data collector upgrade package took too long to complete. The default time in which the download should complete is 60 minutes.	592
BPCSS0138E The data collector wasn't upgraded because the extraction of the data collector upgrade package took too long to complete. The default time in which the extraction should complete is 10 minutes.	592
BPCSS2000I Cannot connect to the device as the user account is locked.	593
BPCSS2001I Cannot connect to the device.	593
BPCSS2002I The download of installer package that runs Data Collector upgrade operation is completed.	593
BPCSS2003I The extraction of Data Collector installer package is completed.	593
BPCSS2004W Performance data was not received for the device within the expected time. The current sample is skipped.	594
BPCSS2005E Task timed out because it did not complete in the expected time.	594
BPCSS2006I System discovery data is being processed for system natural key.	594
BPCSS2007I Running task task type for system system natural key.	594
BPCSS2008I Running task task type for data collector collector.	594
BPCSS2009E A policy group with the same name already exists.	595
BPCSS2010I Opened ticket ticket number and started collecting logs from the device with serial number device serial number.	595

BPCSS2011I Collecting logs from device with serial number device serial number for ticket ticket number.	595
BPCSS2012I The log package for device with serial number device serial number was collected for ticket ticket number.	595
BPCSS2013E Opened ticket ticket number, but logs were not collected from the device with serial number device serial number.	596
BPCSS2014E Opened ticket ticket number, but log collection from the device with serial number device serial number timed out.	596
BPCSS2015I The logs for device with serial number device serial number are being uploaded for ticket ticket number.	596
BPCSS2016I The logs for device with serial number device serial number have been uploaded for ticket ticket number.	597
BPCSS2017E Upload of the logs for device with serial number device serial number for ticket ticket number failed.	597
BPCSS2018E Upload of the logs for device with serial number device serial number for ticket ticket number timed out.	597
BPCSS2019E The Ticket Service Upload of the logs for device with serial number device serial number for ticket ticket number failed.	597
BPCSS2020W An upgrade is already in progress for system system . A new upgrade can not be started till the current one finishes	598
BPCSS2021E The upgrade process of all data collectors stopped. Go to the Data Collectors page to upgrade manually.	598
BPCSS2022I The data collector installer package is being downloaded.	598
BPCSS2023I The data collector installer package is being extracted.	598
BPCSS2024I Old data collector files are being replaced with new files from the data collector download package.	598
BPCSS2025I Performance data is being uploaded.	599
BPCSS2026I Started collecting logs from device with serial number device serial number for ticket ticket number.	599
BPCSS2027E Logs were not collected from the device with serial number device serial number for ticket ticket number.	599
BPCSS2028E Opened ticket ticket number, but logs were not collected from device with serial number device serial number, because the device firmware version device version is lower than the minimum supported version 7.7.52.19.	599
BPCSS2029E Logs were not collected from device with serial number device serial number for ticket ticket number, because the device firmware version device version is lower than the minimum supported version 7.7.52.19.	600
BPCUI - User Interface messages	600
BPCUI000E The action can't be completed because the following error occurred: Error message text.	610
BPCUI0001E An action could not be completed and the following error message was generated: TPCRemoteException message	610
BPCUI0002E Failed to retrieve the requested data because the service is unavailable.	610
BPCUI0003E The NAPI with the IP address Napi IP was not added because of an Internal Error	611
BPCUI0004E The SSH private key for the NAPI Napi IP could not be uploaded	611
BPCUI0005E The action cannot be completed because the following internal error has occurred: message.	611
BPCUI0007E The discovery job failed to complete.	611
BPCUI0009E The SSH key could not be loaded for the following reason: IOException message	611
BPCUI0010E The host name or IP address that you entered is a resource_type, but you selected to add a different type of storage system.	612
BPCUI0011E The Device Server did not discover any device	612
BPCUI0012E Cannot connect to the device with the address Ip Address.	612
BPCUI0019E No data is available for this selection.	612
BPCUI0025E Probe job job Id failed.	612
BPCUI0029E Invalid parameter param passed.	613
BPCUI0030I This task was already executed.	613
BPCUI0032E An unexpected response was received from the server.	613
BPCUI0034E Invalid number of runs to keep for each schedule. The number should be between param1 and param2.	613
BPCUI0035E Invalid number of days' worth of log-files to keep. The number should be between param1 and param2.	614
BPCUI0036E The schedule id scheduleID associated with this job is no longer valid. It might have been deleted. Refresh the view and try again.	614
BPCUI0037E The replication server is not installed or is unavailable.	614
BPCUI0038E Invalid number of days to retain alerts. The number should be between param1 and param2.	614
BPCUI0039E A Storage Resource agent cannot be found.	615
BPCUI0040E Parsing results from a call to the Data server failed with the following error message: param1.	615
BPCUI0042E Communication with the Data Server failed with the following error: param1	615
BPCUI0043E Cannot connect to the Data server.	615
BPCUI0044E The entity was not found in the database.	616
BPCUI0045E Host name length exceeds the 255 character limit	616
BPCUI0046E Report 'configurationId' not found	616
BPCUI0047E Parameter 'parameterName' is not defined in report configurationId'	616
BPCUI0048E No property is not defined for report configurationId'	616
BPCUI0049E No such property propertyName for report configurationId'	617
BPCUI0050E variableName can not be overridden	617
BPCUI0051E variableName not valid report output format.	617
BPCUI0052E variableName not reachable	617
BPCUI0053E Cannot authenticate with the provided user credentials.	617

BPCUI0054E The host name or IP address {0} is not valid.	618
BPCUI0055E Cannot connect to the storage system.	618
BPCUI0056E Cannot connect to the storage system or cluster.	618
BPCUI0058I No supported resources were discovered on the data source data_Source_Address.	619
BPCUI0060I File param was successfully uploaded to the Data Server.	619
BPCUI0061E Upload file type param is not supported.	619
BPCUI0062E The requested action failed with the following error message: error message	619
BPCUI0063E Cannot find jobs for scheduleId param and deviceId param. No logs are displayed.	620
BPCUI0064E A log file cannot be displayed for the job.	620
BPCUI0065E The job log file cannot be accessed. The log file may have been manually removed or may have been deleted because it was older than retain_days days or it exceeded the maximum number of no_of_lofs runs.	620
BPCUI0067E The schedule for collecting status and asset data cannot be created.	620
BPCUI0068E A proposed schedule for collecting status and asset data cannot be created.	621
BPCUI0069E The proposed schedule for collecting status and asset data cannot be deleted.	621
BPCUI0071E The task task_name could not be completed.	621
BPCUI0072E Cannot connect to the Device server. Verify that the database service and Device server are running, and that the Device server is accessible.	622
BPCUI0073E Can't make a connection to the storage_resource storage resource.	622
BPCUI0074E The wizard could not set an attribute for the storage resource.	622
BPCUI0075E The certificate wasn't saved on the server.	622
BPCUI0076W The initial job to collect status and asset data did not start.	623
BPCUI0077E A failure occurred loading the certificate.	623
BPCUI0078I The certificate was loaded successfully.	623
BPCUI0079E The SSL certificate is not in the expected format.	624
BPCUI0084W The wizard could not retrieve the default interval information for performance monitoring.	624
BPCUI0085E The user name or password for the hypervisor or vCenter hypervisor or vCenter Server is invalid.	624
BPCUI0086E The SSL certificate is invalid for the hypervisor or vCenter hypervisor or vCenter Server, or the firewall is blocking access to it.	624
BPCUI0087E The version of the hypervisor or vCenter hypervisor or vCenter Server is not supported.	625
BPCUI0088E The host name, protocol, or port for the hypervisor or vCenter hypervisor or vCenter Server is invalid, or the hypervisor or vCenter Server is unreachable.	625
BPCUI0089W Cannot retrieve a valid set of data collection intervals for performance monitoring.	625
BPCUI0090I All alerts were removed.	626
BPCUI0091W error_count of total_count alerts were not removed.	626
BPCUI0093I No data path is available for deviceNameVariable.	626
BPCUI0094E Authorization failed due to an internal error.	626
BPCUI0097E Authorization failed due to an invalid request context.	627
BPCUI0098E The current user is not authorized to perform the requested function.	627
BPCUI0099E Information about the storage resource is not available.	627
BPCUI0100I success_count alerts were marked as acknowledged.	628
BPCUI0101I The alert was marked as acknowledged.	628
BPCUI0102E None of the alerts were marked as acknowledged.	628
BPCUI0104I success_count alerts were marked as unacknowledged.	628
BPCUI0105I The alert was marked as unacknowledged.	629
BPCUI0108I All informational alerts were marked as acknowledged.	629
BPCUI0110W Some informational alerts were not marked as acknowledged.	629
BPCUI0111I All alerts were marked as acknowledged.	629
BPCUI0112I success_count alerts were removed.	629
BPCUI0113I The alert was removed.	630
BPCUI0114I All acknowledged alerts were removed.	630
BPCUI0116W Some acknowledged alerts were not removed.	630
BPCUI0120W Some acknowledged alerts were not marked as unacknowledged.	630
BPCUI0121E Unable to communicate with the product server. Make sure that the server is running properly.	631
BPCUI0122E No job log file was created for this job run.	631
BPCUI0123E The action cannot be completed.	631
BPCUI0124E An unexpected error occurred during the execution of the action.	632
BPCUI0125E The alert is not available.	632
BPCUI0126E The status of the Performance Monitors could not be retrieved.	632
BPCUI0127E The currently installed version of the product does not have the required product license for the function that you requested.	632

BPCUI0128E An undefined capacity chart metric was requested.	633
BPCUI0129I Alerts that were migrated from a previous version of the product are not shown on this page.	633
BPCUI0130E The alerts cannot be acknowledged because they were deleted.	633
BPCUI0131E The alerts cannot be unacknowledged because they were deleted.	634
BPCUI0132W success_count alerts were marked as acknowledged. unsuccess_count alerts cannot be marked as acknowledged because they were deleted.	634
BPCUI0133W success_count alerts were marked as unacknowledged. unsuccess_count alerts cannot be marked as unacknowledged because they were deleted.	634
BPCUI0134E The alert cannot be acknowledged because it was deleted.	634
BPCUI0135E The alert cannot be unacknowledged because it was deleted.	635
BPCUI0136E The device was not removed because the action is not supported for devices of type devType.	635
BPCUI0137E Input text provided has invalid character(s): characters. Input text: text	635
BPCUI0141E Host name or IP address hostname specified on line line of file file is not valid.	635
BPCUI0143E Host port WWPN wwpn specified on line line of file file is not valid.	636
BPCUI0144E Duplicate server name specified on lines line1 and line2 of file file.	636
BPCUI0145E Could not parse file file.	636
BPCUI0146E Could not parse file file. Invalid entry on line line.	636
BPCUI0148I Successfully deleted server server_name.	636
BPCUI0149I Successfully modified ports of server server_name.	637
BPCUI0150I The server was created.	637
BPCUI0151E The host name or IP address is associated with another resource.	637
BPCUI0152I The data source data_Source_Address was successfully added as a data source for monitoring. The following new resources were detected:	637
BPCUI0155W You cannot provision volumes because there is no Fibre Channel host port information for at least one server.	638
BPCUI0156W You cannot provision volumes to servers that use different operating systems.	638
BPCUI0157W You cannot provision volumes to servers and virtual machines at the same time. To provision volumes, ensure that you select either only servers or only virtual machines.	638
BPCUI0158I Volumes are assigned to the hypervisors that host virtual machines. Volumes are not assigned directly to virtual machines.	639
BPCUI0159W You cannot provision volumes because at least one of the hypervisors that host the virtual machines is not being monitored. Ensure that all the hypervisors that are hosting the virtual machines that were selected for provisioning were probed.	639
BPCUI0160E Duplicate port WWPN wwpn specified on lines line1 and line2 of file file.	639
BPCUI0162W File file does not contain any servers to create.	639
BPCUI0166W Optimization cannot be done in place to the subsystem since storage subsystem param1 and/or its pools belong to more than one capacity pool. Following are capacity pools the subsystem is associated with: param2	640
BPCUI0167W Optimization cannot be done in place to the subsystem since storage subsystem param1 and/or its pools are not part of any capacity pool.	640
BPCUI0168W Optimization cannot be done in place to the server param1 since storage subsystems or storage pools associated with luns assigned to the server belong to more than one capacity pool. Following are associated capacity pools: param2	640
BPCUI0169W Optimization cannot be done in place to the server param1 since storage subsystems or storage pools associated with luns assigned to the server are not part of any capacity pool.	641
BPCUI0170W Optimization cannot be done in place to the storage entity param1 since storage subsystems or storage pools associated with it belong to more than one capacity pool. Following are associated capacity pools: param2	641
BPCUI0171W Optimization cannot be done in place to the storage entity param1 since storage subsystems or storage pools associated with it are not part of any capacity pool.	641
BPCUI0172E The operation timed out while waiting for a response from the server.	642
BPCUI0173E File file does not exist or is empty.	642
BPCUI0174E The device does not support the credential mechanism used.	642
BPCUI0175E A required parameter is missing.	642
BPCUI0176E The highlighted field contains an invalid value.	643
BPCUI0177E The highlighted field contains a value that is outside of the allowed range. The value must be between minVal and maxVal.	643
BPCUI0178E A service class with the same name and type already exists.	643
BPCUI0179I The service class was created.	643
BPCUI0180I Based on the known configuration of storage system host connections, fabric zone aliases, and HBA ports, additional ports may have been added to the selection below.	644
BPCUI0181I You selected to add a expectedDevice resource, but a foundDevice resource was detected and will be added.	644
BPCUI0182I The data source data_Source_Address was added as a data source for monitoring. No new resources were detected	644
BPCUI0183E The text in the highlighted field exceeds the maxLength character limit.	644
BPCUI0185W Unable to lookup the IP Address for Host Name hostName. Enter the IP Address manually.	645
BPCUI0189I Configuration of SRA deployment and probe schedules were done successfully.	645

BPCUI0190W Configuration of SRA finished with some warnings or errors. Check the detail messages.	645
BPCUI0191E An internal error occurred while testing conneciton to param1.	645
BPCUI0192E The supplied service class type is invalid.	646
BPCUI0193E The specified SMI-S provider was not found. Make sure that the protocol, SMI-S provider host name or IP address, and port are specified correctly and that the SMI-S provider is properly configured at that location.	646
BPCUI0194E An unknown error has occurred. Please review all values entered.	646
BPCUI0195E The Interop Namespace is not correct. Please correct this entry.	646
BPCUI0196E A timeout occured while processing the request. Please retry request.	646
BPCUI0197E A connection was not established. Make sure that the protocol, SMI-S provider host name or IP address, and port are specified correctly.	647
BPCUI0198E The authentication to the SMI-S provider failed.	647
BPCUI0199E An SSLHandshakeException or SSLProtocolException has occurred. This exception might be due to an invalid SLP registration, e.g. 'http' instead of 'https'.	647
BPCUI0201E There is a pending delete in process for this SMI-S provider.	647
BPCUI0202I Success	647
BPCUI0203E The selected resources were not removed.	647
BPCUI0204W successfulDeletes of attemptedDeletes of the selected resources were removed.	648
BPCUI0205W successfulDeletes selected resources were removed, however warnings did occur.	648
BPCUI0209E A database operation cannot be completed.	648
BPCUI0210I Device param1 supports performance monitoring.	649
BPCUI0211E No performance data is available for a resource.	649
BPCUI0212E There is no Secure Shell running at this host/IP.	649
BPCUI0213E Unsupported Secure Shell protocol was used.	649
BPCUI0214E Invalid public key location for subsystem param1.	649
BPCUI0215E Invalid public key format for subsystem param1.	650
BPCUI0216E Passphrase was incorrect for subsystem param1.	650
BPCUI0217E Unable to transfer the key(s) to the server param1.	650
BPCUI0218E The specified private key file format is not supported. Please convert it to Open SSH (.pem) key file format for subsystem param1.	650
BPCUI0219E The specified key file or key file name is already linked to another user.	650
BPCUI0220E The IP address that was entered was the address of the management console for the storage system. You must enter the valid IP address of the block component of the storage system.	651
BPCUI0221E The IP address you entered is the address of another device's management console.	651
BPCUI0222E The IP address you entered points to a device of another type.	651
BPCUI0223E Passphrase is required. Specify one for subsystem param1.	651
BPCUI0224E Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: http://www.ibm.com/support/docview.wss?uid=swg21976237	652
BPCUI0225I The agent log files for server_Name have been collected and copied to log_Location.	652
BPCUI0226I Discovery of data_source is taking longer than expected. Click Close to run the discovery in the background.	652
BPCUI0227E Thin provisioning must be enabled when compression is enabled.	652
BPCUI0229I 1 resource was added to name.	653
BPCUI0231I count resources were added to name.	653
BPCUI0233E The specified host name is already associated with an existing server.	653
BPCUI0234E The specified IP address is already associated with an existing server.	653
BPCUI0235E The specified host name and IP address are already associated with an existing server.	654
BPCUI0236E The disabling of the agents failed.	654
BPCUI0237E Errors occurred when attempting to disable some of the agents.	654
BPCUI0238W Warnings occurred when attempting to disable warningCount of the agents.	654
BPCUI0239I attemptedCount of the selectedCount selected agents were disabled.	654
BPCUI0240E The agents were not enabled.	655
BPCUI0241E Errors occurred when attempting to enable some of the agents.	655
BPCUI0242W Warnings occurred when attempting to enable warningCount of the agents.	655
BPCUI0243I attemptedCount of the selectedCount selected agents were enabled.	655
BPCUI0244I The credentials of an agent were updated.	656
BPCUI0245I The credentials of updateCount agents were updated.	656
BPCUI0246E Cannot authenticate to the file module with the provided user credentials.	656
BPCUI0247E Unknown file module key user.	656
BPCUI0248E The SSH key could not be loaded for the following reason: IOException message	657
BPCUI0249E Passphrase is incorrect.	657

BPCUI0250E Passphrase is required.	657
BPCUI0251E Cannot connect to the storage system or cluster.	657
BPCUI0252E The host name or IP address {0} is not valid.	657
BPCUI0253E Cannot connect to the data source for the resource with the address ip_address.	658
BPCUI0254E Invalid private key location.	658
BPCUI0255W The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?	658
BPCUI0256W The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?	658
BPCUI0257W The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?	658
BPCUI0258W The following internal resources of a storage system you are attempting to add are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?	659
BPCUI0259W The following storage systems and storage-system internal resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?	659
BPCUI0260E The specified private key file format for the file module is not supported. Please convert it to Open SSH (.pem) key file.	659
BPCUI0261E The service class was not found in the database.	659
BPCUI0262E The capacity pool was not found in the database.	660
BPCUI0263E The scheduling of the agent upgrade jobs failed.	660
BPCUI0264E Errors occurred when attempting to schedule the upgrade jobs of some of the agents.	660
BPCUI0265W Warnings occurred when scheduling the upgrade of warningCount of the agents.	660
BPCUI0266I attemptedCount of the selected agents were scheduled for upgrade.	661
BPCUI0267I The upgrade agent job was successfully scheduled for hostName.	661
BPCUI0268W Deleting a capacity pool does not affect any volumes or shares that were provisioned from the capacity pool. However, the volumes or shares are no longer associated with the capacity pool. Associations with the following volumes or shares will be removed:	661
BPCUI0269W The following volumes are associated with the service class scName. When the volumes were created, they satisfied the requirements of the service class. If you modify the service class, the volumes are still associated with the service class, but might not satisfy the new requirements of the service class. Depending on your changes to the service class, users might incorrectly assume that the volumes have properties that they do not possess.	661
BPCUI0270W The following shares are associated with the service class scName. When the shares were created, they satisfied the requirements of the service class. If you modify the service class, the shares are still associated with the service class, but might not satisfy the new requirements of the service class. Depending on your changes to the service class, users might incorrectly assume that the shares have properties that they do not possess.	662
BPCUI0271W The following volumes are associated with the service class scName. If you delete the service class, the volumes are no longer associated with any service class.	662
BPCUI0272W The following shares are associated with the service class scName. If you delete the service class, the shares are no longer associated with any service class.	662
BPCUI0273E The action does not support the specified type of device.	662
BPCUI0274I The connection test to resource data_Source_Name was successful.	662
BPCUI0275I To collect data about zoning or complete zoning actions during provisioning, you must deploy Storage Resource agents to one or more servers that are on the fabric.	663
BPCUI0276I Agent agentName was disabled.	663
BPCUI0277I Agent agentName was enabled.	663
BPCUI0278I The credentials for agentName were updated.	663
BPCUI0279I There is no job defined for the device Name. Please create a job first before running it again.	664
BPCUI0280I No switches are managed by the data_Source_Address data source.	664
BPCUI0282I The resources that are managed by data_Source_Address are already known. One or more resources were added.	664
BPCUI0284I No fabrics are managed by the data_Source_Address data source.	664
BPCUI0286I The fabrics that are managed by data_Source_Address are already being monitored.	665
BPCUI0289W The following network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these NSDs to a different capacity pool?	665
BPCUI0290W The following file systems and network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?	665
BPCUI0291W The following network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these NSDs to a different capacity pool?	665
BPCUI0292E The host name or IP address ip_address_or_hostname cannot be reached.	666
BPCUI0293I A probe is started for deviceName.	666
BPCUI0294I A performance monitor is started for deviceName.	666
BPCUI0295I The performance monitor is stopped for deviceName.	666

BPCUI0297W One resource was added to capacity_pool_name. One resource could not be added because it could not be found.	667
BPCUI0298W count resources were added to capacity_pool_name. One resource could not be added because it could not be found.	667
BPCUI0299W One resource was added to capacity_pool_name. count_Not_Found resources could not be added because they could not be found.	667
BPCUI0300W count resources were added to capacity_pool_name. count_Not_Found resources could not be added because they could not be found.	667
BPCUI0301E Failed to assign the role name role.	668
BPCUI0302E Failed to retrieve the existing role assignments.	668
BPCUI0303E Failed to remove all role assignments from the specified groups.	668
BPCUI0304W An error occurred when saving the user-defined properties of the resourcesType.	668
BPCUI0305E A capacity pool with the same name already exists.	668
BPCUI0306W The selected resource was removed, however warnings did occur.	669
BPCUI0307E The schedule could not be deleted.	669
BPCUI0308I The resource does not have a connection configured. To add a connection to the resource, click Add Storage System	669
BPCUI0309I A probe schedule is defined for deviceName.	669
BPCUI0310I A performance monitor schedule is defined for deviceName.	670
BPCUI0311I Probe and performance monitor schedules are defined for deviceName.	670
BPCUI0312I SNMP Discovery of switches is taking longer than expected. Click Close to run the discovery in the background.	670
BPCUI0313I An upgrade is started for server deviceName.	670
BPCUI0314E Failed to retrieve the list of user groups from the WebSphere user repository.	670
BPCUI0315E Failed to retrieve the list of user groups from user repository due to an invalid search string.	670
BPCUI0316W Failed to update the role cache maintained by the Device server.	671
BPCUI0317E Access can not be removed, because at least one Administrator user must remain in the system.	671
BPCUI0318E The group mapping can not be modified, because at least one Administrator user must remain in the system.	671
BPCUI0319I A task is started for resource resourceName.	671
BPCUI0320I Probe and performance monitor schedules are defined for deviceName. A performance monitor is scheduled to collect performance data after the probe is done.	672
BPCUI0321I A task is paused for resource resourceName.	672
BPCUI0322E A task could not be paused for resource resourceName.	672
BPCUI0323I A task is resumed for resource resourceName.	672
BPCUI0324E A task could not be resumed for resource resourceName.	672
BPCUI0325E Failed to retrieve the list of users from the WebSphere user repository.	672
BPCUI0326E Failed to retrieve the list of users from user repository due to an invalid search string.	673
BPCUI0327E Failed to get the roles associated with the current user.	673
BPCUI0328I A task is saved.	673
BPCUI0329I A task was successfully deleted.	673
BPCUI0330E The user user is not authorized to access the product.	673
BPCUI0331I A task is cancelled for resource resourceName.	674
BPCUI0332E An unexpected error occurred. The task for schedule schedule name could not be paused or resumed.	674
BPCUI0333E An unexpected error occurred. The task for schedule schedule name could not be be paused.	674
BPCUI0334E An unexpected error occurred. The task for schedule schedule name could not be resumed.	674
BPCUI0335E The volumes cannot be converted or moved because the target pools do not have sufficient available space.	674
BPCUI0336I The ability to provision with block storage devices is only available with the advanced license.	675
BPCUI0338E Insufficient user privileges to service the REST request.	675
BPCUI0339E An unexpected error occurred while authorizing the REST request.	675
BPCUI0340I A task was successfully renamed.	675
BPCUI0341E The task could not be renamed.	675
BPCUI0342E The task could not be renamed because the specified name already exists.	676
BPCUI0343I Performance monitoring is unavailable for resource resource name because the resource was not probed.	676
BPCUI0344W The following service classes allow provisioning only from the capacity pool capacity pool: service classes. If you delete this capacity pool, the service classes will allow provisioning from any available storage.	676
BPCUI0346I The Storage Resource agent that is deployed on the server cannot be uninstalled.	677
BPCUI0347I All servers were removed except for the product server. Entries for the product server resources might still be displayed in the GUI until all the associated removals are complete.	677
BPCUI0348W You cannot provision volumes because at least one of the selected hosts was not found in the database. Ensure that all hosts that are selected for provisioning are being monitored.	677
BPCUI0349W You cannot provision volumes because not all of the selected hosts appear to have Fibre Channel connectivity.	677
BPCUI0350W You cannot provision volumes because the hypervisors that host the virtual machines use different operating systems.	678

BPCUI0351W You cannot provision volumes because there is no Fibre Channel host port information for at least one hypervisor.	678
BPCUI0352W You cannot provision volumes because not all of the hypervisors that host the virtual machines appear to have Fibre Channel connectivity.	678
BPCUI0355W You cannot provision volumes because no block-storage service class exists.	679
BPCUI0356W You cannot provision shares because no file-storage service class exists.	679
BPCUI0357W You cannot provision volumes because you do not have permission to provision by using any block-storage service class.	679
BPCUI0358W You cannot provision shares because you do not have permission to provision by using any file-storage service class.	679
BPCUI0359E The credentials for the servers were not updated.	680
BPCUI0360W The credentials for successfulUpdates of attemptedUpdates of the selected servers were updated.	680
BPCUI0361W The credentials for the selected server was updated, however warnings did occur.	680
BPCUI0362W The credentials for successfulUpdates selected servers were updated, however warnings did occur.	680
BPCUI0363E Cannot connect to the SNMP data source IP_Address.	681
BPCUI0364I The performance monitor schedule was updated for deviceName.	681
BPCUI0366W The server serverName was not updated because it does not support the action.	681
BPCUI0367W You cannot provision volumes to virtual machines with NPIV ports and virtual machines without NPIV ports at the same time. To provision volumes to virtual machines, ensure that you select either only virtual machines with NPIV ports or only virtual machines without NPIV ports.	681
BPCUI0368W You cannot provision volumes because none of the selected hosts appear to have Fibre Channel connectivity and the automatic zoning option is enabled. Disable the automatic zoning option in your zoning policy.	682
BPCUI0369W You cannot provision volumes because none of the hypervisors that manage the selected virtual machines appear to have Fibre Channel connectivity and the automatic zoning option is enabled. Disable the automatic zoning option in your zoning policy.	682
BPCUI0370E The display name displayName is already assigned to resource resource Name.	682
BPCUI0372I The selected hosts do not appear to have Fibre Channel connectivity. In the resulting provisioning task, ensure that the recommended storage system is connected to the hosts before you run the task. Also, be aware that all fabric-related options will be ignored.	683
BPCUI373I Volumes are assigned to the hypervisors that host virtual machines. Volumes are not assigned directly to virtual machines that do not have NPIV ports. None of the hypervisors that manage the virtual machines appear to have Fibre Channel connectivity. In the resulting provisioning task, ensure that the recommended storage system is connected to the hypervisors before you run the task. Also, be aware that all fabric-related options will be ignored.	683
BPCUI0374E Schedule is not enabled for the resource resource.	684
BPCUI0375E Performance data is not available.	684
BPCUI0376E Invalid number of days to keep configuration history. The number should be between minimum value and maximum value.	684
BPCUI0377E Invalid number of days to keep data for removed resources. The number should be between minimum value and maximum value.	684
BPCUI0378E Invalid number of days to keep sample performance data. The number should be between minimum value and maximum value.	685
BPCUI0379E Invalid number of days to keep hourly performance data. The number should be between minimum value and maximum value.	685
BPCUI0380E Invalid number of days to keep daily performance data. The number should be between minimum value and maximum value.	685
BPCUI0381E Failed to update the performance data retention settings.	685
BPCUI0382E Performance monitoring is unavailable for resource resource name.	686
BPCUI0383E Failed to update the history retention settings.	686
BPCUI0384E Failed to retrieve the history retention settings.	686
BPCUI0385E Invalid number of runs to keep log files for each schedule. The number should be between minimum value and maximum value.	687
BPCUI0386E A job cannot be run for resource resourceName because there is a job already running for the resource. Wait for the job to finish and try again.	687
BPCUI0387I The selected resources support different performance monitor intervals. If you select multiple resources, intervals that are common to all resources are displayed in the interval list.	687
BPCUI0388E The probe schedule cannot be created for resource {0} because not all the information was provided. If you are configuring a probe for a resource for the first time, you must enter values for the probe status, time, and frequency fields.	688
BPCUI0389E The performance monitor schedule cannot be created because not all the information was provided. If you are configuring a performance monitor for a resource for the first time, you must enter values for the performance monitor status and interval fields.	688
BPCUI0390I The service logs were successfully created.	688
BPCUI0391I The connection test to data source data source was successful. A probe is running. The health status is unknown until the probe is finished.	688
BPCUI0392I The connection test to the data source data source was successful.	689

BPCUI0393E The user user_name does not have sufficient privileges to deploy the vSphere Web Client extension.	689
BPCUI0394E The user user_name does not have permission to log in to the vCenter Server system.	689
BPCUI0395E This version of the vCenter Server server_name does not support the deployment of the vSphere Web Client extension for the product.	690
BPCUI0396E The user user_ID does not have the required role. The role associated with this user must be Administrator, Monitor, or External Application.	690
BPCUI0397E The vCenter Server user name or password is invalid.	690
BPCUI0398E The user name or password is invalid.	690
BPCUI0399I The server was started.	691
BPCUI0400E Failed to retrieve the system management information from the Data server.	691
BPCUI0402E Failed to retrieve the server status of the Data server.	691
BPCUI0403E The SMI-S provider service is not available.	691
BPCUI0404E An error occurred while updating the trace log configuration file. The original file file was deleted and could not be restored. A backup of this file may be available at backup file.	691
BPCUI0405E Failed to set the trace settings from the Data server.	692
BPCUI0406E Cannot start the server. The start script reported the following error: error	692
BPCUI0407E Cannot start the server. Unable to locate the start script path to script.	692
BPCUI0408E Cannot start the server. Unable to execute the start script path to script.	692
BPCUI0409W The server is taking a long time to start. If the server status continues to show an error status after a reasonable interval, try to start the server again.	693
BPCUI0410E Cannot stop the server. The stop script reported the following error: error	693
BPCUI0411W The server is taking a long time to stop. If the server status continues to show that it is still running try to stop the server again after a reasonable interval.	693
BPCUI0412E Cannot stop the server. Unable to locate the stop script path to script.	694
BPCUI0413E Cannot stop the server. Unable to execute the stop script path to script.	694
BPCUI0414W It is taking a long time for the services to start. If the server status continues to show an error status after a reasonable interval, try to start the services again. If the problem persists then restart the server.	694
BPCUI0415E Failed to start the service service name.	694
BPCUI0416I The server was stopped.	694
BPCUI0417I The services of the server were started.	695
BPCUI0418E The action cannot be completed because the data source that is managing this resource cannot be reached.	695
BPCUI0419E A Storage Resource agent is already deployed for this server and has a status of Pending deployment or Failed deployment. Use the Servers page to resolve the deployment errors or modify the deployment schedule.	695
BPCUI0420E A file access error occurred when the system attempted to back up or modify the tracing configuration file configuration file.	696
BPCUI0421E There is a log collection operation already running. A new one cannot be submitted until the current one completes	696
BPCUI0422E Cannot start the log collecting job. Unable to locate the required script path to script.	696
BPCUI0423E Cannot start the log collecting job. Unable to run the log collection script path_to_script.	696
BPCUI0424E Storage cannot be provisioned from capacity pool capacity pool using service class service class for the following reason:	697
BPCUI0425W The task task name cannot be scheduled because it is already running.	697
BPCUI0426E Storage cannot be provisioned by using service class service class for the following reason:	697
BPCUI0427W The selected group action is complete for all tasks, but warnings were reported.	697
BPCUI0428I The selected group action is complete for all tasks. Some informational messages were returned.	698
BPCUI0429E The validation process cannot contact the server. The server might be down or unreachable due to network problems.	698
BPCUI0430I Some tasks were not deleted because they were already run.	698
BPCUI0431E Failed to retrieve the list of managed devices.	698
BPCUI0432E Failed to retrieve the performance monitoring granularity from the Device server. Check the connection to the Device server and retry the operation.	699
BPCUI0433E OS type osType specified on line line of file file is not valid.	699
BPCUI0434E Data source data_Source_Key could not be found.	699
BPCUI0435E Required host name or IP address and OS type were not specified on line line of file file.	699
BPCUI0436E The alert notification settings cannot be displayed.	700
BPCUI0437E The alert notification settings cannot be saved.	700
BPCUI0438E File file does not exist or is empty.	700
BPCUI0439E The file file could not be uploaded.	700
BPCUI0440E The text location specified on line line of file file has invalid character(s): characters	701
BPCUI0441E The alert definitions cannot be displayed.	701
BPCUI0442E The alert definitions cannot be saved.	701

BPCUI0443E Select at least one managed server that is deployed for which alert notification settings need to be displayed.	701
BPCUI0444E Select at least one managed server that is deployed for which alert definitions need to be displayed.	702
BPCUI0445W The discovery job completed with errors. Some available devices were not discovered.	702
BPCUI0446E Unable to test the connection to the device because the request was not processed by the data collector.	702
BPCUI0447E Select at least one managed storage subsystem for which alert notification settings need to be displayed.	703
BPCUI0448E Select at least one managed storage subsystem for which alert definitions need to be displayed.	703
BPCUI0449E The user does not have the required authority to complete the task or command.	703
BPCUI0451E One or more applications from provided list: names do not exist.	703
BPCUI0452E entity name is not supporting data collection actions.	704
BPCUI0453E One or more departments from provided list: names do not exist.	704
BPCUI0455I No performance data is available for the selected resources.	704
BPCUI0456E You cannot complete the action because the service is temporarily unavailable.	704
BPCUI0457W The applications listOfApplications cannot be deleted because they contain subcomponents subcomponent, which cannot be moved up a level in the applications hierarchy due to name conflicts with existing applications in that higher level.	705
BPCUI0458W The departments listOfDepartments cannot be deleted because they contain subdepartments or applications subdepartment, which cannot be moved up a level in the departments hierarchy due to name conflicts with departments in that higher level.	705
BPCUI0459W The selected subcomponents cannot be removed from the application because they cannot be moved up a level in the application hierarchy due to name conflicts with the existing applications or subcomponents at the higher level.	705
BPCUI0460W The selected applications or subdepartments cannot be removed from the department because they cannot be moved up a level in the department hierarchy due to name conflicts with the existing applications or subdepartments at the higher level.	706
BPCUI0461W There are no task details to display. The analysis-execution task could not be run.	706
BPCUI0462E Failed to add the device because the data collector is not responding.	706
BPCUI0463E The discovery failed because the data collector is not responding.	707
BPCUI0464E The connection test failed because the data collector is not responding.	707
BPCUI0465E The requested action failed because the data collector is not responding.	707
BPCUI0466I The servers were created.	707
BPCUI0467W successCount of totalCount servers were created.	708
BPCUI0468E The creation of the servers failed.	708
BPCUI0469E Schedule job does not exist for entity name.	708
BPCUI0470E Invalid file file size of size GB. Maximum allowed file size is max size GB.	708
BPCUI0471E Failed to set the trace settings from the Alert server.	708
BPCUI0472E Failed to retrieve the system management information from the Alert server.	709
BPCUI0474E Failed to retrieve the server status of the Alert server.	709
BPCUI0475I The volumes have been excluded from the reclamation analysis.	709
BPCUI0476I The volumes will be included in future analyses to reclaim storage.	709
BPCUI0477E An unexpected error occurred when modifying the optimization characteristics of the volumes.	710
BPCUI0478E The scheduled agent upgrade time is in the past.	710
BPCUI0479E The object storage credentials are incorrect. Enter the correct credentials. Alternatively, clear the object credentials check box and do not specify the authentication credentials for object storage now. You can use the Modify Connection action to add the object storage later.	710
BPCUI0480E An object storage request failed on the GPFS cluster.	711
BPCUI0481W No resources were removed.	711
BPCUI0482E No resources were updated.	711
BPCUI0483E The connection information cannot be updated because it points to another device.	711
BPCUI0484I The connection information for device name was updated.	712
BPCUI0485E The connection information cannot be updated.	712
BPCUI0486E Cannot query the object service for information about accounts and containers as the specified user does not have admin privileges.	712
BPCUI0487I The connection information of the selected device was successfully updated. Other devices were detected as being managed by the same data source. Would you like to update the connection information of all of them?	712
BPCUI0488I The connection information of all devices connecting through this data source was updated.	713
BPCUI0489W Some of the devices connecting through this data source failed to be updated.	713
BPCUI0490I The vCenter vCenter Server was removed.	713
BPCUI0491E The vCenter vCenter Server was not found in the database.	713
BPCUI0492E The selected vCenter Servers were not found in the database.	714
BPCUI0493I The vCenter vCenter Server and all number of monitored hypervisors monitored by it were successfully removed.	714

BPCUI0494I	The number of vCenters selected vCenter Servers and all number of monitored hypervisors monitored by them were successfully removed.	714
BPCUI0495W	Only number of removed vCenters or number of selected vCenters of the selected vCenter Servers and number of removed monitored hypervisors or number of monitored hypervisors of the hypervisors monitored by them were successfully removed.	714
BPCUI0496I	The following fabrics were detected as being managed by the same data source: comma separated fabrics list. This action applies to all fabrics that are managed by the current data source. Would you like to update the connection information of all of them?	715
BPCUI0497E	The following fabrics cannot be monitored through the SMI agent: comma separated fabrics list. The data source connection information will not be updated.	715
BPCUI0498E	The fabric cannot be monitored through the SMI agent.	716
BPCUI0499I	Other switches were detected as being managed by the same data source. This action applies to all switches that are managed by the current data source. Would you like to update the connection information of all of them?	716
BPCUI0500E	One or more switches cannot be monitored through the SMI agent. The data source connection information will not be updated.	716
BPCUI0501E	The information cannot be displayed. Log out of the GUI, log in, and try the action again.	716
BPCUI0502E	The device is already managed by this data source. The data source connection information will not be updated.	717
BPCUI0503I	The connection information of the selected switches was updated.	717
BPCUI0504I	The detected versions of the resources discovered on the data source data_Source_Address are unsupported.	717
BPCUI0505E	The resource does not have a connection configured.	718
BPCUI0506E	Cannot connect to the Alert server.	718
BPCUI0507E	The version of the tpc_server IBM Spectrum Control Server is not supported.	718
BPCUI0508E	Cannot connect to the rollup server rollup_server on port host_port.	718
BPCUI0509E	Cannot authenticate with the rollup server using the provided credentials.	719
BPCUI0510E	You entered an invalid time range. The start date and time must be before the end date and time.	719
BPCUI0511E	The following alert name(s) are not unique: names.	719
BPCUI0512E	Custom alerts already exist for other resources with the following alert name(s): names.	719
BPCUI0513E	Unable to connect from rollup server rollup_server to the repository database.	720
BPCUI0514E	The specified subordinate server subordinate_server is the master server.	720
BPCUI0515E	The duration of the automated probe run window must be at least minimum_hours hours.	720
BPCUI0516W	The selected subgroups cannot be removed from the general group because they cannot be moved up a level in the groups hierarchy due to name conflicts with the general groups at the higher level.	720
BPCUI0519E	Authorization has failed because the private key is not valid for the user name that you have specified.	721
BPCUI0520E	The IP address ip_address for the FlashSystem storage system is not the management IP address.	721
BPCUI0521E	The configuration for the report can't be saved.	721
BPCUI0522E	Failed to delete a report configuration.	722
BPCUI0523E	Alerts cannot be defined for this storage system.	722
BPCUI0524E	The changes to the report configuration can't be saved.	722
BPCUI0525E	The configuration for the report can't be saved because the report title isn't unique.	722
BPCUI0527E	The action cannot be completed because of an invalid request.	723
BPCUI0528E	The action cannot be completed because of an invalid file upload request.	723
BPCUI0526I	The connection test to data source data_source was successful. A probe is running.	723
BPCUI0529I	The data source data_Source_Address is already being managed as a data source for monitoring. No new resources were detected.	723
BPCUI0530I	The data source data_Source_Address is already being managed as a data source for monitoring. The following new resources were detected:	724
BPCUI0531E	The action cannot be completed because LDAP registry file failed to upload.	724
BPCUI0532E	The action failed because of a missing resource.	724
BPCUI0533E	The LDAP configuration test failed.	724
BPCUI0534E	There was an error executing the collect log process. If this problem persists, you can try collecting and uploading the service logs manually. Learn More.	725
BPCUI0535E	An FTP connection can not be established. If your organization requires the use of a proxy server, consult the following documentation: Troubleshooting FTP Transfers.	725
BPCUI0536E	The support data collection failed due to an invalid PMR number format.	725
BPCUI0537E	The support package could not be created because file system permissions prevent the creation of temporary files.	725
BPCUI0538E	The support data collection completed creating a support package, but the package could not be uploaded to IBM.	726
BPCUI0539E	The support data collection failed with an internal error	726
BPCUI0540E	The support data collection failed due to an invalid email address format.	726
BPCUI0541E	The specified SMI agent was not found. Make sure that the protocol, SMI agent host name or IP address, and port are specified correctly and that the SMI agent is properly configured at that location.	727

BPCUI0542E A connection was not established. Make sure that the protocol, SMI agent host name or IP address, and port are specified correctly.	727
BPCUI0543E The authentication to the SMI agent failed.	727
BPCUI0544E There is a pending delete in process for this SMI agent.	727
BPCUI0545E The SMI agent service is not available.	727
BPCUI0546E The action cannot be completed because the LDAP registry file could not be updated.	727
BPCUI0547E Connection failed. The server might be down or unreachable due to network problems.	728
BPCUI0548E The add SSL certificate action failed.	728
BPCUI0549E The add SSL certificate action failed because of a wrong password.	728
BPCUI0550E The specified storage resource is not valid for the REST API service request.	728
BPCUI0551E The file cannot be used because it is not a valid SSL certificate. Select a valid certificate file and try again.	729
BPCUI0554E The SSL certificate download process failed.	729
BPCUI0555E The test connection to the LDAP server failed. Verify that your XML file contains the correct syntax and values and that the LDAP server is running.	729
BPCUI0556E An unexpected error occurred creating or updating a support ticket.	729
BPCUI0557E An invalid request was made when creating or updating a support ticket.	730
BPCUI0558E This tier name is already in use. Enter a different name.	730
BPCUI0559E The custom dashboard was removed by another user. Cancel the action and refresh the page manually.	730
BPCUI0600W Can't save the scheduling information for the report because the Data server is offline.	730
BPCUI0601I The resource does not have a connection configured. To add a connection to the resource, click Add Switch or Add Fabric.	731
BPCUI0602E The osAuthentication script does not start. The script reported the following error: script_error.	731
BPCUI0603E The connection test to data source data source was not successful.	731
BPCUI0604E Can't stop data collection for entity name.	731
BPCUI0605E Can't restart data collection for entity name.	732
BPCUI0606E The action cannot be completed because there was a failure to create or write into the pending configuration file.	732
BPCUI0607E The action cannot be completed because there was a failure to read the pending LDAP registry file.	732
BPCUI0608E The action cannot be completed because there was a failure to get the list of LDAP groups.	732
BPCUI0609E The Local OS authentication configuration test failed.	733
BTADS/BTAFM/BTAVM/HWN - Job logging messages	733
BTADS0001I Starting Discover Process value , with Device Server RUN ID value , and Job ID value .	754
BTADS0001I Discover Process with Device Server run ID value and job ID value is complete.	754
BTADS0002I Starting Child Discover Process value with Job ID= value .	755
BTADS0003I The Child Discover Process with Job ID value has completed with Status= value and Return Code= value .	755
BTADS0004W The child discovery request with job ID job_id completed with status status_number and return code value.	755
BTADS0005E The child discovery request with job ID job_id completed with status status_number and return code value.	755
BTADS0010I Invoking outband scanner value on agent value .	756
BTADS0011I Outband scanner value on agent value completed successfully.	756
BTADS0012E Outband Scanner value on agent value failed with return code value .	756
BTADS0019E An outband scanner failed to capture the scan data.	756
BTADS0020I Processing value data from agent value .	757
BTADS0021W Warning encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value .	757
BTADS0022E Exception encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value .	757
BTADS0023E Fatal error encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value .	757
BTADS0024E Error encountered processing scanner value data from agent value . value .	758
BTADS0025I Running job to discover SMI-S providers through Service Location Protocol: RUN ID= value , Job ID= value .	758
BTADS0026I Service Location Protocol has found value SMI-S providers.	758
BTADS0027E Error encountered by a Service Location Protocol job: RUN ID= value , and Job ID= value . value .	758
BTADS0028W The Device Server Job with RUN ID=: value , Job ID= value , Discover Request= value has been cancelled since it is long running.	759
BTADS0029I Scanner value data from agent value has not changed since last scan.	759
BTADS0030I Invoking inband Scanner value on agent value .	759
BTADS0031I Inband Scanner value on Agent value completed successfully.	759
BTADS0032E Inband Scanner value failed on agent value with Return Code value .	760
BTADS0033E Error invoking value on host value .	760
BTADS0034E Fatal error encountered while persisting the data for job: RUN ID= value , and Job ID= value . value .	760
BTADS0035E The execution of the job failed with: value .	760
BTADS0036I Found SNMP Target at value .	760
BTADS0037E Found SNMP Target at value but it is not persisted in the database. Will NOT perform discovery of information using the address.	761

BTADS0038I Starting scan of SNMP agents from value to value .	761
BTADS0039I Starting probe of detected agents.	761
BTADS0040I Processing of Scanner value data from Agent value completed successfully.	761
BTADS0041I Discover Process with Device Server RUN ID value and Job ID value completed successfully.	762
BTADS0042E Discover Process with Device Server RUN ID value and Job ID value failed with return code value .	762
BTADS0043I Invoking value scanner value on target value .	762
BTADS0044I value scanner value on target value completed succesfully.	762
BTADS0045E value Scanner value on target value failed with return code value .	763
BTADS0046I Processing value data from agent value .	763
BTADS0047W The value parser encountered a warning while parsing XML for job with RUN ID= value , and Job ID value . The return code from the parser job is value .	763
BTADS0048E The value parser encountered an exception while parsing XML from job with RUN ID= value , and Job ID= value .The return code from the parser is value .	763
BTADS0049E The value parser for Device Server job with RUN ID= value , and Job ID= value failed. The return code from the parser is value .	764
BTADS0050I Service Location Protocol has found SMI-S provider, value , at address value .	764
BTADS0051I Service Location Protocol has found SMI-S provider, value , at address value , which requires security information to be configured.	764
BTADS0052W Warning encountered while parsing value data from agent value. value.	764
BTADS0053E Exception encountered while parsing value data from agent value. value.	765
BTADS0054E Fatal error encountered while parsing value data from agent value. value.	765
BTADS0055E Outband Scanner value on agent value encountered the presence of a McData i10k. These devices do not report correctly via SNMP and can only be used with SMI-S provider.	765
BTADS0056E Errors in Topology XML generator.	765
BTADS0057E Errors occurred while resolving InterconnectElement and Port relationship.	766
BTADS0058E Errors in creating an entity.	766
BTADS0059E The outband agent target address IP address is not a Cisco device or is invalid.	766
BTADS0060E Outband Scanner value is not responding.	766
BTADS0062E Encountered SQL error value while persisting some data.	766
BTADS0063E The execution of the PM BSP invocation failed with: value .	767
BTADS0063W The performance data collection for the current device is not enabled.	767
BTADS0064I Starting scan of Storage Subsystems from value to value .	767
BTADS0065I Outband and inband agents for fabric(s) specified in probe are value	767
BTADS0066I Could not find scanners for agent value	768
BTADS0067I Agent value is configured for no SAN calls and so no scanners will be invoked for this particular agent	768
BTADS0068I Could not retrieve connection information for agent value. Will not be able to invoke scanners for this particular agent	768
BTADS0069I Added inband scanner job with id value discover request value for agent value.	768
BTADS0070I Agent value has not discovered any fabrics and will not be used during the probe.	769
BTADS0071I Invoked inband Scanner value on agent value .	769
BTADS0072I Successfully received response from agent for job value with request id value .	769
BTADS0073E Received error response from agent for job value with request id value. Return code is value.	769
BTADS0074E IP Scan Discovery was canceled due to a hung socket/thread detected. Partial result of the scan will be persisted.	770
BTADS0075E IP Scan Discovery was canceled due to a hung socket/thread detected.	770
BTADS0076I IP Scan Discovery has started for DS, XIV, and IBM SONAS subsystems.	770
BTADS0077I Scanning value out of value IP addresses.	770
BTADS0078I IP Scan Discovery has started for SVC subsystems.	770
BTADS0079I IP Scan Discovery for DS and XIV was done.	771
BTADS0080I IP Scan Discovery for SVC was done	771
BTADS0081I Inband Scanner value for agent address value is not required for probing switches and will not be used.	771
BTADS0082W A first run of a switch probe failed. Additional agents will be used.	771
BTADS0083I The available agents provide a subset of possible features for the probed switch: value	772
BTADS0084I There are no limitations for probing switch value based on the mix of agents that are configured.	772
BTADS0085W A problem was encountered when agent assignments were being determined for the probe. All available agents will be used to collect information about the switch.	772
BTADS0086I The following storage systems were discovered value	772
BTADS0087I IP Scan Discovery did not find any DS8000, SVC, XIV, and IBM SONAS storage systems in the given IP range.	773
BTADS0088I IP Scan Discovery finished.	773
BTADS0089E The Device server is not registered with agent manager. Scanners cannot be used for agent value. value.	773
BTADS0090E There are no agents currently available to probe switch value.	773
BTADS0091I Inband Scanner value for agent address value is currently not running and will not be used.	774

BTADS0092I Inband Scanner value for agent address value is currently disabled from performing fabric functions and will not be used.	774
BTADS0093I Inband Scanner value for agent address value is currently not reachable and will not be used.	774
BTADS0094W The probe for switch value has some limitations.	774
BTADS0095W For switch value some information will not be collected.	775
BTADS0096I The probe limitation can be overcome by configuring an SMI agent to manage fabric value.	775
BTADS0097I The probe limitation can be overcome by configuring SNMP agents to manage switches in fabric value.	775
BTADS0098I The probe limitation can be overcome by configuring a Storage Resource agent to manage fabric value.	776
BTADS0099W The following WWN is not recognized as belonging to a known vendor: value.	776
BTADS0100W Invalid relationships between switches and fabrics were identified. If possible, these relationships will be fixed automatically for the following switches: value.	776
BTADS0101W The discover process that has the Device server run ID value and job ID value completed with one or more warnings.	776
BTADS0102E The probe with the run ID value completed with errors.	777
BTADS0103E No data source is available to probe switch switch_name.	777
BTADS0104E A timeout occurred while processing the request. Try the request again.	777
BTADS0105E A response from the data collector was not received within the specified time.	778
BTADS0106E The requested action on agent agent_name did not complete because the data collector stopped or is not responding. The request failed with error code error_code.	778
BTADS0107W Outband Scanner outband_scanner_name on agent agent_name failed because of another transaction in progress on the switch.	778
BTADS0108E Outband Scanner outband_scanner_name on agent agent_name failed because unexpected data was returned by the switch. Check the trace file for more details.	778
BTADS0109I Outband Scanner outband_scanner_name on agent agent_name did not collect zoning data.	779
BTADS0110I Outband Scanner outband_scanner_name on agent agent_name did not pass write capabilities check.	779
BTADS0111E The probe was unable to collect some details of the switch.	779
BTADS0112E Error encountered while persisting some data. value	779
BTADS0113E Error encountered while processing a probe job. value	780
BTADS0114E The information cannot be saved to the database repository.	780
BTADS0115E The probe failed when collecting information about the resource. The data collector returned the following error status: value.	780
BTAFM0000I Operation op_name processed successfully.	780
BTAFM0100I Initializing Collection.	781
BTAFM0110I Querying the SMI-S provider.	781
BTAFM0113I Collecting for db_table, current_obj of num_objs.	781
BTAFM0114I Probing data for switch switch_name.	781
BTAFM0115I Probing data for port port_name.	782
BTAFM0150I Storing Information.	782
BTAFM0151I The db_table of current_obj num_objs stored.	782
BTAFM0200I Traversing fabric topology.	782
BTAFM0500I The IBM Spectrum Control Device Server service has started successfully.	782
BTAFM0501I The IBM Spectrum Control Device Server service was shut down successfully.	783
BTAFM0502I The IBM Spectrum Control Device Server service provides methods to collect, report and configure the fabric hardware.	783
BTAFM0505I The delete missing function has started.	783
BTAFM0506I The delete missing method was processed in milliseconds milliseconds.	783
BTAFM2000W Operation op_Name partially processed.	784
BTAFM2501W Unable to shut down Device Server Service smoothly.	784
BTAFM4000E Operation op_Name failed.	784
BTAFM4001E An internal error occurred.	784
BTAFM4002E Could not get requested information due to an internal error - errorMessage	784
BTAFM4100E Mandatory parameter parameter_Name is missing.	785
BTAFM4101E Invalid parameter parameter_name.	785
BTAFM4103E Entity entity_name was not found.	785
BTAFM4104E Attribute attribute_name was not found.	785
BTAFM4105E Computer computer_name was not found.	786
BTAFM4106E Fabric fabric_name was not found.	786
BTAFM4107E Switch switch_name was not found.	786
BTAFM4108E Port port_name was not found.	786
BTAFM4109E Zone set zoneset_name was not found.	786
BTAFM4110E Zone zone_name was not found.	787

BTAFM4111E Zone alias zone_alias_name was not found.	787
BTAFM4112E Zone member zone_member_name was not found.	787
BTAFM4113E Subsystem subsystem_name was not found.	787
BTAFM4114E Host Bus Adapter HBA_name was not found.	787
BTAFM4115E Node node_name was not found.	788
BTAFM4116E Link from port from_port_name to port to_port_name was not found.	788
BTAFM4117E Hub hub_name was not found.	788
BTAFM4118E Router router_name was not found.	788
BTAFM4119E Bridge bridge_name was not found.	789
BTAFM4120E LUN LUN_name was not found.	789
BTAFM4140E Agent Agent_name was not found.	789
BTAFM4141E Scanner scanner_name on agent agent_name was not found.	789
BTAFM4142W Agent agent_name was ignored because the switch switch_name was probed by agent agent1_name.	789
BTAFM4150E Indexed properties property_name don't match.	790
BTAFM4180E Agent to gather sensor and event data is not available for the switch switch_name.	790
BTAFM4200E Credentials not found.	790
BTAFM4300E The connection to the SMI agent for switch switch_name could not be made.	790
BTAFM4301E The invocation of CIM method method_name failed on SMI-S provider SMI-S provider name. The return code is return_code.	791
BTAFM4302E The invocation of CIM method method_name failed on SMI-S provider SMI-S provider name with the following exception text: exception_text.	791
BTAFM4303E Received unexpected values from SMI-S provider SMI-S provider name .	791
BTAFM4304E SMI agent SMI agent name can not contact switch switch_name.	791
BTAFM4305E The CIM method method_name is not supported on the switch switch_name.	792
BTAFM4306E Could not create connection to SMI-S provider SMI-S provider name . Reason: reason.	792
BTAFM4307E The username user_name or password is wrong on SMI-S provider SMI-S provider name.	792
BTAFM4308I Could not create connection to SMI-S provider SMI-S provider name . Reason: reason. An alternate SMI-S provider will be used.	792
BTAFM4501E No agent is available to configure the zoning on the fabric with ID fabric_name.	793
BTAFM4502E The fabric with ID fabric_name is currently locked by another client of IBM Spectrum Control.	793
BTAFM4503E A token for fabric fabric_name has expired for client client_name.	793
BTAFM4504E The transaction for fabric fabric_name has expired.	793
BTAFM4505E Another transaction is in progress for fabric fabric_name.	794
BTAFM4506E Zone set zoneset_name already exists.	794
BTAFM4507E Zone zone_name already exists.	794
BTAFM4508E Zone alias zone_alias_name already exists.	794
BTAFM4509E Zone member zone_member_name already exists.	794
BTAFM4510E Another job is in progress for fabric fabric_name.	795
BTAFM4550E The Device Server encountered an error accessing the database.	795
BTAFM4600E Unable to start the Device Server service.	795
BTAFM5000E Step failed after collecting Count of collected entities entities for switch switch where entities exist. Continuing with next step.	795
BTAFM5001E No set of fabrics or switches was defined for this probe.	796
BTAFM5002E The SMI agents SMIURL returned an error or can no longer contact the switches.	796
BTAFM5003E Requests to an SMI agent did not correctly collect a set of switches for fabric fabric identity.	796
BTAFM5004E No switch retrieved from the SMI agent for fabric fabric identity.	797
BTAFM5005E No switch found for fabric fabric identity.	797
BTAFM5006E No switch retrieved from database.	797
BTAFM5007E Failed to get CIM entity for fabric fabric_name.	797
BTAFM5008E Failed to get CIM entity for switch switch_name.	797
BTAFM5009E Failed to enumerate CIM entity Entity class name.	798
BTAFM5010E SMI-S provider is not available.	798
BTAFM5011E Failed to get blade for switch Switch name.	798
BTAFM5012E Failed to get physicalpackage for blade with slot number Blade slot name.	798
BTAFM5013E Blade serial number is NULL.	799
BTAFM5014E Step failed after collecting Count of collected entities entities for fabric fabric where entities exist. Continuing with next step.	799
BTAFM5015E Data source could not be retrieved from the IBM Spectrum Control database for fabric fabric where data source exists.	799
BTAFM5016E The selected data source could not be contacted for fabric fabric where data source exists.	799

BTAFM5017E Failed to get fabric for switch Switch name.	800
BTAFM5018E Failed to get CIM entity for port port_name.	800
BTAFM5019E Failed to get switch for port port_name.	800
BTAFM5020E Failed to get blade for port port_name.	800
BTAFM5021E Failed to get CIM entity for blade blade_name.	800
BTAFM5022E Failed to get switch for blade blade_name.	801
BTAFM5023E Failed to discover Fabric and Switch.	801
BTAFM5024E The data source for switch switch_name was not retrieved from the database repository.	801
BTAFM0600I Count of collected entities blades collected for switch switch where entities exist.	801
BTAFM0601I Starting collection of switch blades for switch switch identifier.	802
BTAFM0602I Collection of switch blades completed. Count of collected entities entities collected in total for switch switch identifier.	802
BTAFM0603I Starting collection of switch fcports for switch switch identifier.	802
BTAFM0604I Collection of switch fcports completed. count of collected entities entities collected in total for switch switch identifier.	802
BTAFM0605I Start probing switch entities switches.	803
BTAFM0606I Start topology probing for fabric fabric entity.	803
BTAFM0609I Count of entities fcports collected for switch switch where entities exist.	803
BTAFM0614I The probe task is to probe topology and zone. The probe algorithm is CIM association.	803
BTAFM0616I The probe policy involves discovering segmented or merged fabrics.	803
BTAFM0617I The probe policy doesn't involve discovering segmented or merged fabrics.	804
BTAFM0618I The probe task is to probe topology. The probe algorithm is CIM association.	804
BTAFM0620I Start zone probing for fabric fabric entity.	804
BTAFM0621I Starting collection of zone set for switch switch entity.	804
BTAFM0622I Starting collection of zone for switch switch entity.	805
BTAFM0623I Starting collection of zone alias for switch switch entity.	805
BTAFM0624I Starting collection of zone member from zone alias for switch switch entity.	805
BTAFM0625I Starting collection of zone member and zone alias from zone for switch switch entity.	805
BTAFM0626I Starting collection of zone member from zone for switch switch entity.	806
BTAFM0627I Starting collection of zone set for fabric fabric entity.	806
BTAFM0628I Count of collected entities zone sets collected.	806
BTAFM0629I Collection of zone set completed. Count of collected entities entities collected in total for fabric fabric entity.	806
BTAFM0630I Starting collection of zone for fabric fabric entity.	807
BTAFM0631I Count of collected entities zones collected.	807
BTAFM0632I Collection of zone completed. Count of collected entities entities collected in total for fabric fabric entity.	807
BTAFM0633I Starting collection of zone alias for fabric fabric entity.	807
BTAFM0634I Count of collected entities zone aliases collected.	807
BTAFM0635I Collection of zone alias completed. Count of collected entities entities collected in total for fabric fabric entity.	808
BTAFM0636I Starting collection of zone member from zone alias for fabric fabric entity.	808
BTAFM0637I Starting collection of zone member and zone alias from zone for fabric fabric entity.	808
BTAFM0638I Starting collection of zone member from zone for fabric fabric entity.	808
BTAFM0639I Collection of zone member completed. Count of collected entities entities collected in total for fabric fabric entity.	809
BTAFM0640I Zone probe will discover both active and inactive zone definitions at selected data source datasource name for zone probe.	809
BTAFM0641I Zone probe will discover only active zone sets at data source datasource name for zone probe.	809
BTAFM0654I The port is not switch port.	809
BTAFM0655I The switch profile doesn't support this switch switch_name. No further process to probe this switch.	810
BTAFM0656I Start enumerating entity of association between fabric and zone set at selected data source Url entity.	810
BTAFM0657I Start enumerating entity of association between fabric and zone at selected data source Url entity.	810
BTAFM0658I Start enumerating entity of association between fabric and zone alias at selected data source Url entity.	810
BTAFM0659I Start enumerating entity of association between switch and zone set at selected data source Url entity.	811
BTAFM0660I Start enumerating entity of association between switch and zone at selected data source Url entity.	811
BTAFM0661I Start enumerating entity of association between switch and zone alias at selected data source Url entity.	811
BTAFM0662I Start enumerating associations between virtual fabric and zoning entities at selected data source Url entity.	811
BTAFM0663I Starting collection of switch control processor blades for switch switch identifier.	812
BTAFM0664I Count of collected entities control processor blades collected for switch switch where entities exist.	812
BTAFM0665I Collection of switch control processor blades completed. Count of collected entities entities collected in total for switch switch identifier.	812
BTAFM0666I Checksums for the active and defined Zone Database could not be updated for fabric entity.	812
BTAFM0667E Job id or request id is missing for a SRA job that is been processed.	813

BTAFM0668E Command and/or job timestamp is missing for job id with request id .	813
BTAFM0669I job id with request id was is not found. Device server may have been restarted after job was created.	813
BTAFM0670E could not retrieve output file for job id with request id .	813
BTAFM0671E Another probe of fabric The Name+Nameformat of the fabric is already in progress.	814
BTAFM0672E Device server is not registered with agent manager. Will not be able to invoke scanner on host .	814
BTAFM0673E There are no agents that are currently available to probe fabric .	814
BTAFM0674W No fabric found for event source that is associated with switch with IP address .	814
BTAFM0675E Unable to start parsing of SRA fabric probe data for SRA job id request id file name .	815
BTAFM0676E Error parsing SRA fabric probe data for SRA job id request id file name .	815
BTAFM0677E Unable to connect to SNMP port (another application may already be connected and forwarding messages).	815
BTAFM0678I The Name of the switch switch was removed.	815
BTAFM0679I The The Name+Nameformat of the fabric fabric was removed.	816
BTAFM0680E The Name of the switch switch was not removed because it is not missing.	816
BTAFM0681E The The Name+Nameformat of the fabric fabric was not removed because it is not missing.	816
BTAFM0682E An error occurred while checking for access to the database to save new zoning information for fabric to the database.	816
BTAFM0683E Unable to access the database to save zoning information for fabric . Another job is currently saving new zoning information to the database for the same fabric.	817
BTAFM0684I The job is waiting to access the database to save new zoning information for fabric . Another job is currently saving zoning information to the database for the same fabric.	817
BTAFM0685W Host/IP Address is not a switch.	817
BTAFM0686W Switch is not a supported switch.	817
BTAFM0687W The switch does not respond to SNMP queries.	818
BTAFM0688W Cannot communicate with host or IP address .	818
BTAFM0689W No ports were discovered for the switch .	818
BTAFM0690I Collection of data from trunks is completed. Data was collected from count of collected entities trunks.	818
BTAFM0691I Starting collection of data from trunks for switch switch identifier.	819
BTAFM0692I Count of entities trunks collected for switch switch where entities exist.	819
BTAFM0692E A response from the data collector was not received within the specified time.	819
BTAFM0693E A response from the data collector was not received. The request failed with return code return_code	819
BTAFM0694W Zoning data cannot be collected because there is a transaction in progress on the switch key	820
BTAFM0695E The switch key is returning unexpected data.	820
BTAFM0696E Zone set zoneset_name is already active.	820
BTAFM0697E Zone set zoneset_name is already inactive.	820
BTAFM0698E On the switch switch_name VSAN vsan_name was not found.	820
BTAFM0699E The switch key did not return zoning data.	821
BTAFM0700E Duplicate entries for the same switch: switch.	821
BTAFM0701E Current active full zone configuration is not synchronized with the zone configuration on the switch switch_name for VSAN vsan_name .	821
BTAFM0702E You cannot monitor Brocade Access Gateway switches without Network Advisor.	821
BTAFM0703I Waiting for probes of other Access Gateway switches to complete.	822
BTAFM0704W Distributing zone configuration across all the switches for VSAN vsan_name did not succeed on the switch switch_name .	822
BTAFM0705W Zone data collection after zone changes were made failed on the switch switch_name .	822
BTAFM0706E The fabric probe was unable to collect some details of the blades on the switches.	823
BTAFM0707I You cannot use IBM Spectrum Control to make zoning changes for provisioning on switch switch_name.	823
BTAFM0708E The probe was unable to collect some details of the switches.	823
BTAQE1107E InbandScanHandler failed to start InbandScanner scanner name on managed host target.	824
BTAQE1108E InbandScanHandler failed to get callback information for InbandScanner scanner name on managed host target.	824
BTAQE1112E During an outband scan, the scanner scanner name was unable to identify the target host target.	824
BTAQE1113E Unable to invoke an Outband scan scanner name on target target.	824
BTAQE114E OutbandScannerHandler received invalid callback information for Outband scanner scanner name on target target.	825
BTAQE1115E The outband scanner scanner name did not return the SAN ID on target target.	825
BTAVM0001I The operation Name of the operation processed successfully.	825
BTAVM0002I The Web service call Name of the operation processed successfully.	825
BTAVM0003I Data source Name of the datasource successfully added.	826
BTAVM0004I Data source Name of the datasource successfully deleted.	826
BTAVM0005I Data source Name of the datasource successfully modified.	826
BTAVM0006I Discovery on data source Name of the datasource has started.	826
BTAVM0007I Discovery on data source Name of the datasource completed successfully.	827

BTAVM0008I Probe of hypervisor Name of the Hypervisor has started.	827
BTAVM0009I Probe of hypervisor Name of the Hypervisor completed successfully.	827
BTAVM0010I A connection test to data source Name of the data source has started.	827
BTAVM0011I The Connection test to data source Name of the data source completed successfully.	827
BTAVM0012I Hypervisor Name of the Hypervisor discovered/rediscovered.	828
BTAVM0013I Discovery: Hypervisor Name of the hypervisor will not be discovered as it is managed by another data source.	828
BTAVM0014I Discovery: Hypervisor Name of the hypervisor will not be discovered as it itself is registered as a data source.	828
BTAVM0015I Collection of the physical storage configuration for hypervisor Name of the hypervisor has started.	828
BTAVM0016I Collection of the physical storage configuration for hypervisor Name of the hypervisor completed successfully.	829
BTAVM0017I Collection of the logical storage configuration for hypervisor Name of the hypervisor has started.	829
BTAVM0018I Collection of the logical storage configuration for hypervisor Name of the hypervisor completed successfully.	829
BTAVM0019I Collection of the virtual machines configuration for hypervisor Name of the hypervisor has started.	829
BTAVM0020I Collection of the virtual machines configuration for hypervisor Name of the hypervisor completed successfully.	830
BTAVM0021I The probe of name of the hypervisor found number of physical disks physical disks.	830
BTAVM0022I The probe of name of the hypervisor found number of logical volumes logical volumes.	830
BTAVM0023I The probe of name of the hypervisor found number of virtual machines virtual machines.	830
BTAVM0024I The Name of the hypervisor hypervisor was removed.	831
BTAVM0025I VMWare Cluster Name of the Cluster discovered/rediscovered.	831
BTAVM1301I The probe of name of the hypervisor could collect partial information only for the disk with the device name Device name of the disk.	831
BTAVM1302I LUN correlation is not supported for disk with device name Device name of the disk, vendor: Vendor name, model: model name, for hypervisor hypervisor name.	831
BTAVM1503E An internal error occurred: Text describing the internal error.	832
BTAVM2001E The mandatory parameter Name of the mandatory parameter which is missing is missing.	832
BTAVM2002E Invalid parameter Name of the parameter which was invalid.	832
BTAVM2003E A database error was encountered during database query or insert.	832
BTAVM2004E Cannot connect to the database repository.	833
BTAVM2006E The operation Name of the operation that failed failed for the following reason: Reason of the failure.	833
BTAVM2007E The Web service call Name of the operation failed for the following reason: Reason of the failure.	833
BTAVM2008E The product Name of the unsupported product is not supported.	833
BTAVM2010E The user name or password is invalid for Address of the host	834
BTAVM2011E The operation Name of the timed out operation could not complete within the time limit of Timeout threshold in milliseconds milliseconds.	834
BTAVM2012E An error occurred while trying to establish secure communication over SSL.	834
BTAVM2013E The Add Device wizard could not add the Name of the data source data source.	834
BTAVM2014E The deletion of data source Name of the data source failed.	835
BTAVM2015E The modification of data source Name of the data source failed.	835
BTAVM2016E Discovery on data source Name of the datasource failed.	835
BTAVM2017E Probe of the hypervisor Name of the Hypervisor failed.	835
BTAVM2018E IBM Spectrum Control can't connect to the data source Name of the datasource.	836
BTAVM2201E Probe: An error occurred during the collection of the physical storage configuration.	836
BTAVM2202E Probe: An error occurred during the collection of the logical storage configuration.	836
BTAVM2204E Probe: An error occurred during the collection of the virtual machine configuration.	836
BTAVM2206E Discovery: the hypervisor Name of the hypervisor will not be discovered because its version is not supported.	837
BTAVM2207E Calculation of the summary data for the hypervisor Name of the hypervisor failed.	837
BTAVM2208E Unable to obtain the hypervisor version(s) from the datasource Name of the datasource.	837
BTAVM2209E Unable to obtain information about other Virtual Centers managing the hypervisor(s) of datasource Name of the datasource.	837
BTAVM2210W Error getting LUN definition data for the disk with the device name Device name of the disk, storage subsystem vendor: Vendor name, model: model name, for hypervisor hypervisor name.	838
BTAVM2211E Probe: Virtualization Manager failed to get the VMWare VI data source for the hypervisor Name of the hypervisor from the database.	838
BTAVM2212E Probe: The hypervisor Name of the hypervisor is not available on the VMWare VI datasource Name of the datasource.	838
BTAVM2213E Data source Name of the datasource is disconnected from Virtual Center.	839
BTAVM2214E The probe job encountered an NFS file system while probing ESX server {0}. IBM Spectrum Control currently does not support probes of ESX servers with NFS file systems. The probe job for this ESX server has been stopped. Probes of other ESX servers that are included in this probe job will continue.	839
BTAVM2215W Unsupported storage subsystem disk with device name Device name of the disk, vendor: Vendor name, model: model name, for hypervisor hypervisor name with hypervisor version less than 3.5.0.	839

BTAVM2216E Unable to get keystore instance.	839
BTAVM2217E Unable to load keystore file.	840
BTAVM2218E Unable to set certificate entry in keystore file.	840
BTAVM2219E Unable to open keystore for writing.	840
BTAVM2220E Unable to close keystore file.	840
BTAVM2221E Unable to acquire lock on keystore file.	841
BTAVM2222E Unable to store certificate in keystore file.	841
BTAVM2223E Unable to release lock on keystore file.	841
BTAVM2224E Unable to decrypt keystore password.	841
BTAVM2225E Unable to open keystore for reading.	841
BTAVM2226E Certificate already exists in keystore.	842
BTAVM2227E host_address hypervisor is already being monitored and could not be added.	842
BTAVM2228E Missing host name.	842
BTAVM2229E Missing certificate.	842
BTAVM2230E Cannot create keystore directory.	842
BTAVM2231E Cannot download the certificate from Data Source Name of the data source.	843
BTAVM2232E Cannot connect to the Name of the data source data source.	843
BTAVM2233E Cannot download the certificate from the port.	843
BTAVM2234E The hypervisor name hypervisor was not removed because IBM Spectrum Control is running other actions on the device.	843
BTAVM2235E Unable to obtain the cluster(s) from the datasource Name of the datasource.	844
BTAVM2236W Subsequent steps of probe process may not be able to collect data for the hypervisor Name of the hypervisor because the hypervisor is in critical state.	844
BTAVM2237E Datastore Browser Task failed for hypervisor Name of the hypervisor, datastore Name of the datastore with error: Error	844
BTAVM2238E The registration of the vSphere Web Client extension for IBM Spectrum Control has started on Name of the vCenter server.	845
BTAVM2239E The registration of the vSphere Web Client extension for IBM Spectrum Control did not extract the extension package.	845
BTAVM2240E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete while updating the VASA web archive file, vasa.war, with the IBM Spectrum Control server configuration.	845
BTAVM2241E The registration of the vSphere Web Client extension for IBM Spectrum Control completed.	845
BTAVM2242E Unable to register IBM Spectrum Control as an extension on the vCenter server Name of the vCenter server. The validation of input values did not complete.	846
BTAVM2243E Unable to register IBM Spectrum Control as an extension on the vCenter server Name of the vCenter server. Could not authenticate with the vCenter server.	846
BTAVM2244E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete.	846
BTAVM2245E Unable to connect to the vCenter Server Name of the datasource.	847
BTAVM2246E Unable to configure the vCenter Server.	847
BTAVM2247E The registration of the vSphere Web Client extension for IBM Spectrum Control did not delete the temporary directory Name of the directory.	847
BTAVM2248E The registration of IBM Spectrum Control as a VASA provider did not complete.	847
BTAVM2249E Automatic registration of IBM Spectrum Control as a VASA provider is not supported for vCenter Server version 5.0 and earlier.	848
BTAVM2250E IBM Spectrum Control is already registered as a VASA provider for vCenter Server server_name. Register IBM Spectrum Control as a VASA provider manually in the vSphere Web Client to update the credentials.	848
BTAVM2251E One or more third-party VASA providers are already registered with the vCenter Server. IBM Spectrum Control VASA provider was not registered. Register IBM Spectrum Control as a VASA provider manually.	848
BTAVM2252E The registration of IBM Spectrum Control as a VASA provider has started on Name of the vCenter server.	848
BTAVM2253E The registration of IBM Spectrum Control as a VASA provider has completed.	849
BTAVM2254E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete. The current session is invalid.	849
BTAVM2255E The registration of IBM Spectrum Control as a VASA provider did not complete. The current session is invalid.	849
BTAVM2256W Could not determine the host for VM with ID: host id and Name: Vendor name. Check if the same mac address is used on other computers.	849
BTAVM2257I Found number of files files on name of datastore of name of the hypervisor.	850
BTAVM2258I The probe of name of the hypervisor found number of controllers controllers.	850
BTAVM2259I Collecting file system details for hypervisor Name of the hypervisor.	850
BTAVM2260I Collecting list of files for hypervisor Name of the hypervisor.	850
BTAVM2261I Collecting logical volumes for hypervisor Name of the hypervisor.	851
BTAVM2262I Collecting disk partition for hypervisor Name of the hypervisor.	851

BTAVM2263I Files details for Name of the datastore being collected by id of the Hypervisor.	851
BTAVM2264I Files details for Name of the datastore were collected by id of the Hypervisor on timestamp.	851
BTAVM2265E Invalid host name or IP address.	852
BTAVM2266E The connection information cannot be updated because it points to another device.	852
BTAVM2268E The connection information cannot be updated because IBM Spectrum Control cannot determine if the hypervisor is managed by the Name of the data source data source.	852
BTAVM2269E The connection information cannot be updated because a data source with this host name or IP address is already present.	852
BTAVM2270E The connection information cannot be updated because it doesn't point to a data source of the same type (vCenter/ESX).	853
BTAVM2271W The hypervisor Name of the Hypervisor cannot be discovered because its connection state is "Connection State".	853
BTAVM2272E The user User Name does not have the privilege to browse the datastore Name of the Datastore.	853
HWN020001I Operation Name of the operation processed successfully.	854
HWN020002E Mandatory parameter Name of the mandatory parameter which is missing missing	854
HWN020003E Invalid parameter Name of the parameter which was invalid	854
HWN020101E The external process terminated unexpected.	854
HWN020102W The external process was canceled per users request.	855
HWN020103E The external process exceeded the timeout limit and was canceled.	855
HWN020104E The external process could not be started.	855
HWN020105E The data collector is not responding to the server.	855
HWN020106E An external process was cancelled by the data collector.	856
HWN021503E The action cannot be completed	856
HWN021504E Entity The ID of the entity was not found.	856
HWN021508E Credentials not found	856
HWN021514E The invocation of CIM method Name of method failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method	857
HWN021515E The invocation of CIM method Name of method failed on SMI-S provider Name of SMI-S provider with the following exception text: Exception text	857
HWN021516E The LSS specified LSS name on subsystem Name of subsystem is already at the maximum volume number (255). Volume creation can not be done on this LSS, please select a different one.	857
HWN021517E The connection to SMI-S provider for storage system VPD of the storage system could not be made.	857
HWN021520E The attribute Name of the attribute was not found.	858
HWN021522E Host port The WWPN of the host port not assigned to Volume The PK of the volume	858
HWN021524E Indexed Properties Names don't match	858
HWN021529E An SMI-S provider has reported unexpected values: IP and port of SMI-S provider.	858
HWN021530E The Volume - Port mapping can not be created. There are existing mappings that prevent this combination. VolumeCOP: The ID of the volume , Port: The WWPN of the port that should be mapped to the volume	859
HWN021531E SMI-S provider The IP and port of the SMI-S provider can not reach storage system The VPD of the storage system	859
HWN021535E There is not enough space left in the storage pool The primary key of the Poolon storage system The VPD of the storage system to create a volume of The requested volume size bytes.	859
HWN021536E The CIM method The CIM method that is not supported. is not supported on the storage system The VPD of the storage system	860
HWN021537E Could not create connection to SMI-S provider The IP and port for the SMI-S provider..Reason: The exception returned by the SMI-S provider.	860
HWN021538E The username The username that was used to connect to the SMI-S provider. or password is wrong on SMI-S provider The IP and port for the SMI-S provider.	860
HWN021539E The SVC with IP The IP of the SVC. which is managed by SMI-S provider The IP and port for the SMI-S provider. can not be discovered. The status is The status of the SVC..	860
HWN021540E The invocation of CIM method Name of method failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method. Details provided by the SMI-S provider : Description of Returncode	861
HWN021600W Operation Name of the operation. partially processed.	861
HWN021601E The operation(s) Operation_names failed.	861
HWN021602E It is necessary to specify target ports for storage device VPD of the storage subsystem	861
HWN021603W More storage volumes and ports than specified will loose access	862
HWN021604E WWPNs and storage volumes to be unassigned not completely specified. Assigned WWPNs: All WWPNs that are assigned to the volumes in the host port collection , missing WWPNs: The WWPNs that are assigned but were not specified in the input parameter in the method unassign . Storage volumes to be unassigned not completely specified. Assigned storage volumes: Lists all storage volumes that are really assigned to the WWPNs. }, missing storage volumes: The storage volumes that are really assigned but were not specified in the input parameter in the method unassign	862
HWN021605I More storage volumes and ports than specified will gain access.	862

HWN021606E	WWPNs and storage volumes to be assigned not completely specified. Missing WWPNs: The WWPNs that need to be assigned but were not specified in the input parameter. . Storage volumes to be assigned not completely specified. Missing storage volumes: The storage volumes that need to be assigned but were not specified in the input parameter.	863
HWN021607E	The client type the client type with description the client description is not supported on SMI-S provider the SMI-S provider IP and port for storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in	863
HWN021608E	The target port the target port ID does not belong to storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in	863
HWN021609E	There is not enough space left in the storage pool The primary key of the Pool on storage system The VPD of the storage system to create The number of volumes to create volumes of The total size needed bytes total.	864
HWN021610E	The specified size The size of the volume to create is not supported on pool The storage pool ID Size has to be dividable by Divisor returned by getSupportedSizeRange and in between Minimum returned by getSupportedSizeRange and Maximum returned by getSupportedSizeRange	864
HWN021611E	Volume The volume ID has mappings, it can not be deleted.	864
HWN021612E	The mapping between volume The volume ID and port The initiator port wwpn exists already	865
HWN021613E	The WWPN The WWPN not found can not be found on subsystem The subsystem	865
HWN021614E	The WWPNs The WWPNs without mappings have no mappings on storage system The storage system	865
HWN021615E	WWPNs WWPNs that can not share mappings can not share mappings on storage system Storage system}. There are existing mappings that prevent this.	865
HWN021616E	Volumes VolumeIDs can not share mappings on storage system Storage system }. There are existing mappings that prevent this.	866
HWN021617E	The stored data for storage system The storage system is not in sync with the environment. Rerun data collection.	866
HWN021618E	Modifying target ports is not supported by subsystem the subsystem	866
HWN021619E	Modifying the target ports for mapping of initiator port initiator port WWPN and volume volume name will also modify the target ports of the following mappings: port - volume list	866
HWN021620I	Modifying the target ports for mapping of initiator port initiator port WWPN and volume volume name will modify the target ports of more mappings than specified.	867
HWN021621E	It is not supported to modify the target ports of existing mappings and create new mappings in one step. Modify the existing mappings first and then create the new mappings. Existing mappings: port - volume list	867
HWN021622I	Started modification of the assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN . Target ports to add: target ports to add Target ports to remove: target ports to remove	867
HWN021623I	Finished modification of the assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN . Target ports to add: target ports added Target ports to remove: target ports removed	868
HWN021624E	The modification of the assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN failed.	
HWN021625E	Target ports to add: target ports to add Target ports to remove: target ports to remove	868
HWN021650E	A timeout occurred while connecting to SMI-S provider SMI-S provider IP and port.	868
HWN021651E	Job on SMI-S provider SMI-S provider IP and Port in format IP:Port failed. Job Status: Job status . Error code is Error code , error description: Error description . Check IBM Spectrum Control and SMI-S provider logs.	869
HWN021652E	The process has timed out. Check the IBM Spectrum Control log files for more information.	869
HWN021653E	The attribute Name of the attribute was not found.	869
HWN021654E	Pool ID was not found.	869
HWN021655E	Volume ID The ID of the volume was not found.	870
HWN021656E	Port ID The ID of the port was not found.	870
HWN021657E	Subsystem ID The ID of the subsystem was not found.	870
HWN021658E	Managed Disk ID The ID of the MDisk was not found.	870
HWN021659E	SMI-S provider The ID of the SMI-S provider was not found	870
HWN021660E	IO Group The SVC IO Group was not found.	871
HWN021661E	Extent The storage extent external key was not found.	871
HWN021662E	Physical volume The physical volume external key was not found.	871
HWN021670E	The client type the client type with description the client description is not unique on SMI-S provider the SMI-S provider IP and port } for storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in	871
HWN021671I	The storage system The storage system was deleted from the database	872
HWN021672E	The storage system name storage system was not removed because other monitoring actions are running on the device.	872
HWN021673E	The probe job on SMI-S provider SMI-S provider IP and Port in format IP:Port did not complete within the time limit of Microseconds microseconds. The job is Percent complete percent complete. Check the SMI-S provider log for job status. Job information: JobCOP . Run the probe job again after the current job has completed.	872
HWN021674E	Job on SMI-S provider SMI-S provider IP and Port in format IP:Port returned unexpected results. Job information: JobCOP Job status: JobState , status description: JobStatus Check SMI-S provider log. Redo probe if the job completed.	873
HWN021675I	Started creation of volume with size Size in pool Pool on subsystem Subsystem	873
HWN021676I	Volume creation completed successfully. New volume VolumeID created with size Size in pool Pool on subsystem Subsystem .	873

HWN021677E Volume creation failed. The volume of size Size in pool Pool on subsystem Subsystem could not be created.	874
HWN021678I Started assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN .	874
HWN021679I Finished assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN .	874
HWN021680E The assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN failed.	874
HWN021681I Started unassignment of volume VolumeID on subsystem Subsystem to initiator port WWPN .	875
HWN021682I Finished unassignment of volume VolumeID on subsystem Subsystem to initiator port WWPN .	875
HWN021683E The unassignment of volume VolumeID on subsystem Subsystem to initiator port WWPN failed.	875
HWN021684I Started deletion of volume VolumeID on subsystem Subsystem .	875
HWN021685I Volume deletion completed successfully. Volume VolumeID on subsystem Subsystem was deleted.	875
HWN021686E Volume deletion failed. Volume VolumeID on subsystem Subsystem could not be deleted.	876
HWN021687I Started modification of Pool Pool display name on subsystem Subsystem display name .	876
HWN021688I Pool modification completed successfully. Pool Pool display name on subsystem Subsystem display name was modified.	876
HWN021689E Pool modification failed. Pool Pool display name on subsystem Subsystem display name could not be modified.	876
HWN021690I Started creation of number volumes volumes with size Size in pool Pool on subsystem Subsystem	877
HWN021691I Created number volumes out of total number volumes volumes with size Size in pool Pool on subsystem Subsystem	877
HWN021692E Volume creation failed. Created number volumes out of total number volumes volumes with size Size in pool Pool on subsystem Subsystem	877
HWN021693W Warning: The task succeeded, but the database update failed. Run probe to update the database.	877
HWN021700I Enumerating CIM Associator The CIM association name which is being enumerated. for The name of the DB table which will be populated as result of this query.	878
HWN021701I Enumerating CIM Class The CIM class name which is being enumerated. for The name of the DB table which will be populated as result of this query.	878
HWN021702I Querying SMI-S provider	878
HWN021703I Task starting on SMI-S provider Identifier of the SMI-S provider..	878
HWN021708I Initializing Collection for storage system storage system identification.	879
HWN021709I Collection for storage system storage system identification completed.	879
HWN021710I Discovering devices for SAN Volume Controller The VPD of the SAN Volume Controller.	879
HWN021711I Discovery devices for SAN Volume Controller The VPD of the SAN Volume Controller. failed with error message The exception which has occurred.	879
HWN021712I Collecting Nodes for storage system storage system identification.	880
HWN021713I Collecting fibre channel ports for storage system storage system identification.	880
HWN021714I Collecting volumes for storage system storage system identification.	880
HWN021715I Traversing host to volume assignments for storage system storage system identification.	880
HWN021716I Collecting pools and volumes for storage system storage system identification.	881
HWN021717I Collecting volume settings for storage system storage system identification.	881
HWN021718I Collecting client setting data for storage system storage system identification.	881
HWN021719I Perform collection post process tasks for storage system storage system identification.	881
HWN021720I Flash enclosure is missing drive flash_drive_ identifier.	882
HWN021724W SMI-S provider SMI-S provider identifier manages device(s) of type device_type which is supported through the native device interface or SNMP only.	882
HWN021725I IBM Spectrum Control discovered/rediscovered a device with name Identifier of the device. on SMI-S provider Identifier of the SMI-S provider..	882
HWN021726I IBM Spectrum Control discovered/rediscovered no device on SMI-S provider Identifier of the SMI-S provider..	882
HWN021727I IBM Spectrum Control discovery starting on SMI-S provider Identifier of the SMI-S provider..	883
HWN021728I IBM Spectrum Control discovery on SMI-S provider Identifier of the SMI-S provider. is complete.	883
HWN021729W IBM Spectrum Control discovery of Device type value is not supported.	883
HWN021730W IBM Spectrum Control discovery of device value with code level value is not supported on SMI-S provider Identifier of the SMI-S provider..	883
HWN021731I Probing Volumes for Storage System: value.	884
HWN021732I Number of Volumes Found Currently: value. Continuing to Probe Volumes.	884
HWN021733I value Volumes Found.	884
HWN021734I Probing Disks for Storage System: value.	884
HWN021735I Number of Disks Found Currently: value. Continuing to Probe Disks.	884
HWN021736I value Disks Found.	885
HWN021737I Probing Virtual Disks for Cluster: value	885
HWN021738I Number of Virtual Disks currently found: value. Continuing to probe Virtual Disks.	885
HWN021739I value Virtual Disks found.	885
HWN021740I Probing Views of Host Initiator access to Volumes.	886
HWN021741I value Views Found.	886

HWN021742E The SMI-S provider SMI-S provider URL is not managing storage subsystems.	886
HWN021743E The SMI-S provider SMI-S provider URL is not managing switches.	886
HWN021744E Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: http://www.ibm.com/support/docview.wss?uid=swg21976237	886
HWN021745I Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: http://www.ibm.com/support/docview.wss?uid=swg21976237. An alternate resource will be used.	887
HWN021746W SMI-S provider Identifier of the SMI-S provider. manages Cisco device types through SNMP only.	887
HWN021747E Unable to add the specified switch by using SNMP. The switch is a Brocade switch and can be added only by using an SMI agent.	887
HWN021800E Failed to get a database connection.	888
HWN021801E The server failed to get SMI-S provider entity from database.	888
HWN021802E Experienced SQL problems while working with database: The SQL error.	888
HWN021803W The server did not get userid and or password for SMI-S provider The Service URL of the SMI-S provider from database.	888
HWN021804E The server failed to access slp attributes for SMI-S provider The Service URL of the SMI-S provider from database.	889
HWN021805E CIMOMManager failed to get a database mapper of type The type of the database mapper.	889
HWN021806E CIMOMManager failed to get a valid mapper result from The type of the database mapper.	889
HWN021807E CIMOMManager failed to get a proxy for calling slp discovery.	889
HWN021808E The device cannot be contacted through any of the following SMI-S providers The comma separated list of IP and port for the SMI-S providers.. Possible causes are that the SMI-S providers are not accessible or the device is disconnected from the SMI-S providers.	890
HWN021809E The host for SMI-S provider The service URL of the SMI-S providers. was not resolvable in DNS.	890
HWN021810E The service URL for SMI-S provider The service URL of the SMI-S providers. is not valid.	890
HWN021811I The operational status for device The ID of the device. on SMI-S provider The service URL of the SMI-S provider. has this value The operational status vector. .	890
HWN021812E The operational status for device The ID of the device. on SMI-S provider The service URL of the SMI-S provider. could not be retrieved because SMI-S provider is in status The SMI-S provider connection status. .	891
HWN021813E Fabric ID The ID of the fabric was not found.	891
HWN021814E The device device id cannot be contacted through the SMI-S provider SMI-S provider service URL.	891
HWN021899E Switch The wwn of the switch. has no associated Fabric.	892
HWN021901E The virtual disk size cannot exceed maximum size when creating space efficient virtual disks.	892
HWN021902E Invalid grain size. Valid values are valid values.	892
HWN021903E Authentication to ip or name of host failed. Please specify correct authentication information.	892
HWN021904E Connection to IP address or name of host failed with following operating system exception: exception text . Please make sure IP address is correct and machine is up and running. If this is a SVC V4 machine, it could be that its RAS interface is not up. If this is a SVC V5, make sure the SMI-S provider is up and running.	893
HWN021905E Connection to IP address or name of host failed with following operating system exception: exception text .	893
HWN021906E Failed to get native API entity from database.	893
HWN021907E The IP address The service URL of the SMI-S providers. was not resolvable in DNS.	893
HWN021908E Failed to get a proxy for calling NAPI discovery.	894
HWN021909E There are no IO Groups available for Virtual Disk creation.	894
HWN021910E Managed Disk ID The ID of the MDisk is not in unmanaged mode and cannot be added to the specified managed-disk group.	894
HWN021911E Another probe of storage subsystem The Name+Nameformat of the storage subsystem is already in progress.	894
HWN021912E Other probes of storage subsystems The list of Name+Nameformat of the storage subsystems are already in progress.	895
HWN021913E IBM Spectrum Control Device Server could not write to directory The directory.	895
HWN021914E SSH key file The SSH key file name is still in use, so it cannot be deleted.	895
HWN021915E IBM Spectrum Control Device Server could not delete the file The file.	895
HWN021916E The storage subsystem subsystem ID is not configured for file level management.	896
HWN021917E An invalid parameter Name of the parameter which was invalid was specified. The corresponding file system mount point does not exist.	896
HWN021919E The cluster ID The ID of the cluster. was not found.	896
HWN021920E The export ID The ID of the export. was not found.	896
HWN021921E The specified activity or protocol could not be used to change the export The ID of the export..	897
HWN021922E The file system ID file_system_ID was not found.	897
HWN021923E Invalid parameter Name of the parameter which was invalid. File system does not exist.	897
HWN021924E The parameter Name of the parameter which was invalid is not a valid parameter.	897
HWN021925E The fileset ID fileset_ID was not found.	898

HWN021926E The WAN-cache source ID WAN_cache_source_id was not found.	898
HWN021927E The WAN-cache ID WAN_cache_source_id was not found.	898
HWN023000I The Optimization Execution task has started.	898
HWN023001E The task to optimize the volumes was not completed successfully.	899
HWN023002I The Optimization Execution task has completed.	899
HWN023003I The Optimization Execution task retrieved number recommendations	899
HWN023004I The Optimization Automation request persisted recommendations to be processed.	899
HWN023005I The Optimization Execution task updated the status of number recommendations.	900
HWN023006I The Optimization Automation request begins processing number recommendations.	900
HWN023007W The recommendation being processed contains a virtual disk that is no longer detected.	900
HWN023008W The recommendation for virtual disk vdisk name contains a source storage pool that is no longer detected.	900
HWN023009W The recommendation for virtual disk vdisk name contains a target storage pool that is no longer detected.	901
HWN023010I Virtual disk vdisk name was successfully migrated from storage pool source pool name to storage pool target pool name.	901
HWN023011W The recommendation for virtual disk vdisk name contains a virtual disk that does not exist in the source storage pool source pool name or the target storage pool target pool name.	901
HWN023012W The recommendation for virtual disk vdisk name contains a non-mirrored virtual disk that is now a mirrored virtual disk.	902
HWN023013W The recommendation for virtual disk vdisk name contains a mirrored virtual disk that is now a non-mirrored virtual disk.	902
HWN023014I The recommendation for virtual disk vdisk name requires more space on target pool target pool name to be processed.	902
HWN023015I Virtual disk vdisk name will now be migrated from storage pool source pool name to storage pool target pool name	903
HWN023016I Successfully added virtual disk copy to virtual disk vdisk name.	903
HWN023017I Synchronization for virtual disk vdisk name has completed synchronization percent% and requires about seconds to complete seconds to complete.	903
HWN023018I Synchronization for virtual disk vdisk name has completed.	903
HWN023019I Successfully removed a virtual disk copy from virtual disk vdisk name.	904
HWN023020I Successfullly changed the synchronization rate of virtual disk vdisk name to syncrate%.	904
HWN023021I Successfullly changed the primary copy of virtual disk vdisk name.	904
HWN023022E There is no space available on target pool target pool name to migrate the virtual disk vdisk name.	904
HWN023023E Unable to submit request to add vdisk copy command for virtual disk vdisk name due to rc (rc).	905
HWN023024E Unable to complete request to add vdisk copy command for virtual disk vdisk name due to rc (rc).	905
HWN023025E Unable to submit request to get vdisk synchronization progress for virtual disk vdisk name due to rc (rc).	905
HWN023026E Unable to complete request to get vdisk synchronization progress for virtual disk vdisk name due to rc (rc).	905
HWN023027E Unable to submit request to remove vdisk copy command for virtual disk vdisk name due to rc (rc).	906
HWN023028E Unable to complete request to remove vdisk copy command for virtual disk vdisk name due to rc (rc).	906
HWN023029E Unable to submit request to change the synchronization rate for virtual disk vdisk name due to rc (rc).	906
HWN023030E Unable to complete request to change the synchronization rate for virtual disk vdisk name due to rc (rc).	906
HWN023031E Unable to submit request to change the primary copy for virtual disk vdisk name due to rc (rc).	907
HWN023032E Unable to complete request to change the primary copy for virtual disk vdisk name due to rc (rc).	907
HWN023033E The request failed. Message from failed request: message.	907
HWN023034E The Optimization Automation job completed with errors in the recommendations.	908
HWN023035W The Optimization Execution task completed with warnings.	908
HWN023036E The request failed because there were not enough extents in the storage pool.	908
HWN023037E The request failed because the number of copies of this volume would exceed the limit.	908
HWN023038E The request failed because the copy specified does not exist.	909
HWN023039E The following exception occurred during a migration request: exception	909
HWN023040E The migration request for volume vdisk name is already being processed.	909
HWN023041W The request to migrate the mirrored volume vdisk name is suspended because the secondary volume is offline.	909
HWN023042E The secondary copy needed for migration does not exist.	910
HWN023043I The mirrored volume migration for volume vdisk name will be ignored.	910
HWN023044I The mirrored volume migration for volume vdisk name will result in the current secondary volume becoming the primary volume.	910
HWN023045I The mirrored volume migration for volume vdisk name will result in the primary volume being migrated to the target pool.	911
HWN023046I The Migration of the previously abandoned Optimization Automation job has started.	911
HWN023047I The Migration of the previously abandoned Optimization Automation job has completed.	911
HWN023048I The Optimization Automation cancellation job jobname has started.	911
HWN023049E The Optimization Automation cancellation job completed with errors.	912

HWN023050I The Optimization Automation cancellation job jobname has completed.	912
HWN023051I The Optimization Automation job jobname will be canceled.	912
HWN023052W The Optimization Automation job is not in progress.	912
HWN023053I The migration of volume vdisk name has been canceled.	912
HWN023054W The Optimization Automation job was canceled.	913
HWN023055I The volume that was chosen for transformation, vdisk name, is a secondary volume in a mirrored volume relationship. The secondary volume will be migrated to the specified target pool or converted as specified.	913
HWN024000I An optimization analysis task was started.	913
HWN024001I The analysis is completed.	913
HWN024002W Unable to retrieve any policy for Tier value.	914
HWN024003I Analyzed number_of_volumes volumes on tier tier_number for storage virtualizer subsystem_name.	914
HWN024006W No target pools in subsystem value were selected.	914
HWN024011W Destination storage pool value in subsystem value was not considered. Reason: value.	914
HWN024012I It is recommended that number_of_volumes volumes on tier source_tier_number are moved to tier target_tier_number.	915
HWN024015I The optimization analysis of the value subsystem was started.	915
HWN024016W Volume value is already in the destination storage pool value. No recommendations will be generated for the volume.	915
HWN024018W No destination storage pools in Tier value have been specified for subsystem value.	915
HWN024019W The following pools on tier tier_number on the storage_system storage system cannot be balanced by redistributing or re-tiering volumes: pool_names.	916
HWN024020I Started analysis to balance pools on tier value.	916
HWN024021W The pool_name pool on tier tier_number on the storage_system storage system cannot be balanced by redistributing the volumes.	916
HWN024027I Storage Pool pool name has insufficient available space for volume volume name in storage pool pool name.	917
HWN024030W One or more entities specified as input for the analysis could not be found or pools or volumes in some input entities could not be found.	917
HWN024031W One or more entities specified as candidate destinations for the analysis could not be found.	917
HWN024032W For one or more mirrored volumes, both the primary and the secondary volume copies were chosen for transformation. You cannot transform both volume copies in the same transform task. Only the primary volume copies are included for transformation. You can transform the secondary volume copies in a separate transformation.	917
HWN024033W The volume volume name cannot be analyzed because it is not in a capacity pool.	918
HWN024034W The pool pool name cannot be analyzed because the pool is not in a capacity pool.	918
HWN024035W The storage virtualizer system name cannot be analyzed because the storage virtualizer is not in a capacity pool.	918
HWN024036W The operation to transform the volumes on the subsystem name storage virtualizer cannot be completed because the destination pools were not available.	919
HWN024037E An unexpected error occurred. The operation to transform the volumes on the subsystem name storage virtualizer cannot be completed because the destination pools were not identified.	919
HWN024043I The capacity pools of the source volumes were selected as the target pools.	919
HWN024046I The option that was selected to handle volumes with mirrored volumes is: After optimization, set the copy of the secondary volume in the destination pool as the primary volume. The original secondary volume remains the secondary volume.	920
HWN024047I The number of days for collecting performance data to analyze the volumes is set to performance_data_collection_period.	920
HWN024050I Automatic tiering was selected to tier the volumes.	920
HWN024051I The tiering analysis is starting.	920
HWN024052I Tier tier# has an I/O density threshold value of value per second per GiB.	921
HWN024053I Tier tier#, has a file age threshold value of value percent of files last accessed within time_unit.	921
HWN024054I The real capacity for the thin-provisioned volumes is set to value unit.	921
HWN024055I The auto expand property of the thin-provisioned volumes is set to yes/no.	921
HWN024056I The warning level for thin-provisioned volumes is set to value %.	922
HWN024057I The grain size that was specified for the thin-provisioned volumes is grain_size KiB.	922
HWN024058I The real capacity for the compressed volumes is set to value unit.	922
HWN024059I The auto expand property for the compressed volumes is set to yes/no.	922
HWN024060I The warning level for the compressed volumes is set to value.	923
HWN024061I The option that was selected to handle volumes with mirrored volumes is: After optimization, set the secondary volume as the primary volume. The volume in the destination pool is the secondary volume.	923
HWN024062I The option that was selected for mirrored volumes is: Do not optimize volumes with mirrored volumes.	923
HWN024066I Tier tier# has an I/O rate threshold value of value I/O per second.	923
HWN024067W Recommendations cannot be generated for number_of_volumes volumes because the volumes do not meet the tiering criteria for tier current_tier_number or for any lower tier.	924

HWN024068W Recommendations cannot be generated to move number_of_volumes volumes from source_tier to tier target_tier_number due to the pool activity limit value.	924
HWN024069W Recommendations cannot be generated to move number_of_volumes volumes from tier source_tier to to tier target_tier_number because the destination storage pools do not have enough space.	924
HWN024070I The analysis to optimize subsystem storage_subsystem was completed.	925
HWN024071I The option that was selected was to restrict the placement of volumes in capacity pools to destination storage pools in the same capacity pool.	925
HWN024072W No file age information for volume volume name.	925
HWN024073W Storage pool {0} in tier {1} needs at least one additional storage pool in the same tier for the Balance Analysis to run on this tier.	925
HWN024074W Storage pool {0} in tier {1} and capacity pool {2} needs at least one additional storage pool in the same tier and capacity pool for the Balance Analysis to run within this capacity pool and on this tier.	926
HWN024075W number_of_volumes volumes from storage pool pool could not be moved to the destination storage pools because the destination storage pools do not have enough space.	926
HWN024076W number_of_volumes volumes from storage pool pool could not be moved to the destination pools because the destination storage pools are not in the same capacity pool.	926
HWN024077W number_of_volumes volumes from storage pool pool could not be moved to the destination storage pools because the destination storage pools would have exceeded the pool activity limit value.	927
HWN024078W number_of_volumes volumes from storage pool pool could not be moved to the destination storage pools because the destination storage pools already have a volume copy.	927
HWN024079W Because of an internal error, the number of volumes in the pool storage pool that could not be moved to destination storage pools is number_of_volumes.	927
HWN024080W Destination storage pool pool already contains a copy of storage volume volume.	927
HWN024081W Because the destination storage pool does not have sufficient available space, the volume storage volume in the source_pool storage pool cannot be moved to the destination_pool destination storage pool.	928
HWN024082W Because the destination storage pool contains a copy of the mirrored volume, the volume volume in the source_pool storage pool cannot be moved to the destination_pool destination storage pool.	928
HWN024083W Because of an internal error, the volume storage volume in the spool storage pool could not be moved to the destination_pool destination storage pool.	928
HWN024084W Because the destination storage pools contain one or more copies of the mirrored volumes, the number of volumes that could not be moved from tier source_tier to tier target_tier is number_of_volumes.	929
HWN024085W The pool_name storage pool cannot be balanced because the tier level of the pool was reset to none.	929
HWN024086E Recommendations cannot be generated because the tier level of the destination_pool_name destination storage pool was reset to none.	929
HWN024087W Recommendations cannot be generated for one or more of the volumes because collocated volumes cannot be placed in the same destination storage pool.	929
HWN024088I The option to collocate volumes that are assigned to the same server or hypervisor was selected.	930
HWN024089I The option to collocate volumes that are assigned to the same server or hypervisor was not selected.	930
HWN024090W Because the storage pools do not meet the service class requirements, the number of volumes that cannot be moved is no_volumes.	930
HWN024091W If the recommendation to move the volume_name volume to the storage_pool_name storage pool is implemented, the service class requirements of the volume_name volume cannot be met.	931
HWN024092W Recommendations cannot be generated to move number_of_volumes volumes from tier source_tier to tier target_tier_number because the destination storage pools do not meet the service class requirements of the volumes.	931
HWN024093I The number of volumes on tier tier_level that were not analyzed because of the instruction to exclude mirrored volumes from the analysis is number_of_volumes volumes.	931
HWN024094W Valid target pools were not selected for the subsystem name storage virtualizer.	931
HWN024095I The grain size for the thin-provisioned volumes was set to the default value of grain_size KiB.	932
HWN024096W Volumes in the pool_name pool on tier tier_level cannot be moved to a higher tier to reduce the activity level of the pool to the user-defined level.	932
HWN024097W Volumes in the pool_name pool on tier tier_level cannot be moved to a lower tier to reduce the activity level of the pool to the user-defined level.	932
HWN024098W Cannot generate recommendations to tier volumes from the storage_system_name storage system because all of the source volumes are in the selected destination storage pools.	933
HWN024099I The number of volumes that were excluded from the analysis to plan the tiering of the storage_system_name storage system is vols_count. The volumes were excluded because performance data is not available for the volumes.	933
HWN024100I The number of volumes that were excluded from the analysis to plan the tiering of the storage_system_name storage system is vols_count. The volumes were excluded from the analysis because the capacity of the volumes is zero.	933
HWN024101I The number of volumes that were excluded from the analysis to plan the tiering of the storage_system_name storage system is vols_count. The volumes were excluded from the analysis because the volumes are not assigned to pools that are tiered or the thresholds were not defined for the tiers.	933

HWN024102W The recommendation to move the storage_volume_name volume from the source_pool_name storage pool to the target_pool_name storage pool was not generated because the status of the destination pool is offline or excluded.	934
HWN024103I Reclaiming volumes	934
HWN024104I Planning for tiering volumes	934
HWN024105W The recommendation to move the storage_volume_name volume from the source_pool_name storage pool to the target_pool_name storage pool will not be executed because the status of the destination pool is offline or excluded.	935
HWN024106W The recommendation to move the storage_volume_name volume from the source_pool_name storage pool was not generated because the status of the volume is offline.	935
HWN024107W The recommendation to move the storage_volume_name volume from the source_pool_name storage pool to the target_pool_name storage pool will not be executed because the status of the volume is offline.	935
HWN024108E The recommendations can't be shown because the analysis was not completed.	936
HWN024109W The data for the previous analysis of the storage_subsystem storage system was not deleted.	936
HWN024110E Volumes reclamation analysis failed for storage_subsystem storage subsystem.	936
HWN024111W Recommendations cannot be generated to move number_of_volumes volumes from tier source_tier to tier target_tier_number because there is no potential destination pool assigned to the recommended tier.	936
HWN024112W Cannot generate recommendations to tier volumes from the storage_system_name storage system because the source storage pools and the selected destination storage pools are assigned to the same tier.	937
HWN024200I The days of the week to include in the analysis: days_of_week.	937
HWN024201I The time window for the performance data to include in the analysis is set to start time - end time.	937
HWN024202I The time window for the performance data to include in the analysis is set to start time - end time. The end time occurs on the next day.	937
HWN024203W The volume storage_volume_name cannot be converted or moved because the target pools do not have sufficient available space or the target pool types are incorrect for the operation.	938
HWN025000I Storage pool value in storage system value has storage from different types of back-end storage systems. Back-end disk data cannot be determined.	938
HWN025001I Storage pool value in storage system value has storage from unknown back-end storage system(s). Back-end disk data cannot be determined.	938
HWN025002I Storage pool value in storage system value has storage from multiple back-end storage systems or from multiple pools in a single storage system. Back-end disk data cannot be determined.	939
HWN025003I Storage pool value in storage system value has storage from a back-end storage pool with multiple disk types. Back-end disk data cannot be determined.	939
HWN025004I Storage pool value in storage system value has storage from a back-end storage pool with a mixed raid type. Back-end disk data cannot be determined.	939
HWN025005I Storage pool value in storage system value has storage from a back-end storage pool with multiple raid types. Back-end disk data cannot be determined.	939
HWN025006I Storage pool value in storage system value has storage from back-end disks of unknown type. Back-end disk data cannot be determined.	940
HWN025007I Storage pool value in storage system value has storage from unknown number of back-end disks. Back-end disk data cannot be determined.	940
HWN025008I Storage pool value in storage system value has storage from back-end disks with unknown raid type. Back-end disk data cannot be determined.	940
HWN025009E Connection to Data Server failed. Make sure Data Server is up.	941
HWN025011W All of the target ports for the storage system are used for the provisioning request. The request might take a long amount of time.	941
HWN025010I Collecting parent pool volumes for storage system: storage system identification.	941
HWN025011E The port the target port ID has a usage restriction which prevents it from being used as a target port for volume assignment.	941
HWN025012E The invocation of CIM method ExposePaths failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.	942
HWN025013E The invocation of CIM method HidePaths failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.	942
HWN025014E The invocation of CIM method CreateOrModifyElementFromStoragePool failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.	943
HWN025015E The invocation of CIM method ReturnToStoragePool failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.	943
HWN025016E The invocation of CIM method DeleteStorageHardwareID failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.	944
HWN025017E A CLI command failed. Check the logs from EP working dir.	944
HWN025018E An error occurred when attempting to parse the file File name.	944
HWN025019E The requested operation failed. Check the logs from EP working dir.	945
HWN025020E The volume cannot be created. The volume of size Size in pool Pool on storage system Subsystem cannot be created. The pool might already have the maximum number of volumes allowed.	945

HWN025021E Unable to resolve the address for the device because the request was not processed by the data collector.	945
HWN025022E The data collection detected storage system New Subsystem with serial number new serial number instead of expected serial number expected serial number.	945
HWN025025I Starting the task to send the report for schedule Schedule Id by email.	946
HWN025026I The report title report is being created.	946
HWN025027I The report title report with ID report id is being sent by email to the reports recipients.	946
HWN025028I The report title report with ID report id was sent by email to the reports recipients.	946
HWN025029E Can't retrieve the configured settings of the report for schedule Schedule Id .	946
HWN025030E The report can't be sent because the email server was not configured.	947
HWN025031E Can't send the report title report with ID report id by email because of the following error: reported_error.	947
HWN025031I To view the report, choose HTML as the message format or use an email application that supports HTML message formats.	947
HWN025032E Job failed during post processing of collected data from the data source.	947
HWN025033E Failed to send the report name report for schedule Schedule Id.	948
HWN025034I Created number_of_servers agentless servers automatically.	948
HWN025035I Removed number_of_servers agentless servers automatically.	948
HWN025036E Can't save the report in the directory.	948
HWN025037E Can't save the report because the path specifies a file name instead of a directory name.	949
HWN025038E Can't save the report, because the directory doesn't exist.	949
HWN025039E Can't save the report because the directory doesn't have enough disk space.	949
HWN025040I The report title report with ID report id is being saved as report file name in the full path directory.	949
HWN025041I The report title report with ID report id was saved as report file name in the full path directory.	949
HWN099990I The method name of the Device Server method of the device server returned return value @ (execution context information).	950
HWN099991I info trace message@ (execution context information)	950
HWN099992W warning trace message@ (execution context information)	950
HWN099993E error/exception trace message @ (execution context information)	950
HWN099994I An object of class name of the class has been instantiated @ (execution context information).	951
HWN099995I == class name.method name entry, parameter(s): parameter value(s) @ (execution context information).	951
HWN099996I == class name.method name exit, return value: method return value (execution time in milliseconds) @ (execution context information).	951
HWN099997I External service name of the (DM) external service will be invoked with parameter(s) parameter value(s) @ (execution context information).	951
HWN099998I Invocation of external service name of the (DM) external service returned result invocation result @ (execution context information).	952
HWN099999I The method name of the device server method of the device server was invoked with parameters invocation parameters @ (execution context information).	952
HWN6001I Operation operation completed successfully.	952
HWN6002I Unable to set up NLS message file processing.	952
HWN6003E Unable to set up tracing.	953
HWN6004E Operation operation failed.	953
HWN6005E Unknown operation operation.	953
HWN6006E Could not initialize connection, rc is rc	953
HWN6007E Could not parse command arguments: arg	953
HWN6008E Error processing command: command	954
HWN6009E Missing 'operation' property in input file	954
HWN6010I Task arg completed successfully	954
HWN6011E Task arg failed	954
HWN6012E Cannot connect to this IP, switching to IP	955
HWN6013E An IBM XIV CLI command failed. The error is arg.	955
HWN6014I Command arg completed successfully	955
HWN6015E Command command failed.	955
HWN6016I Connected with IP address IP	955
HWN6017I Started creation of volume with size size in pool pool.	956
HWN6018I Volume creation completed successfully. New volume volume created with size size in pool pool.	956
HWN6019I Started deletion of volume volume in pool pool.	956
HWN6020I Volume deletion completed successfully. Volume volume deleted in pool pool	956
HWN6021I Started creation of host host with initiator ports ports	957
HWN6022I Finished creation of host host with initiator ports ports	957
HWN6023I Started assignment of volume volume to host host.	957

HWN6024I Finished assignment of volume volume to host host.	957
HWN6025I Started unassignment of volume volume from host host.	958
HWN6026I Finished unassignment of volume volume from host host	958
HWNEP0001I Successfully persisted number of count instances.	958
HWNEP0002E The probe failed as the data collector couldn't write to its output file, value.	958
HWNEP0003E A DS8000 ESSNI command failed. The error code is error_code.	959
HWNEP0004I Started creation of volume group volume_group.	959
HWNEP0005I Finished creation of volume group volume_group with subsystem volume group number number .	959
HWNEP0006I Started adding volumes, with serial numbers volume_list, to subsystem volume group volume_group_number .	959
HWNEP0007I Finished adding volumes to volume group.	960
HWNEP0008I Started assignment of host host on subsystem subsystem to volume group volume_group.	960
HWNEP0009I Finished assigning host on subsystem subsystem to volume group volume_group.	960
HWNEP0010I Started removing volumes, with serial numbers volume_list, from subsystem volume group volume_group_number	960
HWNEP0011I Finished removing volumes, with serial numbers volume_list, from subsystem volume group volume_group_number .	961
HWNEP0012I Increased virtual capacity of storage pool storage_pool on subsystem subsystem to size size .	961
HWNEP0013I Collecting pools for storage system storage system identification.	961
HWNEP0014I Collecting volumes for lss logical subsystems on storage system storage system identification.	961
HWNEP0015I Collecting volume groups on storage system storage system identification.	962
HWNEP0016I Collecting hosts on storage system storage system identification.	962
HWNEP0017I value Hosts Found.	962
HWNEP0018I Launching external process for devices devices.	962
HWNEP0019I External process for devices devices completed successfully.	962
HWNEP0020E Could not create connection to NAPI The IP for the NAPI..	963
HWNEP0021E ESSNI API query for Space Efficient Volume failed with ESSNI code ESSNI Code. Data from ESSNI is considered suspect.	963
HWNEP0022I Started deletion of volume group with number volume_group_number.	963
HWNEP0023I Finished deletion of volume group with number volume_group_number.	963
HWNEP0100I Probing Volumes for Storage System: value	964
HWNEP0101I Number of Volumes currently found: value. Continuing to probe Volumes.	964
HWNEP0102I value Volumes found.	964
HWNEP0103I Probing Configured Disks for Storage System: value.	964
HWNEP0104I Number of Configured Disks Found Currently: value. Continuing to Probe Disks.	965
HWNEP0105I value Configured Disks Found.	965
HWNEP0106I Probing Views of Host Initiator access to Volumes.	965
HWNEP0107I Finished probing Views.	965
HWNEP0108I Initializing Probe for storage system storage system identification.	966
HWNEP0109I Probe for storage system storage system identification completed.	966
HWNEP0110I Collecting Nodes and fibre channel ports for storage system storage system identification.	966
HWNEP0111E The connection to the storage device failed. The error code is error_code.	966
HWNEP0113E The cluster IP address is not specified in the configuration file.	967
HWNEP0114E The trustore location is not specified in the configuration file.	967
HWNEP0115E The IBM Spectrum Control data is out of synch with the device configuration and a re-probe is required for device device name .	967
HWNEP0116E The user configured for the subsystem subsystem name is not permitted to perform the requested action.	967
HWNEP0117E The virtual disk (VDisk)-to-host mapping was not created because the volume vdiskName is already mapped to the hostName host for the Device deviceName	968
HWNEP0115I Starting Control Process for storage system storage system identification.	968
HWNEP0116I Started deletion of volume VolumeID on subsystem Subsystem .	968
HWNEP0117I Volume deletion completed successfully. Volume VolumeID on subsystem Subsystem was deleted.	969
HWNEP0118I Started adding Managed Disk(s) Managed Disk ID to Managed-disk group Managed Disk group name on subsystem Subsystem.	969
HWNEP0119I Finished adding Managed Disk(s) Managed Disk ID to Managed-disk group Managed Disk group name on subsystem Subsystem.	969
HWNEP0120I Started creation of volume with size Size in pool Pool on subsystem Subsystem	969
HWNEP0121I Volume creation completed successfully. New volume VolumeID created with size Size in pool Pool on subsystem Subsystem .	970
HWNEP0122I Started assignment of volume VolumeID on subsystem Subsystem to initiator port Initiator Port on host Host .	970
HWNEP0123I Finished assignment of volume VolumeID on subsystem Subsystem to initiator port Initiator Port on host Host Name .	970

HWNEP0124I Started unassignment of volume VolumeID on subsystem Subsystem from initiator port Initiator Port on host Host Name .	970
HWNEP0125I Finished unassignment of volume VolumeID on subsystem Subsystem from initiator port Initiator Port on host Host Name .	971
HWNEP0126I Started creation of host host name on subsystem Subsystem with initiator ports WWPNs .	971
HWNEP0127I Finished creation of host host name on subsystem Subsystem with initiator ports WWPNs .	971
HWNEP0128I Host name hostName already exists for the WWPNs wwpns on the device Subsystem	971
HWNEP0129E The operation failed because the device returned unexpected values.	972
HWNEP0130E A IBM XIV CLI command failed. The error is error_code.	972
HWNEP0131I The host definition for host host name on subsystem Subsystem contains additional Hostports WWPNs that will also be assigned to Volume VolumeID .	972
HWNEP0132E The unassignment of Volume VolumeID from hostport WWPN failed because the definition for host host name on subsystem Subsystem contains additional hostports WWPNs .	972
HWNEP0133E Error invoking the external process for device device name .	973
HWNEP0134E Following exception occurred: exception .	973
HWNEP0135E External process failed with error code error code .	973
HWNEP0136E Error connecting to IP address with user ID user ID .	973
HWNEP0137I Job job ID submitted for device device name .	974
HWNEP0138I External process was successfully executed for device device name .	974
HWNEP0139I An instruction was issued to add a copy of the volume_name volume_size-byte volume in the pool_name pool on the storage_system_name storage system.	974
HWNEP0140I The copy of the volume_name volume_size-byte volume with the copy ID of VolumeID in the pool_name pool on the storage_system_name storage system was added successfully.	974
HWNEP0141I Probing Internal Drives for Storage System: value.	975
HWNEP0142I Number of Internal Drives Found Currently: value. Continuing to Probe Internal Drives.	975
HWNEP0143I value Internal Drives Found.	975
HWNEP0144I Probing Pools for Storage System: value.	975
HWNEP0145I Number of Pools Found Currently: value. Continuing to Probe Pools.	976
HWNEP0146I value Pools Found.	976
HWNEP0147I Collecting asset and status information about storage_system_id storage system.	976
HWNEP0148I Collecting cluster information for storage_system_id storage system.	976
HWNEP0149I Collecting file system exports for storage_system_id storage system.	976
HWNEP0150I Collecting nodes for storage_system_id storage system.	977
HWNEP0151I Collecting file systems for storage_system_id storage system.	977
HWNEP0152I Collecting pools for storage_system_id storage system.	977
HWNEP0153I Collecting file system storage for storage_system_id storage system.	977
HWNEP0154I Collecting filesets for storage_system_id storage system.	978
HWNEP0155I Collecting links between file systems and nodes for storage_system_id storage system.	978
HWNEP0156I Collecting quotas for storage_system_id storage system.	978
HWNEP0157I Collecting file system snapshots for storage_system_id storage system.	978
HWNEP0158I Collecting capacity for file_system_id file system.	979
HWNEP0159I Creating the export export name on cluster cluster name .	979
HWNEP0160I The export export name on cluster cluster name with path export path was created.	979
HWNEP0161I The export export name on cluster cluster name is being changed.	979
HWNEP0162I The export export name on cluster cluster name was changed.	979
HWNEP0163I Setting quota quota type - quota name on file system file system name .	979
HWNEP0164I Quota quota type - quota name on file system file system name has been created.	980
HWNEP0165I Checking quota on file system file system name .	980
HWNEP0166I Quota on file system file system name has been checked.	980
HWNEP0167I The export export name on cluster cluster name is being removed.	980
HWNEP0168I The export export name on cluster cluster name was removed.	981
HWNEP0169E Command: command did not complete. IBM SONAS CLI message	981
HWNEP0170I Creating fileset fileset name on file system files system name .	981
HWNEP0171I Successfully created fileset fileset name on file system file system name .	981
HWNEP0172I Removing fileset fileset name on file system files system name .	981
HWNEP0173I Successfully removed fileset fileset name on file system file system name .	982
HWNEP0174I Modifying fileset fileset name on file system files system name .	982
HWNEP0175I Successfully modified fileset fileset name on file system file system name .	982
HWNEP0176I Creating file system file system on cluster cluster name .	982
HWNEP0177I Successfully created file system file system on cluster cluster name .	983

HWNEP0178I Changing file system file system on cluster cluster name .	983
HWNEP0179I Successfully changed file system file system on cluster cluster name .	983
HWNEP0180I Removing file system file system on cluster cluster name .	983
HWNEP0181I Successfully removed file system file system on cluster cluster name .	984
HWNEP0182I Mounting file system file system .	984
HWNEP0183I Successfully mounted file system file system .	984
HWNEP0184I Unmounting file system file system .	984
HWNEP0185I Successfully unmounted file system file system .	984
HWNEP0186I Linking fileset fileset on file system file system .	985
HWNEP0187I Successfully linked fileset fileset on file system file system .	985
HWNEP0188I Unlinking fileset fileset on file system file system .	985
HWNEP0189I Successfully unlinked fileset fileset on file system file system .	985
HWNEP0190E The IBM Spectrum Control server could not connect to IP address using the SSH protocol.	986
HWNEP0191E The IBM Spectrum Control server could not authenticate with IP address using the SSH protocol.	986
HWNEP0192E The IBM Spectrum Control server could not execute a command on the IBM Storwize V7000 Unified/IBM SONAS device at IP address .	986
HWNEP0193E The command name command failed because the following command executed on the NAS device failed with the return code return code : command returned: command output	986
HWNEP0195I modify fileset	987
HWNEP0196I change export	987
HWNEP0197I create export	987
HWNEP0198I remove export	987
HWNEP0199I create fileset	988
HWNEP0200I link fileset	988
HWNEP0201I remove fileset	988
HWNEP0202I unlink fileset	988
HWNEP0203I change filesystem	988
HWNEP0204I create filesystem	989
HWNEP0205I mount filesystem	989
HWNEP0206I remove filesystem	989
HWNEP0207I unmount filesystem	989
HWNEP0208I check quota	989
HWNEP0209I set quota	990
HWNEP0210I probe	990
HWNEP0211W The command name command completed, however during post-processing the following command executed on the NAS device failed with the return code return code : command returned: command output As a result, the IBM Spectrum Control database is now out of sync with the current state of the NAS device.	990
HWNEP0212I create disk in modifying file system	990
HWNEP0213I Started deletion of host host name on subsystem Subsystem .	991
HWNEP0214I Finished deletion of host host name on subsystem Subsystem .	991
HWNEP0215I Collecting cache information for storage_system_id storage system.	991
HWNEP0216I remove cached source	991
HWNEP0217I create cached node	992
HWNEP0218I remove cached node	992
HWNEP0219I create cache	992
HWNEP0220I remove cache	992
HWNEP0221I modify cache source	992
HWNEP0222I Creating cache source cache_source_name on cluster file_system_name.	993
HWNEP0223I Created cache source cache_source_name on cluster file_system_name.	993
HWNEP0224I Removing cache source cache_source_name on cluster file_system_name.	993
HWNEP0225I Removed cache source cache_source_name on cluster file_system_name.	993
HWNEP0226I Modifying cache source cache_source_name on cluster file_system_name.	994
HWNEP0227I Modified cache source cache_source_name on cluster file_system_name.	994
HWNEP0228I Creating cache cache_name on file system file_system_name.	994
HWNEP0229I Created cache cache_name on file system file_system_name.	994
HWNEP0230I Removing cache cache_name on file system file_system_name.	994
HWNEP0231I Removed cache cache_name on file system file_system_name.	995
HWNEP0232I Modifying cache cache_name on file system file_system_name.	995
HWNEP0233I Modified cache cache_name on file system file_system_name.	995
HWNEP0234I modify cache	995

HWNEP0235I create cached source	996
HWNEP0236I Configuring nodes node_names as cached nodes.	996
HWNEP0237I Configured nodes node_names as cached nodes.	996
HWNEP0238I Unconfiguring cached nodes node_names.	996
HWNEP0239I Unconfigured cached nodes node_names.	996
HWNEP0240I Executed control operation on cache cache_name on filesystem file_system_name .	997
HWNEP0241I control cache	997
HWNEP0242I run prepop	997
HWNEP0243I list prepop	997
HWNEP0244I Retrieving cache prepopulation status for file system file system name .	998
HWNEP0245I Cache prepopulation status for file system file system name has been retrieved.	998
HWNEP0246I Prepopulate cache data for fileset fileset_name on file system file_system_name using policy policy_name.	998
HWNEP0247I Command to pre populate cached data for fileset fileset_name was successful.	998
HWNEP0248W An error was encountered while parsing protocol options for export export_name. The options were not persisted, the probe will continue.	999
HWNEP0249W The connection to the storage device failed. The error code is error_code.	999
HWNEP0250I Started adding initiator port(s) initiator ports to host host name on subsystem subsystem .	999
HWNEP0251I Finished adding initiator port(s) initiator ports to host host name on subsystem subsystem .	1000
HWNEP0252W A CLI command completed with warning. The warning message is : warning_message	1000
HWNEP0253W Volume creation completed with warning. New volume VolumeID created with size Size in pool Pool on subsystem Subsystem .	1000
HWNEP0254W Volume deletion completed with warning. Volume VolumeID on subsystem Subsystem was deleted.	1000
HWNEP0255I The task to execute the recommendations for optimizing the volumes on the storage system with an ID of storage_system_id was paused.	1001
HWNEP0256I The task for optimizing the volumes on the storage system with an ID of storage_system_id was canceled.	1001
HWNEP0257I The task for optimizing the volumes on the storage system with an ID of storage_system_id was resumed.	1001
HWNEP0258E The optimization task cannot be paused because the synchronization rate for the volume cannot be reset. The ID of the volume is volume_id and the ID of the storage system is storage_system_id.	1001
HWNEP0259E The optimization task cannot be resumed because the synchronization rate for the volume cannot be reset. The ID of the volume is volume_id and the ID of the storage system is storage_system_id.	1002
HWNEP0260I Started creation of host port host port name on storage system Storage System with initiator port WWPN .	1002
HWNEP0261I Finished creation of host port host port name on storage system Storage System with initiator port WWPN .	1002
HWNEP0262E The recommendation for the volume_name volume was not implemented because the command that was issued by the storage virtualizer returned the following error: error_message	1002
HWNEP0263I The synchronization of the volume_name volume with the volume copy was successful.	1003
HWNEP0264E The synchronization of the volume_name volume with the volume copy was unsuccessful.	1003
HWNEP0265E The CLI command that was issued for the storage_system_name storage system failed and generated the following error: error_message	1003
HWNEP0266I Started expanding the capacity of volume volume on subsystem subsystem from oldsize to newsize bytes.	1004
HWNEP0267I Finished expanding the capacity of volume volume on subsystem subsystem to newsize bytes.	1004
HWNEP0268E The server operating system or version is not supported by IBM Spectrum Control for IBM Spectrum Scale.	1004
HWNEP0269E The IBM Spectrum Scale cluster information cannot be displayed. All the nodes in the cluster are down or cannot be contacted.	1004
HWNEP0270E The switch cannot respond to SNMP queries because of an authentication error.	1005
HWNEP0271E The following password decryption exception occurred: exception	1005
HWNEP0272E The switch cannot respond to SNMP queries because of the following exception: exception	1005
HWNEP0273E The following exception occurred because the OID format is incorrect: exception	1005
HWNEP0274E The switch cannot respond to SNMP queries because of a timeout problem.	1006
HWNEP0270I Retrieved the file module address file_module_address.	1006
HWNEP0271I No quota data was collected. Quota limits are not activated for the file systems that are associated with the IBM Spectrum Scale cluster.	1006
HWNEP0272I Collecting file systems that are mounted on the nodes of storage system storage_system_id.	1007
HWNEP0275W One or more operations failed for the CLI command that was issued for the storage system. The following error was generated: errorMsg .	1007
HWNEP0276E Command execution failed because sudo is not installed.	1007
HWNEP0277I Commands are executed through 'sudo'.	1007
HWNEP0278E User can not execute command through sudo.	1008
HWNEP0279I Collecting remote file systems for storage_system_id storage system.	1008
HWNEP0280I Collecting remote file systems that are mounted on the nodes of storage system storage_system_id.	1008
HWNEP0281E The switch is returning corrupted data.	1008

HWNEP0282E Zoning data cannot be collected because there is a transaction in progress on the switch	1008
HWNEP0283E VSAN vsan_name was not found.	1009
HWNEP0284E No zoning data collected from the switch.	1009
HWNEP0285E Cannot authenticate to the object storage using the specified user credentials.	1009
HWNEP0286E An object storage request failed on the GPFS cluster.	1009
HWNEP0287E Error when collecting Accounts information from Object Storage Service using REST protocol.	1010
HWNEP0288E Error when collecting Containers information from Object Storage Service using REST protocol.	1010
HWNEP0281I Collecting object storage accounts for storage_system_id storage system.	1010
HWNEP0282I Collecting object storage containers for storage_system_id storage system.	1011
HWNEP0289E Failed to retrieve container information because the number of containers now exceeds the maximum number of containers that can currently be collected for an account (MAX Containers).	1011
HWNEP0290E The probe failed to retrieve object storage account information from the storage system storage_system_id because the userid user does not have the required authority.	1011
HWNEP0291E The probe failed to retrieve object storage container information from the storage system storage_system_id because the userid user does not have the required authority.	1012
HWNEP0292E Cannot query the object service for information about accounts and containers as the specified user does not have admin privileges.	1012
HWNEP0293W The probe did not collect information about all the object accounts for the storage system storage_system_id as the userid user does not have sufficient authority on the storage system.	1012
HWNEP0294W An authentication error prevented the switch from responding to SNMP queries regarding the ability of the switch to perform zone control.	1013
HWNEP0295W A timeout prevented the switch from responding to SNMP queries regarding the ability of the switch to perform zone control.	1013
HWNEP0296W The switch cannot respond to SNMP queries to check the ability of the switch to perform zone control because of the following exception: exception	1013
HWNEP0297W The switch cannot respond to SNMP queries to check the ability of the switch to perform zone control because of the following exception: exception	1014
HWNEP0298I Collecting IBM Cloud Object Storage configuration.	1014
HWNEP0299I Collecting IBM Cloud Object Storage vaults.	1014
HWNEP0300I Collecting detailed IBM Cloud Object Storage status.	1014
HWNEP0301W The IP address ip_address for the FlashSystem storage system is not the management IP address.	1015
HWNEP0302I Collecting Transparent Cloud Tiering information for storage_system_id storage system.	1015
HWNEP0303I No Transparent Cloud Tiering configuration was detected on the IBM Spectrum Scale cluster.	1015
HWNEP0304E Cannot connect to IBM Cloud Object Storage.	1015
HWNEP0305I Collecting disk controllers for storage system storage system identification.	1016
HWNEP0306I Collecting disks for storage system storage system identification.	1016
HWNEP0307I Collecting CIFS shares for storage system storage system identification.	1016
HWNEP0308I Collecting NFS exports for storage system storage system identification.	1016
HWNEP0309I The data is being collected by the data collector: data collector host.	1017
HWNEP0310I Discovery found number storage systems.	1017
HWNEP0311I Probing nodes or directors for storage system name storage system.	1017
HWNEP0312I Probe found number nodes or directors.	1017
HWNEP0313I Probing pools for storage system name storage system.	1018
HWNEP0314I Probe found number pools.	1018
HWNEP0315I Probing disk groups for storage system name storage system.	1018
HWNEP0316I Probe found number disk groups.	1018
HWNEP0317I Probing disks for storage system name storage system.	1018
HWNEP0318I Probe found number disks.	1019
HWNEP0319I Probing host connections for storage system name storage system.	1019
HWNEP0320I Probing ports for storage system name storage system.	1019
HWNEP0321I Probing volumes for storage system name storage system.	1019
HWNEP0322I Probe found number volumes. Continuing to probe volumes.	1020
HWNEP0323I Probe found number volumes for storage system name storage system.	1020
HWNEP0324I Probing NAS nodes for storage system name storage system.	1020
HWNEP0325I Probe found number NAS nodes.	1020
HWNEP0326I Probing file systems that are mounted on the NAS nodes of storage system name storage system.	1021
HWNEP0327I Probe found number file systems.	1021
HWNEP0328I Probing file system exports for storage system name storage system.	1021
HWNEP0329W profile name version version number SMI-S Profile is not supported.	1021
HWNEP0330E Unable to find minimum required SMI-S profile to proceed with requested task.	1022

HWNEP0331I	Probing copy pair relationships for storage system name storage system.	1022
HWNEP0332I	Probe found number copy pairs.	1022
HWNEP1111E	There is no connection for the specified device.	1022
HWNEP1112E	No SSH server found on the device.	1022
HWNEP1113E	Unsupported version.	1023
HWNEP1114E	The connection to the device failed.	1023
HWNEP1115E	Authentication failed.	1023
HWNEP1116E	Unknown host.	1023
HWNEP1117E	The passphrase is wrong.	1024
HWNEP1118E	The passphrase is missing.	1024
HWNEP1119E	Unknown error.	1024
HWNEP1120E	ESSNI not available.	1024
HWNEP1121E	Private key not found.	1024
HWNEP1122E	Invalid format for the private key.	1025
HWNEP1123E	Unable to establish a connection to the device through http port 80.	1025
HWNEP1124I	Log collection successfully started for storage system name storage system.	1025
HWNEP1125E	The activity requested is already in progress on storage system name storage system.	1025
HWNEP1126I	The support log activity has started successfully storage system name storage system.	1026
HWNEP0112E	The CLI command that was issued for the storage system failed and generated the following error: error_message	1026
HWNPMP5412E	The process failed because it was unable to find the Export Tool. Expected location was loc of tool	1026
NAD0001I	Connecting to hostname using protocol protocol.	1026
NAD0002W	Connection to hostname failed using protocol protocol: error.	1027
NAD0003I	Connected to hostname using protocol protocol.	1027
NAD0005E	Connection to hostname failed using protocol protocol: error message.	1027
NAD0006E	Exception thrown for method method name: error message.	1027
NAD0007I	Closing connection to hostname.	1027
NAD0008E	Invalid protocol protocol passed to method name.	1027
NAD0010E	Invalid parameter(s) parameter name passed to method name.	1028
NAD0013I	Installing GUID on remote machine: hostname.	1028
NAD0014I	GUID successfully installed on remote machine: hostname.	1028
NAD0018E	Command on remote machine: host name failed. Error code = value executing command value.	1028
NAD0019E	Parameter parameter passed to method is null or 0 length.	1028
NAD0055E	Failed to connect to remote host host.	1028
NAD0097I	Opening connection to hostname.	1028
NAD0180I	Installing re-distributable package on .	1029
NAD0181I	Install of re-distributable package on succeeded.	1029
NAD0182E	Failed to install re-distributable package on .	1029
NAD0186I	Trying to locate package TIVguid using pkginfo ...	1029
NAD0187I	Package TIVguid is not installed.	1029
NAD0188I	Checking TIVguid default install path : path ...	1029
NAD0259W	Unable to determine Storage Resource Agent version on host . Fabric Discovery will not be invoked.	1030
NAD0145E	Cannot get version information from agent on host .	1030
NAD0146E	The connection to remote machine failed because the Remote Execution and Access component was unable to create a temporary directory on the remote machine. Remove unneeded ~CSRI* directories in the remote machine's temporary directory.	1030
NAD0156E	The server host_address cannot be reached because the host name or IP address is not recognized.	1030
NAD0157E	The server host_name cannot be contacted. The server might be down, unreachable due to network problems, or the SSH credentials might be invalid.	1031
NAD0260I	Agent is active.	1031
NAD0272W	The connection to the Storage Resource Agent on host name was not established. Retrying using the IP address.	1031
NAD0274E	An SSH certificate certificate name already exist.	1031
NAD0275E	Failed to connect to remote host hostname and port. Failed to establish a secure connection.	1032
NAD0276E	Failed to connect to remote host hostname and port. Failed to establish a secure connection because the SSL handshake failed.	1032
NAD0277E	Failed to connect to remote host hostname and port. Failed to establish a secure connection because of an invalid SSL key.	1032
NAD0278E	Failed to connect to remote host hostname and port. Failed to establish a secure connection because the identity of the peer could not be verified.	1032
NAD0279E	Failed to connect to remote host hostname and port. Failed to establish a secure connection because of an SSL protocol error.	1033

NAD0281E	The Storage Resource agent cannot be deployed because of insufficient space or other issues on the target system.	
	The error is: error message.	-1033
BTAVM2272W	Unsupported virtual disk backing info for disk "Disk name" of hypervisor Hypervisor name, virtual machine "VM name": Virtual disk type.	-1033
BTAVM2273W	Unable to find file "File name" which is the backing device of the virtual disk "Disk name" of hypervisor Hypervisor name, virtual machine "VM name".	-1034
BTAVM2274W	Probe of hypervisor Name of the Hypervisor completed with warnings.	-1034
HWNAS - Agentless Server messages		1034
HWNAS0001I	Successfully created server server.	1034
HWNAS0002I	Successfully deleted server server.	1035
HWNAS0003E	The host name or IP address {0} is not valid.	1035
HWNAS0004E	Cannot add port portWWPN because it belongs to server serverName.	1035
HWNAS0005E	Cannot add port portWWPN because it belongs to switch switchName.	1035
HWNAS0006E	Cannot add port portWWPN because it belongs to storage system storageSystemName.	1036
HWNAS0007W	Server serverName was not created because it exists already.	1036
HWNAS0008I	Successfully created mergeServerName server by merging numberOfServers servers.	1036
HWNAS0009I	Successfully separated serverName server into numberOfServers individual servers.	1036
HWNAS0010E	The serverId agentless server that you selected does not exist.	1036
HWNAS0011I	You cannot separate the serverName agentless server because it is not based on storage system host connection	1037
HWNAS0012I	You cannot separate the serverName agentless server because it is already defined on the smallest possible separation boundary.	1037
HWNAS0013I	You cannot merge the selected agentless servers into the serverName agentless server because they are not all based on storage system host connections.	1037
HWND A - Data Manager API messages		1038
HWND A0001I	Operation Name of the operation processed successfully.	1039
HWND A0002E	Mandatory parameter Name of the mandatory parameter which is missing missing	1039
HWND A0003E	Invalid parameter Name of the parameter which was invalid	1040
HWND A0004E	An internal error occurred.	1040
HWND A0005E	The server encountered an error when it was accessing the database.	1040
HWND A0006E	The name provided while creating a new group is already in use.	1040
HWND A0007E	An external key could not be identified for the provided type The constant integer type of the Group element and id The unique integer database ID of the Group element.	1041
HWND A0008E	The specified attribute invalid attribute name is not a valid attribute.	1041
HWND A0009E	An internal ID could not be identified for the provided type The constant integer type of the Group element and external key The unique external key of the Group element.	1041
HWND A0010I	The following elements are already members of the group The group: The keys of the elements.	1041
HWND A0011I	The following elements are not members of the The group Group and cannot be removed: The element key.	1042
HWND A0012E	Adding a Group with the name Name of the proposed new member to the Name of the parent group Group would create a circular relationship that is not allowed.	1042
HWND A0013E	The input parameter value input parameter value for input input parameter name exceeds the maximum allowable length of number of allowable characters characters.	1042
HWND A0014E	The provided Group attribute value Group attribute value for the Group attribute name Group attribute contains invalid characters. The following characters are not allowed, \\\/*?>< ."	1042
HWND A0015E	You are not the original creator of the provided Group name Group name.	1043
HWND A0016E	The provided Tiering Policy name Tiering Policy name is not unique.	1043
HWND A0017E	The provided Group Group name or ID does not exist.	1043
HWND A0018E	The provided Tiering Policy name Tiering Policy name does not exist.	1043
HWND A0019E	The provided candidate and destination Group names, Group name, cannot be the same.	1044
HWND A0020E	The provided condition condition type is not valid.	1044
HWND A0021E	The provided operand operand type is not valid.	1044
HWND A0022E	The provided condition condition type is either already applied to this tiering policy or conflicts with an existing condition, existing condition type.	1044
HWND A0023E	The requested priority value priority value is invalid.	1045
HWND A0024E	The specified Group name Group name is not unique.	1045
HWND A0025E	Cannot add the specified resource because the resource type, element type, is not supported as a child of the group.	1045
HWND A0026E	Cannot add the specified group, Group name, because the group type, type, is not supported as a child of the application.	1045
HWND A0027E	The first option specified in the file must be -appgroupname.	1046
HWND A0028E	The argument of the option option is missing at or before line Line Number : Line	1046
HWND A0029E	Both option1 and option2 were specified at or before line Line Number : Line	1046

HWNDAA0030E The option option is missing at or before line Line Number : Line	1046
HWNDAA0031E Neither option1 nor option2 was specified at or before line Line Number : Line	1047
HWNDAA0032E Invalid number of parameters for option option at or before line Line Number : Line	1047
HWNDAA0033E Incomplete options sequence before end of file.	1047
HWNDAA0034E Invalid option option at line Line Number : Line	1047
HWNDAA0035E Invalid resource type type at line Line Number : Line	1048
HWNDAA0036E Invalid sequence of options at or before line Line Number : Line	1048
HWNDAA0037E Syntax error, quote sequence not properly closed at line Line Number : Line	1048
HWNDAA0038E Option option is not allowed for resource type type at or before line Line Number : Line	1048
HWNDAA0039E The input data for modifying the application groups is missing.	1048
HWNDAA0040E An invalid element was encountered in the input data.	1049
HWNDAA0041E The application group name is missing from the input data.	1049
HWNDAA0042E The operation is missing from the input data.	1049
HWNDAA0043E The resource type is missing from the input data.	1049
HWNDAA0044E The server name is missing from the input data.	1050
HWNDAA0045E The device name is missing from the input data.	1050
HWNDAA0046E Invalid values were specified for the server, device or cluster names in the input data.	1050
HWNDAA0047E Member names and the tags were specified for the same operation.	1050
HWNDAA0048W The following entities were not found: Entities.	1051
HWNDAA0049W No entities were found for the tags: Tags	1051
HWNDAA0050E The member names or tags were not specified for the operation.	1051
HWNDAA0051W The group Name of the proposed new member cannot be added to itself.	1051
HWNDAA0052W The group Name of the proposed new member cannot be added to the Name of the parent group group because it creates a circular relationship that is not allowed.	1051
HWNDAA0053W The group Name of the group contains child groups and cannot be deleted. The child groups must be deleted before the parent group can be deleted.	1052
HWNDAA0054E The filter mask that was used to create or edit a group filter is currently being used.	1052
HWNDAA0055E The argument argument for the parameter parameter on line Line Number : Line is invalid.	1052
HWNDAA0056E The first option specified in the file must be -id.	1053
HWNDAA0057E The specified Group Group name is not of type type.	1053
HWNDAA0058W These groups have same names as existing members of the group The group: The keys of the elements. They were not added to the group.	1053
HWNDAA0059E The specified tag key Tag key is not valid.	1053
HWNDAA0060W These group members are also members of another group: The groups. They are not deleted.	1054
HWNDAA0061W These group members cannot be moved up one level in hierarchy due to name conflicts: The groups. The group is not deleted.	1054
HWNDAA0062E The specified Group Group name is not a department group.	1054
HWNDAA0063W These group members cannot be moved as top level groups in hierarchy due to name conflicts: The groups. No group members were removed from the group.	1054
HWNDAA0064E An application with the same name already exists.	1055
HWNDAA0065E A department with the same name already exists.	1055
HWNDAA0066E Invalid values were specified for the device, cluster or file system names in the input data.	1055
HWNDAA0067E Resources of type Type of resource cannot be added to an application or removed from an application using tags	1055
HWNDAA0068E The application cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.	1056
HWNDAA0069E The department cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.	1056
HWNDAA0070W The File Systems: {0} were not added to the application {1} because they are NAS file systems.	1056
HWNDAA0071E Member IDs and the tags were specified for the same operation.	1056
HWNDAA0072E Member IDs should be specified in the input data for resources of type appgroup.	1057
HWNDAA0073E A general group with the same name already exists.	1057
HWNDAA0074E The general group cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.	1057
HWNDAA0075E A dashboard with the same name already exists.	1057
HWNDAA0076E The dashboard group cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.	1058
HWNDAA0077E A policy group with the same name already exists.	1058
HWNDAA0078I The Name of the policy group policy group was removed.	1058
HWNPM - Performance manager messages	1058

HWNPM0001E	The specified summarization level (level) is invalid. It must be an integer value between minimum and maximum, inclusive.	1066
HWNPM0002E	The specified device category (category) is invalid. It must be an integer value between minimum and maximum, inclusive.	1066
HWNPM0003E	The specified device type (type) is invalid. It must be an integer value between minimum and maximum, inclusive.	1067
HWNPM0004E	The specified component type (type) is invalid. It must be an integer value between minimum and maximum, inclusive.	1067
HWNPM0006E	The string specified as parameter (string) exceeded its allowed length (maximum length).	1067
HWNPM0007E	The value specified as parameter (value) is invalid.	1067
HWNPM0008E	A required parameter is missing (null).	1068
HWNPM0010E	The specified device ID (device ID) is invalid. It must conform to the pattern 'name+nameFormat'.	1068
HWNPM0011E	The specified component ID (component ID) is invalid. It must be a simple WWN (16 hexadecimal characters).	1068
HWNPM0012E	The specified component ID (component ID) was not found or is not unique in the IBM Spectrum Control database.	1069
HWNPM0013E	The specified component ID (component ID) is invalid.	1069
HWNPM0015E	Failed to retrieve the requested data because the service is unavailable.	1069
HWNPM0021E	The device identifier specified as parameter (device ID) is invalid.	1069
HWNPM0090E	Failed to retrieve the requested data because the service is unavailable.	1070
HWNPM0099E	The requested operation failed because of an internal error.	1070
HWNPM0101E	Unable to create the specified performance service instance {{0}}.	1070
HWNPM0200I	This operation (operation name)on Performance Manager was successful.	1071
HWNPM0201E	The device (device_id) that was passed to the method is invalid.	1071
HWNPM0202E	The device category (device_category) that was passed to the method is invalid.	1071
HWNPM0203E	The device type received (device_type) is invalid.	1071
HWNPM0204E	The device type - HOST - that was passed to the method is not supported.	1071
HWNPM0205E	The specified performance collection policy is invalid.	1072
HWNPM0209I	The device type and device category are valid.	1072
HWNPM0210E	Collector failed to start due to system failure.	1072
HWNPM0220E	Collector failed to stop due to system failure.	1072
HWNPM0230E	One or more of the specified performance collection policies are invalid.	1073
HWNPM0231W	The specified performance collection policy is ignored because it conflicts with another policy in the same parameter list.	1073
HWNPM0232E	The specified performance collection policy contains an unsupported interval length.	1073
HWNPM0233E	The specified performance collection policy contains an unsupported frequency.	1074
HWNPM0234E	The specified performance collection policy contains an unsupported duration.	1074
HWNPM0240E	The attempt to update the specified performance collection policies has failed.	1074
HWNPM0241E	The attempt to reset the specified performance collection policies has failed.	1074
HWNPM0242E	The attempt to remove the specified performance collection policies has failed.	1075
HWNPM0249W	An attempt to dynamically update one or more running performance collectors with a new performance collection policy has failed.	1075
HWNPM0250E	One or more default performance collection policies are missing from the database.	1075
HWNPM0281I	Performance monitoring is unavailable for resource resource_name because an agent for monitoring the resource was not defined. For IBM Spectrum Scale, the problem might occur because the data collection service cannot connect to port 9084 on the node where the collector component of the IBM Spectrum Scale performance monitoring tool is running.	1075
HWNPM0282I	Performance monitoring is unavailable for resource resource_name because the associated data sources are unable to collect performance data from the resource.	1076
HWNPM0283I	Performance monitoring is unavailable for resource_name because this resource does not support performance monitoring.	1076
HWNPM0284I	Performance monitoring is unavailable for resource resource_name because the associated agent does not have the required level of software agent_level.	1077
HWNPM0285I	Performance monitoring is unavailable for resource resource name because the associated agent is unable to fully monitor the resource.	1077
HWNPM0286I	Performance monitoring is unavailable for resource resource name because the associated SMI-S provider does not have the required SMI-S support.	1077
HWNPM0287I	Performance monitoring is unavailable for resource resource name because the resource or the associated agent does not support performance monitoring.	1078
HWNPM0288I	Performance monitoring is unavailable for resource resource name because the resource was not probed.	1078
HWNPM0289W	Performance monitoring is unavailable for resource resource_name because no agents are available.	1078
HWNPM0290E	Performance monitoring is unavailable for resource resource_name because the associated agent was could not be selected.	1079
HWNPM0291I	Performance monitoring is unavailable for switch resource_name because the switch has no ports.	1079

HWNPM0292I Performance monitoring is unavailable for switch resource_name because the switch was not probed using the correct agent.	1079
HWNPM0293I Performance monitoring is unavailable for FlashSystem resource_name because its SNMP agent is disabled. You can enable SNMP for FlashSystem storage systems in the FlashSystem GUI.	1080
HWNPM0300E There is an exception for each device processed in a multiple devices call.	1080
HWNPM0390E A system failure occurred.	1080
HWNPM0400I This operation (operation name)on Threshold Service was successful.	1081
HWNPM0401E The device (device_id) that was passed to the method is invalid.	1081
HWNPM0410E The Performance threshold policy that was passed to the method (threshold policy)is null.	1081
HWNPM0411E The Performance threshold that was passed to the method (threshold)is null.	1081
HWNPM0412E The Performance threshold filter that was passed to the method (filter)is null.	1082
HWNPM0420E The device type received (device_type) is invalid.	1082
HWNPM0421E There is no default performance threshold policy or default threshold filter for this device.	1082
HWNPM0425E There is an exception for each device processed in a multiple devices threshold call.	1082
HWNPM0590E Performance Manager failed due to system failure.	1083
HWNPM0600E Parameter number a number of the call made to the IBM Spectrum Control Performance Manager reporting API method name of the api is invalid. The invalid value is the invalid value of parameter descriptive name of the parameter.	1083
HWNPM0601E A request to continue the data retrieval can not be performed. Information for continuing the data retrieval does not exist.	1083
HWNPM0602E Support for the device type device type name is not available in the Performance Manager reporting API function method name.	1084
HWNPM0603E The performance reporting API method_name failed at time_of_failure as a result of an internal processing exception. The Performance Manager logs contain message message_ID that describes the internal processing exception.	1084
HWNPM0604E The sort order parameter of a call to the performance reporting API method_name contains a value not included in the report columns list, at position list_item in the sort order list.	1084
HWNPM0605E The report columns parameter of a call to the performance reporting API method_name contains a metric or counter type that is not available for a specified device of type device_type and specified component with type code component_type. The metric or counter type code is type_code.	1084
HWNPM0606E Unable to instantiate performance reporting service service class name.	1085
HWNPM0607E An error occurred while the performance data was being retrieved.	1085
HWNPM0630E An invalid operator (operator identifier) was specified for the filter expression.	1085
HWNPM0631E An invalid first operand (operand class) was specified for the filter expression. It must be a operand class class.	1086
HWNPM0632E An invalid first operand was specified for the filter expression. The data type of the operand (data type) is invalid or unsupported.	1086
HWNPM0633E An invalid second operand (operand class) was specified for the filter expression. It must be a operand class class.	1086
HWNPM0650E The IBM Spectrum Control Performance Manager reporting API method name failed as a result of exception the related exception from a call to method method name, of the lower-level service name internal service.	1086
HWNPM0651E The configuration data needed to generate the affected volumes and hosts report for the device device name was not found in the IBM Spectrum Control database.	1087
HWNPM2000I Performance monitoring is enabled.	1087
HWNPM2001E The IBM Spectrum Control Performance Manager is not operational.	1087
HWNPM2002E An initialization error occurred.	1088
HWNPM2003E Initialization of the Device server event service failed. No performance threshold exception alerts will be generated.	1088
HWNPM2004E Initialization of the product scheduler status service failed. The status of performance monitors will not be updated in the GUI.	1088
HWNPM2005E Initialization of the product configuration data service failed. Performance monitors cannot be started without this service.	1088
HWNPM2006E Initialization of the product configuration data service failed. Performance monitors cannot be started without this service.	1089
HWNPM2007E Initialization of the product counter data service failed for device type using agent type. Performance monitors will not be able to collect performance data from devices of this type.	1089
HWNPM2008E Initialization of the product metadata service failed. Performance monitors cannot be started without this service.	1089
HWNPM2009E Unable to instantiate lower level service service_class_name.	1090
HWNPM2010E Unable to instantiate the collection logic implementation service class name.	1090
HWNPM2011E Unable to instantiate the performance statistics data class class name.	1090
HWNPM2012I The product is using trace log directory log directory name.	1090
HWNPM2020W The performance monitor for device device name is not currently active, so a dynamic update of its monitor policy is not necessary.	1091
HWNPM2021W The performance monitor for device device name is not currently active, so a dynamic update of its threshold policy is not necessary.	1091

HWNPM2022E A performance monitor for device device name is already active. A new monitor for the same device cannot be started until the previous monitor completes or is cancelled.	1091
HWNPM2023W The performance monitor for device device_name is not currently active.	1092
HWNPM2024E Unable to find a monitor policy applicable to resource resource_name.	1092
HWNPM2025E Unable to find a threshold policy applicable to resource resource_name.	1092
HWNPM2026I The performance monitor's primary process has failed unexpectedly. Attempting to recover from the failure.	1092
HWNPM2027I The performance monitor threshold checker has failed unexpectedly. Attempting to recover from the failure.	1093
HWNPM2028I The performance monitor purge process has failed unexpectedly. Attempting to recover from the failure.	1093
HWNPM2029I Successfully recovered from the performance monitor failure.	1093
HWNPM2030E Unable to recover from the performance monitor failure. The performance monitor for the storage resource will be shut down.	1094
HWNPM2031E The performance monitor failed due to an internal error.	1094
HWNPM2032W The performance monitor for device device name is not currently using the default monitor policy, so a dynamic update of the policy is not necessary.	1094
HWNPM2033W The performance monitor for device device name is not currently using the default threshold policy, so a dynamic update of the policy is not necessary.	1095
HWNPM2040E The device key specified for the snapshot vote (key) was not found in the database. The device does not exist.	1095
HWNPM2050E Failed to get the latest configuration data for device device_name.	1095
HWNPM2051E No performance data was collected from device device_name for the current collection interval (time_stamp) because the performance monitor was stopped.	1095
HWNPM2052E No performance data was collected from device device_name for the current collection interval due to an error. Data was last collected at time_stamp.	1096
HWNPM2053E The new performance data collected from device device_name could not be saved in the database. Increase the size of the transaction log.	1096
HWNPM2054E The new performance data collected from device device_name could not be saved in the database. Increase the size of the database lock list.	1096
HWNPM2055E The new performance data collected from resource device name could not be saved.	1097
HWNPM2056E No performance data was collected from device device name for the current performance monitor job duration. The performance monitor job status is set to 'failed'.	1097
HWNPM2057E No performance data was collected from device device_name for the current collection interval because the performance monitor was stopped.	1097
HWNPM2058E No performance data was collected from device device_name for the current collection interval due to an error.	1097
HWNPM2060W The device does not support performance management for segment pool pool ID. Only incomplete performance data can be collected for array array ID.	1098
HWNPM2061W The device does not support performance management for segment pool pool ID. Only incomplete performance data can be collected for device adapter DA ID.	1098
HWNPM2062W Invalid error message saved in database	1098
HWNPM2100E The performance monitor for resource device name cannot be started because configuration data for the resource is not available.	1099
HWNPM2101E All agents that can collect performance data for resource device name are currently non-operational.	1099
HWNPM2102E The performance monitor for resource device name cannot be started because the resource might not support the collection of performance data.	1099
HWNPM2103W Agent agent name is non-operational. Attempting to find an alternative agent.	1100
HWNPM2104I The performance monitor policy was adjusted due to agent limitations. Current values in effect are: interval-length=interval-length, frequency=frequency.	1100
HWNPM2105E The performance monitor for resource resource name failed because the resource for enabling performance data collection cannot be reached.	1100
HWNPM2106E The performance monitor for device device name failed because of errors trying to enable performance data collection on the device or device agent: error description	1101
HWNPM2107E The performance monitor for device device name failed because of unrecognized errors trying to enable performance data collection on the device or device agent: error description	1101
HWNPM2108E The performance monitor for resource resource name failed during shutdown because the resource cannot be reached for terminating data collection.	1101
HWNPM2109E The performance monitor for resource resource name failed during shutdown because of errors during termination of performance data collection: error description	1102
HWNPM2110E The performance monitor for resource resource name failed during shutdown because of unrecognized errors during termination of performance data collection: error description	1102
HWNPM2111E The performance monitor for resource resource name failed because of errors retrieving the most recent configuration data for the resource.	1103
HWNPM2112I Agent agent name was selected for performance data collection from resource resource name.	1103
HWNPM2113I The performance monitor for resource resource name is starting in an active state.	1103

HWNPM2114I	The performance monitor for resource resource name is starting in a dormant state.	1103
HWNPM2115I	Monitor Policy: name="policy name", creator="policy creator", description="policy description"	1104
HWNPM2116I	Monitor Policy: retention period: sample data=length in days days, hourly data=length in days days, daily data=length in days days.	1104
HWNPM2117I	Monitor Policy: interval length=length in seconds secs, frequency=length in seconds secs, duration=length in hours hours.	1104
HWNPM2118I	Threshold Policy: name="policy name", creator="policy creator", description="policy description"	1105
HWNPM2119I	Threshold Policy: retention period: exception data=length in days days.	1105
HWNPM2120I	Threshold Policy: threshold name=name, component=component type, enabled=Yes or No, boundaries=critical stress boundary,warning stress boundary,warning idle boundary,critical idle boundary units.	1105
HWNPM2121I	Monitor Policy: interval length=length in seconds secs, frequency=length in seconds secs, duration=continue indefinitely.	1105
HWNPM2122W	No valid performance data was provided by the monitored resource. No performance data records were inserted into the database.	1106
HWNPM2123I	Performance data for resource timestamp date and time was collected and processed successfully. record count performance data records were inserted into the database repository.	1106
HWNPM2124W	Performance data continuity is broken. The device was possibly reset or rebooted. record count performance data records were discarded.	1106
HWNPM2125W	Aggregated performance values have been computed from the remaining data records, but their accuracy cannot be guaranteed.	1107
HWNPM2126I	The performance monitor for device device name is stopping because its intended duration has elapsed.	1107
HWNPM2127I	The performance monitor for device device name is stopping due to a user request.	1108
HWNPM2128E	The performance monitor for device device name is stopping due to an unexpected failure.	1108
HWNPM2129I	The performance monitor for device device name is stopping because of a shutdown request.	1108
HWNPM2130W	Failed to retrieve the latest configuration data for device device name.	1108
HWNPM2131W	Performance data could not be collected for device device name, because the device or data source cannot be reached (reason reason code). The current samples are skipped.	1109
HWNPM2132W	Performance data could not be collected for device device name. The current samples are skipped. (error description)	1110
HWNPM2133W	Performance data could not be collected for device device name due to an unknown error. The current samples are skipped.	1110
HWNPM2134W	The state of the performance monitor for resource resource name started, but the status of the performance monitor was not updated.	1110
HWNPM2135W	The state of the performance monitor for device device name has changed to 'active', but could not be recorded appropriately.	1111
HWNPM2136W	The performance monitor for the resource resource name generated a warning, but the status of the performance monitor was not updated.	1111
HWNPM2137W	The performance monitor for the resource resource name stopped, but the status of the performance monitor was not updated.	1111
HWNPM2138W	The performance monitor for the resource resource name completed the collection of data, but the status of the performance monitor was not updated.	1111
HWNPM2139W	The performance monitor for the resource resource name failed, but the status of the performance monitor was not updated.	1112
HWNPM2140W	The status of the performance monitor for the resource resource name was not updated.	1112
HWNPM2141E	The service is unavailable because an unexpected error occurred.	1112
HWNPM2142E	Performance data can't be collected for the resource resource name because the performance monitor was disabled.	1113
HWNPM2143E	The performance monitor for the resource resource name was started, but the status of the performance monitor was not updated and might not be shown in the GUI.	1113
HWNPM2144W	The performance data cannot be checked against the alert conditions, so no alerts can be generated.	1113
HWNPM2145I	The data is being collected by the data collector: data collector host.	1114
HWNPM2146W	Performance data could not be collected for device device name, the exact reason for the failure could not be determined. The current samples are skipped.	1114
HWNPM2147W	Performance data could not be collected for device device name, because of a bad target (device or agent) address. The current samples are skipped.	1114
HWNPM2148W	Performance data could not be collected for device device name, because of an unknown target address. The current samples are skipped.	1115
HWNPM2149W	Performance data could not be collected for device device name, because of an unreachable target address. The current samples are skipped.	1115
HWNPM2150W	Performance data could not be collected for device device name, because of an unresponsive target. The current samples are skipped.	1115

HWNPM2151W Performance data could not be collected for device device name, because a communication time-out for communication that uses UDP rather than TCP. The current samples are skipped. 1116
HWNPM2200I The performance monitor successfully collected the configuration data for the storage system with the following internal resources: number_of_pools pools, number_of_controllers controllers, number_of_device_adapters device adapters, number_of_ports ports, number_of_host_connections host connections, number_of_ranks ranks, number_of_arrays arrays, and number_of_volumes volumes. 1116
HWNPM2201I The performance monitor successfully collected the configuration data for the storage system with the following internal resources: number_of_io_groups I/O Groups, number_of_nodes nodes, number_of_ports ports, number_of_host_connections host connections, number_of_pools pools, number_of_managed_disks managed disks, number_of_local_disks local disks, number_of_volumes volumes, and number_of_volume_copies volume copies. 1117
HWNPM2202I The performance monitor successfully retrieved the configuration data for the switch. The following internal resources were found: number_of_trunks trunks, and number_of_ports ports. 1117
HWNPM2203I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: number_of_host_connections host connections, number_of_modules modules, number_of_ports ports, number_of_pools pools, and number_of_volumes volumes. 1118
HWNPM2204I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: number_of_nodes nodes, number_of_ports ports, and number_of_modules flash modules. 1118
HWNPM2205I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: number_of_ports ports, number_of_controllers controllers, number_of_volumes volumes, and number_of_disks disks. 1118
HWNPM3000E There was a problem establishing the database connection. 1119
HWNPM3001E An unexpected null row was returned from a database cursor. 1119
HWNPM3002E An unexpected database exception occurred. 1119
HWNPM3003E An unexpected database exception occurred on the snapshot database tables. 1119
HWNPM3004E The snapshot ID could not be found. 1120
HWNPM3500E The current transaction has been rolled back because of a deadlock. 1120
HWNPM3501E The current transaction has been rolled back because of a timeout. 1120
HWNPM3502E The current transaction has been rolled back because the database transaction log has been exhausted. 1120
HWNPM3503E The current transaction has been rolled back because the database disk space has been exhausted. 1121
HWNPM3600E The threshold identifier parameter value : threshold ID is not valid. 1121
HWNPM3601E The target component type parameter value : component type is not valid for the threshold identifier : threshold ID passed to the affected volumes and hosts reporting function. 1121
HWNPM3602E There was a problem retrieving the performance data needed to generate the affected volumes and hosts report for the device device name. 1121
HWNPM3603E The sample volume performance data needed to generate the affected volumes and hosts report for the device device name was not found in the IBM Spectrum Control database. 1122
HWNPM3604E There are no volumes associated with the specified target component, component name, in the IBM Spectrum Control database. Therefore, the resulting Affected Volumes and Hosts report will be empty. 1122
HWNPM4000E Unable to retrieve the device agent that managed this device: device identifier. 1122
HWNPM4001E Timeout while starting performance data collection for this device: device identifier. 1123
HWNPM4002E Unable to start performance data collection for this device: device identifier. 1123
HWNPM4003E Performance data collection has already been enabled for this device: device identifier. 1123
HWNPM4004E Failed to enable performance data collection for this device: device identifier. 1123
HWNPM4005I Successfully enabled performance data collection on the storage subsystem, using device access point SMI-S provider address. 1124
HWNPM4006E An exception occurred while starting performance data collection for this device: device identifier. 1124
HWNPM4007E A timeout occurred while stopping performance data collection for this device: device identifier. 1124
HWNPM4008E Unable to stop performance data collection for this device: device identifier. 1124
HWNPM4009E Performance data collection is not enabled for this device: device identifier. 1125
HWNPM4010E Failed to disable performance data collection for this device: device identifier. 1125
HWNPM4011I Successfully disabled performance data collection on the storage subsystem, using device access point SMI-S provider address. 1125
HWNPM4012E An exception occurred while stopping performance data collection for this device: device identifier. 1125
HWNPM4013E A timeout occurred while retrieving the status of the performance data collection for this device: device identifier. 1126
HWNPM4014E Unable to retrieve the status of the performance data collection for this device: device identifier. 1126
HWNPM4015I Performance data collection is not enabled for this device: device identifier. 1126
HWNPM4016I Performance data collection is enabled for this device: device identifier. 1126
HWNPM4017E Unable to determine the status of the performance data collection for this device: device identifier. 1127
HWNPM4018E Failed to retrieve the status of the performance data collection for this device: device identifier. 1127
HWNPM4019E A timeout occurred while polling the performance statistics for this device: device identifier. 1127
HWNPM4020E Unable to retrieve the performance statistics for this device: device identifier. 1127

HWNPM4021E	No performance statistics available at the current time for this device: device identifier.	1128
HWNPM4022E	Failed to disable performance data collection for this device: device identifier.	1128
HWNPM4023W	A set of performance statistics data was empty for this device: device identifier.	1128
HWNPM4024E	An exception occurred while stopping performance data collection for this device: device identifier.	1128
HWNPM4025E	Unable to retrieve storage subsystem for this device: device identifier.	1129
HWNPM4026E	Failed to retrieve storage subsystem for this device: device identifier.	1129
HWNPM4027E	Failed to properly initialize counter data service for this device: device identifier.	1129
HWNPM4028W	Performance data cannot be collected because the security role authority of the user account user name for accessing device identifier is not sufficient.	1129
HWNPM4051E	Failed to obtain a reference to the Performance Manager Configuration Data Service for this device: device name	1130
HWNPM4052E	Error occurred in trying to retrieve a device agent for this device: device name.	1130
HWNPM4053E	Unable to locate or retrieve the device agent that manages this device: device name.	1130
HWNPM4054E	Error occurred in trying to construct the poll state information for this device: device name.	1131
HWNPM4055E	Unable to construct the poll state information for this device: device name.	1131
HWNPM4056E	SMI-S provider operation triggered a timeout (step timeout= step timeout value seconds, operation timeout= total timeout value seconds,).	1131
HWNPM4057E	Mismatch in device identifier for this device: device name.	1131
HWNPM4058E	Failed to build the parameter Map for this device: device name.	1132
HWNPM4059I	Performance data collection has already been enabled for this device: device name.	1132
HWNPM4060I	Performance data collection was successfully started for this device: device name.	1132
HWNPM4061E	Performance data collection could not be started for this device: device name.	1132
HWNPM4062I	Performance data collection successfully stopped for this device: device name.	1133
HWNPM4063W	Parse exception in performance data collected this device: device name.	1133
HWNPM4064E	Wrong format in performance data collected for this device: device name.	1133
HWNPM4065W	number of null time stamps null time stamp(s)for performance data collected from the device were substituted by server time stamp(s).	1133
HWNPM4066W	count of null operational status null Port Operational Status value(s) for performance data collected from the device was/were substituted by default value(s).	1134
HWNPM4081E	A database cursor operation failed.	1134
HWNPM4082E	A database connect operation failed.	1134
HWNPM4083E	A database retrieve operation failed.	1134
HWNPM4084E	A database operation failed.	1135
HWNPM4085E	A database query operation failed.	1135
HWNPM4086W	A database query gave no result rows.	1135
HWNPM4087W	Missing or invalid association between SMI-S provider SMI-S provider URL and device device name. The configured SMI-S provider is inoperative, or may no longer be managing the specified device.	1135
HWNPM4091E	Encountered an error during execution of a discover service process.	1136
HWNPM4092E	Encountered exception during execution of a discover service process.	1136
HWNPM4093E	An input business object could not be converted to a CIMInstance.	1136
HWNPM4100E	Failed to initialize SVC counter data service discover service reference.	1137
HWNPM4101E	Failed to initialize SVC counter data service configuration service reference.	1137
HWNPM4102E	Failed to parse performance data file time stamp suffix: filename.	1137
HWNPM4103E	SMI-S provider operation timeout (timeout value seconds) expired.	1137
HWNPM4104E	Failed to retrieve SMI-S provider password for SVC counter data service access point: access point.	1138
HWNPM4105E	Encountered an error when communicating with the device agent.	1138
HWNPM4106E	Encountered invalid SVC component type: component type.	1138
HWNPM4107E	Failed to create performance data object: performance data object class.	1138
HWNPM4108E	TimeZone property is not defined for SVC cluster: cluster identifier.	1139
HWNPM4109E	SVC cluster TimeZone property is set to unrecognized value: timezone id and name.	1139
HWNPM4110E	StatisticsStatus property is not defined for SVC cluster: cluster identifier.	1139
HWNPM4111E	Failed to retrieve dump filename dump from SVC node node identifier (return code = return code).	1139
HWNPM4112E	IsConfigNode property is not defined for SVC node: node identifier.	1140
HWNPM4113E	Caught exception while processing SVC XML performance data.	1140
HWNPM4114E	SVC cluster cluster identifier has more than one configuration node.	1140
HWNPM4115E	SVC cluster cluster identifier does not have a configuration node.	1140
HWNPM4116W	Failed to associate SVC performance data from non-configuration node with SVC performance data from configuration node.	1141
HWNPM4117W	Encountered incomplete SVC performance data sample.	1141
HWNPM4118E	Firmware version information is not available for storage subsystem subsystem name. Performance data collection cannot proceed.	1141

HWNPM4119E The firmware installed on storage subsystem subsystem name (firmware version) is not supported for performance data collection. The minimum level of firmware supported for performance data collection is firmware version.	1141
HWNPM4150E Unable to retrieve storage subsystem for this device: device identifier.	1142
HWNPM4151E Unable to determine the status of any performance data collection for this device: device identifier.	1142
HWNPM4152E Performance data collection has already been enabled for this device: device identifier.	1142
HWNPM4153E Performance data collection is not enabled for this device: device identifier.	1143
HWNPM4154E Unable to start performance data collection for this device: device identifier.	1143
HWNPM4155E Failed to enable performance data collection for this device: device identifier.	1143
HWNPM4156E Unable to stop performance data collection for this device: device identifier.	1143
HWNPM4157E Failed to disable performance data collection for this device: device identifier.	1143
HWNPM4158E Unable to complete start performance data collection task for this device: device identifier.	1144
HWNPM4159E Unable to complete stop performance data collection task for this device: device identifier.	1144
HWNPM4160E Unable to complete performance data collection status query task for this device: device identifier.	1144
HWNPM4161E Performance data collection is not enabled for this device: device identifier.	1144
HWNPM4162E Unable to retrieve port performance statistics data for this device: device identifier.	1145
HWNPM4163E Unable to retrieve volume performance statistics data for this device: device identifier.	1145
HWNPM4164E Unable to retrieve rank performance statistics data for this device: device identifier.	1145
HWNPM4165E Unable to retrieve performance statistics data for this device: device identifier.	1145
HWNPM4166E Unable to complete polling for performance data collection task for this device: device identifier.	1146
HWNPM4167E Unable to retrieve a device agent for this device: device identifier.	1146
HWNPM4168E Failed attempt to use device device identifier counter data service with device different device identifier.	1146
HWNPM4169E An invalid access point of device agent URL was used to acquire the agent for this device: device identifier.	1146
HWNPM4170E The device agent's configuration for device identifier has changed from the given access point, device agent URL	1147
HWNPM4171E Performance data collection start task timed out after time seconds for device: device identifier.	1147
HWNPM4172E Performance data collection stop task timed out after time seconds for device: device identifier.	1147
HWNPM4173E Performance data collection check status task timed out after time seconds for device: device identifier.	1147
HWNPM4174E Performance data collection poll task timed out after time seconds for device: device identifier.	1148
HWNPM4175W An error occurred while parsing statistics for port port identifier. Its statistics will be excluded.	1148
HWNPM4176W An error occurred while parsing statistics for volume volume identifier. Its statistics will be excluded.	1148
HWNPM4177W An error occurred while parsing statistics for rank rank identifier. Its statistics will be excluded.	1149
HWNPM4178E Failed to decrypt the device agent's password for device device identifier.	1149
HWNPM4179W Performance data collection is currently enabled with errors for device device identifier.	1149
HWNPM4180E Unable to retrieve key identifier value from the internal discover process.	1149
HWNPM4181W number of ports of the port statistics from the device agent were unrecognized and were not included in this sample interval.	1150
HWNPM4182W number of volumes of the volume statistics from the device agent were unrecognized and were not included in this sample interval.	1150
HWNPM4183W number of ranks of the rank statistics from the device agent were unrecognized and were not included in this sample interval.	1150
HWNPM4184E The device agent configured for this storage subsystem is not supported for this task. The current version, version number, is downlevel from from the minimum required, version number.	1151
HWNPM4185W The device agent did not return all performance statistics data for this time interval. The incomplete data is being processed.	1151
HWNPM4186W The ESS SMI-S provider did not return performance statistics data for both clusters for this time interval. The incomplete data is being processed.	1151
HWNPM4187W The device does not support performance management for pool pool ID because it contains Space Efficient Volumes. Only incomplete performance data can be collected for array array ID.	1152
HWNPM4188W The performance monitor was unable to collect performance statistics data from the device agent for the following component types: component list.	1152
HWNPM4189W number of MDisks of the MDisk statistics from the device agent were unrecognized and were not included in this data collection interval.	1153
HWNPM4190W number of nodes of the node statistics from the resource agent were unrecognized and were not included in this data collection interval.	1153
HWNPM4191W number of modules out of total number of modules module statistics could not be retrieved from the device agent due to errors, and were not included in this data collection interval.	1154
HWNPM4192W number of Drives of the drive statistics from the device agent were unrecognized and were not included in this data collection interval.	1154
HWNPM4193W number of Volume-copies of the volume-copy statistics from the device agent were unrecognized and were not included in this data collection interval.	1154
HWNPM4194W number of partitions of the partition statistics from the device agent were unrecognized and were not included in this data collection interval.	1155

HWNPM4195W number of file systems of the file system statistics from the device agent were unrecognized and were not included in this data collection interval.	1155
HWNPM4250E Failed to start the discover service for the SMI-S counter data service.	1155
HWNPM4251E Failed to start the configuration service for the SMI-S counter data service.	1156
HWNPM4252I Successfully returned access point device namer for device device name.	1156
HWNPM4253I Successfully stopped SMI-S counter data service on access point access point for device device name.	1156
HWNPM4254I The SMI-S counter data service is active on access point access point for device device name.	1156
HWNPM4255I The SMI-S counter data service is inactive on access point access point for device device name.	1157
HWNPM4256I Performance statistics successfully returned on access point access point for device device name.	1157
HWNPM4257W Performance statistics not returned on access point access point for device device name.	1157
HWNPM4258E No SMI-S providers found for device device name.	1157
HWNPM4259E No storage subsystem found for device device name.	1158
HWNPM4260E Failed to initialize the polling context for device device name.	1158
HWNPM4261E Failed to retrieve the device capabilities for device device name.	1158
HWNPM4262E A database exception occurred trying to retrieve the device capabilities for device device name.	1158
HWNPM4263E A database exception occurred trying to retrieve the storage subsystem for device device name.	1159
HWNPM4264W Failed to retrieve manifest for component type.	1159
HWNPM4265E A database exception occurred trying to retrieve the Manifests for device device name.	1159
HWNPM4266E No manifests found for device device name.	1159
HWNPM4267E A database exception occurred trying to retrieve the discovery parameters for device device name.	1160
HWNPM4268E Statistics record not correctly formatted due to exception local exception string.	1160
HWNPM4269E Statistics record not correctly parsed due to exception local exception string.	1160
HWNPM4270W The block storage statistics is not formatted for device device name.	1160
HWNPM4271E The SMI-S provider found for device device name is not valid.	1161
HWNPM4272E The storage subsystem found for device device name is not valid.	1161
HWNPM4273W Discarding the stale performance statistics returned on access point access point for device device name.	1161
HWNPM4274E The SMI-S provider found for this device has changed. Please re-run SMI-S provider discovery and probe.	1161
HWNPM4300E Access to the agent or device has been denied. Ensure that valid credentials have been specified for agent agent name.	1162
HWNPM4301E The device or device agent did not respond within the allotted time (timeout value seconds).	1162
HWNPM4302E New performance data is not yet available for the device. Statistics with time stamps later than time_stamp could not be found.	1162
HWNPM4303E An agent API call (API name) failed while attempting to retrieve performance data for the device.	1163
HWNPM4304E The request for performance data could not be retrieved from the queue by the data collector, probably this one is down or encountered problems connecting to the server.	1163
HWNPM4502E Attempt to delete a default policy.	1163
HWNPM4503E A database update operation failed.	1164
HWNPM4504E A database insert operation failed.	1164
HWNPM4505E A database delete operation failed.	1164
HWNPM4506E A database cursor operation failed.	1164
HWNPM4507E A database connect operation failed.	1164
HWNPM4508E A database retrieve operation failed.	1165
HWNPM4509E A database operation failed.	1165
HWNPM4510E A database query operation failed.	1165
HWNPM4511E A database commit operation failed.	1165
HWNPM5200E The performance manager failed to publish event even name due to exception exception.	1165
HWNPM5210E The performance manager failed to receive event from other modules.	1166
HWNPM5211E The first parameter passed to this method is null.	1166
HWNPM5212E The second parameter passed to this method is invalid.	1166
HWNPM5400E The performance data collection identifiers are not valid integers: schedule ID {0}, schedule run number {1}, job run number {2}.	1166
HWNPM5401E There was a problem establishing the database connection: {0}.	1167
HWNPM5402E There was a problem creating the new run job entry: {0}.	1167
HWNPM5403E There was a problem updating the run job entry {0}: {1}.	1167
HWNPM5404E There was a problem closing the database connection: {0}.	1167
HWNPM5405E There was a problem inserting a new run job into the database: {0}.	1168
HWNPM5406E There was a problem executing an update for run job number {0} in the database.	1168
HWNPM5407E There was a problem executing an update for run job number {0} in the database.	1168
HWNPM5408E There was a problem executing an update for run number {0} in the database.	1168

HWNPM5409I Successfully retrieved the configuration data for the elastic device. Found number of nodes Nodes and number of file systems File systems, **1169**
HWNPM5410W The performance monitor could not collect performance data for the following cluster nodes: nodes names. **1169**
HWNPM5411W The performance monitor could not collect performance data for the following filesystems: filesystem names. **1169**
HWNPM5413E The process failed because the userid or password provided failed to connect to the Export Tool. **1170**
HWNPM5414E The process failed because the Hitachi SVP was busy and did not return data or timed out. **1170**

IBM Storage Insights documentation

IBM® Storage Insights is an IBM cloud service that can help you predict and prevent storage problems before they impact your business.

A storage operations center in the cloud: With monitored device status, Call Home events, and key performance and capacity indicators, you can assess the health of your IBM block storage environment and act quickly to resolve incidents before they affect critical storage operations.

Discover

- [What is IBM Storage Insights?](#)
- [Get IBM Storage Insights for free](#)
- [Understand security](#)
- [Know which devices are supported](#)
- [Product legal notices](#)

Get started

- [Read this first! checklist](#)
- [Deploy the metadata collector](#)
- [Connect your devices](#)
- [Manage who has access](#)
- [Can't get started? Get unstuck.](#)

Everyday use

- [Monitor your environment \[Pro\]](#)
- [Alert on conditions in your environment \[Pro\]](#)
- [Report on inventory, capacity, and performance \[Pro\]](#)
- [Identify performance bottlenecks on resources \[Pro\]](#)
- [Upload diagnostic logs](#)

Unlock IBM Storage Insights Pro

- [Unlock more capabilities](#)
- [Compare IBM Storage Insights and IBM Storage Insights Pro](#)

Popular topics

- [What's new](#)
- [FAQ](#)
- [Service updates and maintenance](#)
- [!\[\]\(abf4e4f0a0986420f339dd676c07ffcb_img.jpg\) Getting Started Guide](#)
- [IBM Storage Insights for IBM Spectrum Control](#)

Social media

- [!\[\]\(00b2c6094b9748fed2bcd1ca97a1006c_img.jpg\) Take a guided tour of IBM Storage Insights](#)
- [!\[\]\(6e38859ba8a0988bdc74d48adb1bc426_img.jpg\) Set permissions for IBM Support to collect logs](#)
- [!\[\]\(4398079a588d3c1caa294847f10f08fb_img.jpg\) Define performance alerts for IBM SAN Volume Controller](#)
- [Explore more videos](#)
- [Read expert blogs](#)

Get help

- [Resolving common issues](#)
- [Restoring your dashboard](#)
- [Fixing data collection and connection issues](#)
- [How to get help](#)
- [!\[\]\(2eb1babec9f43633a13f7ebf5053083f_img.jpg\) IBM Storage community](#)

Accessibility

Accessibility features help users who have a disability, such as restricted mobility or limited vision, to use information technology products successfully.

Accessibility features

The following list includes the major accessibility features in IBM® Storage Insights:

- Keyboard-only operation in the GUI.
- The IBM Documentation, which includes the following accessibility features:
 - The IBM Documentation is provided in XHTML 1.0 format, which is viewable in most web browsers. With XHTML, you can view documentation according to the display preferences that are set in your browser. XHTML supports screen readers and other assistive technologies.
 - All images in the IBM Documentation are provided with alternative text, so that visually impaired users can understand the contents of the images.
- Interfaces that are commonly used by screen readers.

The setting for the automatic-refresh button in the screen reader is toggled to the ON position by default. If you want the screen reader to read the previous text, complete the following steps:

1. Navigate to the Accessibility Settings Navigation region by using the arrow keys. The region is located after the IBM Storage Insights Pro application title.
2. Click Enter to toggle the automatic-refresh button to the OFF position. (An alert sounds to make you aware that the turn-off automatic-refresh toggle button was pressed.)
3. To move backward to the previously read text so that the screen reader can read it again, use the arrow keys. You can move backwards and forwards through the page.
4. When you are ready to move on, click Enter to toggle the automatic-refresh button to the ON position and to refresh the page. (An alert sounds to make you aware that the turn-on, automatic-refresh toggle button was pressed.)

Tip: Alternatively, let the toggle setting persist, and refresh as needed by pressing the F5 key.

Keyboard navigation in the GUI

Most of the features in the GUI are accessible by using the keyboard.

You can use keys or key combinations to perform operations and initiate many menu actions that can also be done through mouse actions. The following sections describe the keys or key combinations for different parts of the GUI:

For navigating the GUI and the context-sensitive help system:

- To navigate to the next link, button, or topic within a panel, press Tab.
- To move to the previous link, button, or topic within a panel, press Shift+Tab.
- To select an object, when the object is in focus, press Enter.

For actions menus:

- To navigate to the grid header, press Tab.
- To reach the drop-down field, press the arrow keys.
- To open the drop-down menu, press Enter.
- To select the menu items, press the arrow keys.
- To start the action, press Enter.

For filters:

To specify a filter option and text:

1. Press Tab to navigate to the magnifying glass icon.
2. Press the arrow keys to navigate to the filtering list.
3. Press Enter to select a filtering option.
4. When a filtering option is selected, the cursor moves to the filter text box. Type the filter text and press Enter. To reset a filter, press Enter.

For text fields:

- To navigate to text fields, press Tab.
- To navigate to the fields that are available for editing, press Tab.
- To navigate to the next field or to the Submit button, press Tab.

For tables or lists:

- To navigate between column headers, focus on a column header and use the arrow keys to move to other column headers.
- To navigate between data cells, focus on a data cell and use the arrow keys.
- To sort a column, focus on a column header and press Enter. The focus remains on the column header after the sort occurs.
- To change the size of a column, focus on the column header, hold Shift+Control, and press the arrow keys.
- To follow a link in a data cell, focus on a data cell and press Shift+F9.
- To open a menu for a table row, focus on the row and press Shift+F10.
- To select consecutive rows, select the first row and hold Shift. Press the arrow keys to go to the last row in the range, and press the Space bar to add the new rows to the selection.
- To select non-consecutive rows, select a row and hold Control, press the arrow keys, and press the Space bar to add the new row to the selection.

Restriction: For Chinese languages, the keyboard combination Control+Space bar is not enabled for selecting multiple rows at the same time.

Keyboard navigation with Firefox for Mac users:

If you're using Firefox on a Mac with IBM Storage Insights and want to use keyboard navigation, complete the following steps:

1. In Firefox, go to Preferences > Advanced > General and clear the check mark for Always use the cursor keys to navigate within pages. This step enables the use of Tab key to navigate between GUI elements.
2. In the URL address bar of Firefox, type about:config and press Enter.
Tip: If a warning prompt is displayed, click the button to accept the risk of changing browser settings. Existing settings won't be changed; instead, you'll be adding a preference setting for accessibility.
3. To add an accessibility preference for tab focus, right-click on the configuration page and select New > Integer.
4. In the New integer value window, type accessibility.tabfocus and click OK.
5. Type 7 to set the integer value and click OK.
6. Open your Mac's System Preferences app, go to Keyboard > Shortcuts, and select All Controls.

IBM and accessibility

For more information about IBM's commitment to accessibility, see the IBM Human Ability and Accessibility Center website at <http://www.ibm.com/able>.

Notices

This information was developed for products and services offered in the US. This material might be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM® product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US*

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

*Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan*

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

*IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US*

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to actual people or business enterprises is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

Terms and conditions for product documentation

Permissions for the use of these publications are granted subject to the following terms and conditions.

Applicability

These terms and conditions are in addition to any terms of use for the IBM website.

Personal use

You may reproduce these Publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative work of these publications, or any portion thereof, without the express consent of IBM.

Commercial use

You may reproduce, distribute and display these publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these publications, or reproduce, distribute or display these publications or any portion

thereof outside your enterprise, without the express consent of IBM.

Rights

Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or, as determined by IBM the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.

IBM Trademarks: IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at www.ibm.com/legal/copytrade.shtml.

IBM Online Privacy Statement

IBM Software products, including software as a service solutions, ("Software Offerings") may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user, or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering's use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see IBM's Privacy Policy at <http://www.ibm.com/privacy> and IBM's Online Privacy Statement at <http://www.ibm.com/privacy/details> in the section entitled "Cookies, Web Beacons and Other Technologies," and the "IBM Software Products and Software-as-a-Service Privacy Statement" at <http://www.ibm.com/software/info/product-privacy>.

Privacy policy considerations

IBM® Software products, including software as a service solutions, ("Software Offerings") may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user, or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering's use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see IBM's Privacy Policy at <https://www.ibm.com/privacy> and IBM's Online Privacy Statement at <https://www.ibm.com/privacy/details> in the sections entitled "Cookies, Web Beacons and Other Technologies," and "IBM Cloud® services".

Trademarks

IBM®, the IBM logo, and ibm.com® are trademarks or registered trademarks of International Business Machines Corporation, registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at <https://www.ibm.com/legal/us/en/copytrade.shtml>.

Intel, Intel logo, Intel Xeon, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java™ and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

The registered trademark Linux® is used pursuant to a sublicense from the Linux Foundation, the exclusive licensee of Linus Torvalds, owner of the mark on a worldwide basis.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

Red Hat® is a registered trademark of Red Hat, Inc. or its subsidiaries in the United States and other countries.

UNIX is a registered trademark of The Open Group in the United States and other countries.

VMware, the VMware logo, VMware Cloud Foundation, VMware Cloud Foundation Service, VMware vCenter Server, and VMware vSphere are registered trademarks or trademarks of VMware, Inc. or its subsidiaries in the United States and/or other jurisdictions.

What's new in IBM Storage Insights

New features and enhancements are available in the Q3 2021 update of IBM® Storage Insights and IBM Storage Insights Pro.

IBM is constantly updating the infrastructure, security, and stability of IBM Storage Insights to improve your experience. Enhanced analytics, troubleshooting capabilities, and more robust data collection are built in to this update, so the IBM Support team can better assist you in monitoring your storage environment.

Additionally, the following key features are included in this update:

What's New	IBM Storage Insights	IBM Storage Insights Pro
Enhancements to monitoring DS8000 storage systems	✓	✓
Viewing easy tier load for IBM Spectrum Virtualize devices		✓
Viewing capacity savings for your devices	✓	✓
Getting more insights into the capacity of file and object storage systems		✓
More flexibility for upgrading data collectors	✓	✓

What's new in IBM Storage Insights August 2021



What's New in
IBM Storage Insights
August 2021

▶ 🔊 0:00 / 3:03

CC ⚙️ ↗

Enhancements to monitoring DS8000 storage systems

You can now view the status of the device and host adapters that are associated with DS8000 storage systems. In IBM Storage Insights Pro, you can also view information about the configuration and performance of an adapter. This information includes details about the I/O enclosures where it's located, its type, speed, DA pair, and more.

With performance metrics, you can identify adapters where high workloads might be causing bottlenecks. Other features, such as alerting and reporting, are also supported.

For example, if a DS8000 storage system is experiencing a heavy I/O load or low data rate, you can get alerted and take action before it affects the performance of the device.

Viewing easy tier load for IBM Spectrum Virtualize devices

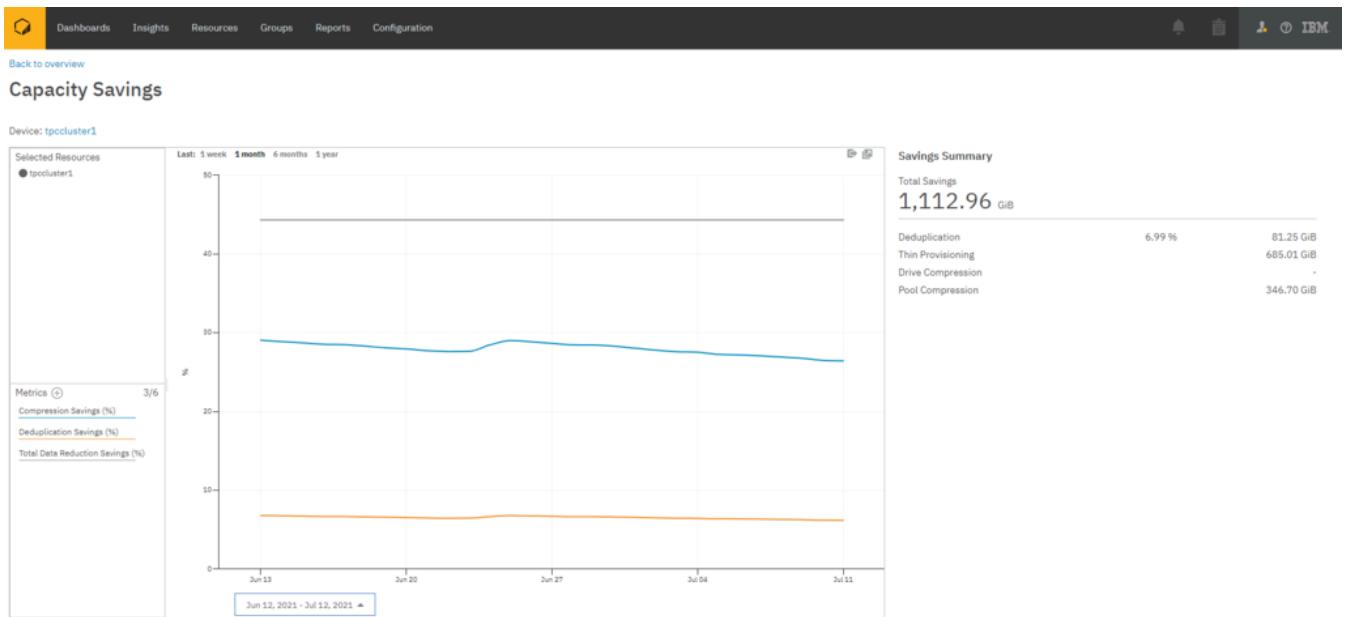
You can now view the easy tier load on managed disks in storage systems that run IBM Spectrum Virtualize. Use this value (low, medium, high, or very high) to identify the IOPS capability of the associated storage tier and fine-tune the utilization of backend storage. It can also help you troubleshoot performance issues, such as determining when the setting is incorrect for a managed disk because high workloads require a better tier.

Use alerts to be notified of issues related to easy tier load. For example, with a custom alert, you can be automatically notified when easy tier load is not configured for external managed disks that are added to a storage system.

Viewing capacity savings for your devices

How much capacity you save through compression technology is critical to helping ensure that you don't run out of space. You can now get a detailed view of your compressions savings over time so that you can monitor any dips in those savings that might cause unexpected capacity shortages.

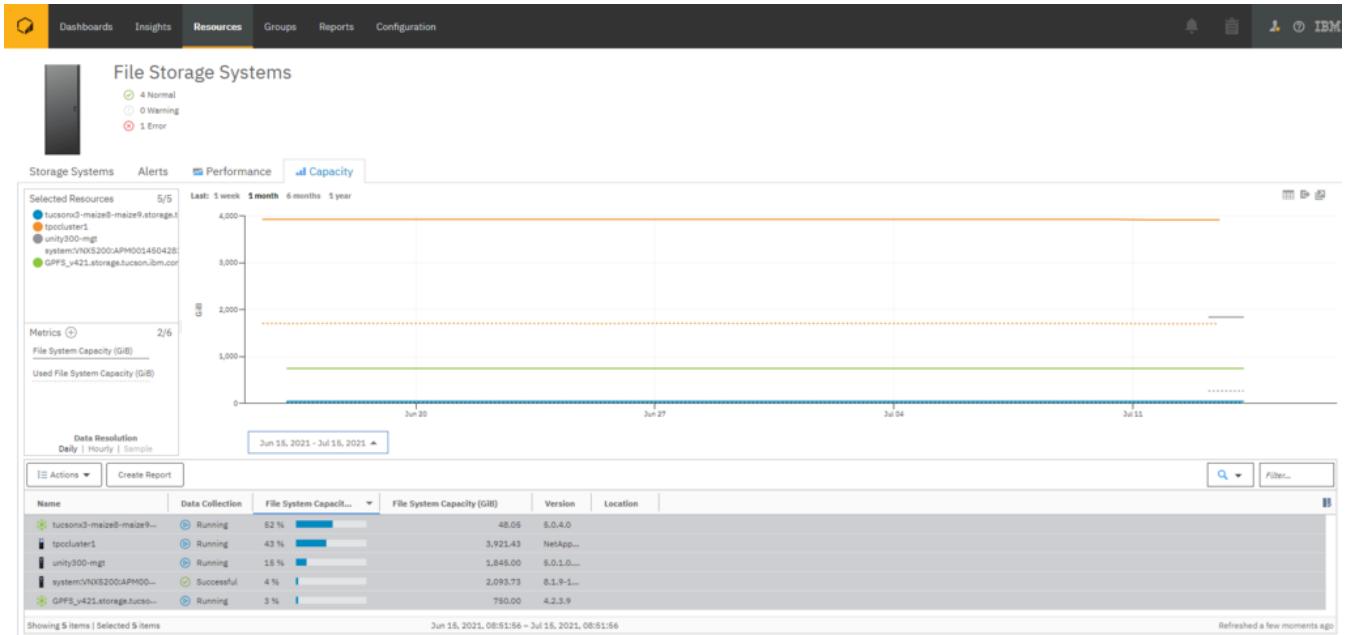
From the Operations dashboard, simply select the storage system that you want to view and click View Capacity Savings to access the new Capacity Saving page. On this page, use the chart to visualize your savings over time for the compression technology that's being used. The handy Savings Summary section next to the chart provides more details about your pool and drive compression, deduplication, and thin-provisioning savings.



Getting more insights into the capacity of file and object storage systems

Monitoring your file and object storage where space usage is growing and where you might need more capacity just got easier. You can now view a single capacity and space usage chart for multiple file or object storage systems. This chart can help you visualize capacity and usage trends across your storage systems based on the different time ranges and metrics that you select.

From the chart, you can also drill down into the internal resources of a storage system to chart their capacity trends. For file storage systems, you can view charts for file systems, filesets, pools, and volumes. For object storage systems with file storage enabled, you can view charts for filesets, file systems, and pools.



More flexibility for upgrading data collectors

You spoke and we listened. In some environments, upgrading applications and their components are governed by tight controls and strict schedules. The process of upgrading data collectors might fall within these rules for your organization. To help address these situations, you can now upgrade your data collectors individually for more granular control over which ones are upgraded, and when.

You can still manually upgrade all data collectors at the same time if that better suits your organization or just right-click a specific data collector and click Upgrade.

Data Collectors

A new version of the data collector is available. Upgrade now to get the latest fixes and most stable data collection. [Upgrade All](#)

[Data Collectors](#) [Assignments](#) [Automatic Upgrades](#) Off

Name	Host Name	Status	Last Contact	Candidates	Monitored Dev...	Unreachable D...	Actions
amador14.storage.tucson.i...	amador14.storage.tucson.i...	✓ Down-level	13 Jul 2021, 13:40:46	16	8	3	View Details
siglo5.storage.tucson.ibm.c...	siglo5.storage.tucson.ibm.c...	✓ Down-level	13 Jul 2021, 13:40:42	16	6	3	View Details

Tip: Don't forget that if you enable automatic upgrades, IBM upgrades data collectors for you. To enable automatic upgrades, ensure that you have the Administrator role in IBM Storage Insights and set Automatic Upgrades to On.

Don't forget to upgrade your data collectors

If the automatic upgrade option for data collectors is enabled, there is nothing that you need to do after IBM Storage Insights is updated. You can pick up right where you left off.

If the automatic upgrade is not enabled, you might be notified to upgrade your data collectors so that you can benefit from all the new features and improvements. To upgrade the data collectors, ensure that you have the Administrator role and simply click the link in the notification message or select Data Collector from the Configuration menu and click Upgrade.

- [**Change log for IBM Storage Insights**](#)
View the changes in previous updates of IBM Storage Insights.
- [**Release notes for IBM Storage Insights**](#)
IBM manages and updates IBM Storage Insights for you and constantly strives to address vulnerabilities and bugs before they impact your business. Learn about the latest security updates, compatibility issues, and bug fixes.
- [**Sponsor user program**](#)
Sponsor users interact directly with designers and developers to improve the user experience and to help shape the future of the overall storage portfolio.
- [**Beta program**](#)
The IBM Storage Insights Pro Beta is a continuous program. It gives you a first look at upcoming features, a chance to influence design, an opportunity to test the new features in your own environment, and a direct voice into the product development process.

Related tasks

- [Want to try or buy IBM Storage Insights Pro?](#)

Related reference

- [IBM Storage Insights vs IBM Storage Insights Pro](#)
- [Videos for IBM Storage Insights](#)

Change log for IBM Storage Insights

View the changes in previous updates of IBM® Storage Insights.

- [Changes in Q3 2021 \(August 23\)](#)
- [Changes in Q2 2021 \(June 21\)](#)
- [Changes in Q1 2021 \(March 22\)](#)

- [Changes in Q4 2020 \(November 14\)](#)
- [Changes in Q3 2020 \(August 22\)](#)
- [Changes in Q2 2020 \(May 30\)](#)
- [Changes in Q1 2020 \(March 7\)](#)
- [Changes in Q4 2019 \(November 16\)](#)
- [Changes in Q3 2019 \(September 29\)](#)
- [Changes in Q2 2019 \(June 2\)](#)
- [Changes in Q1 2019 \(March 3\)](#)
- [Changes in Q4 2018 \(November 18\)](#)
- [Changes in Q3 2018 \(September 9\)](#)
- [Changes in Q2 2018 \(June 10\)](#)
- [Changes in Q1 2018 \(March 11\)](#)
- [Changes in Q4 2017 \(November 19\)](#)
- [Changes in Q3 2017 \(September 10\)](#)
- [Changes in Q2 2017 \(June 4\)](#)
- [Changes in Q1 2017 \(March 5\)](#)
- [Changes in Q4 2016 \(December 4\)](#)
- [Changes in Q3 2016 \(August 28\)](#)
- [Changes in Q2 2016 \(June 5\)](#)
- [Changes in Q1 2016 \(February 28\)](#)
- [Changes in Q4 2015 \(December 13\)](#)

Changes in Q3 2021 (August 23)

For information about the latest features and enhancements in the Q3 2021 update of IBM Storage Insights, see [What's new in IBM Storage Insights](#).

To view the bug fixes, security updates, and known limitations and issues in this update, see [Release notes for IBM Storage Insights](#).

Changes in Q2 2021 (June 21)

The following features and enhancements were available in IBM Storage Insights for Q2 2021:

Knowledge is power – Monitoring switches and fabrics to better troubleshoot your storage environment

Get a more holistic view of your environment and unclog those troublesome bottlenecks! You can now collect configuration, status, and performance metadata about the switches and fabrics in your environment. With the built-in diagnostic capabilities of IBM Storage Insights and IBM Storage Insights Pro, you can monitor and troubleshoot which resources are impacted by an availability or performance issue in your SAN.

What you can monitor:

- [Brocade switches and fabrics](#)
- [Cisco switches and fabrics](#)

Here's just some of what you can do:

- Easily spot which switches and fabrics require your attention.
- Keep an eye out for saturation, congestion, and fabric errors that might impact your storage performance.
- Get improved time to resolution for complex storage and fabric issues because IBM support doesn't have to ask for as much information.
- Use different views to understand how your storage, switches, and hosts are connected so you can better plan and troubleshoot.
- Create and share reports with colleagues to get a quick, birds-eye view of your switch and fabric inventory.
- Create alerts so that you're automatically notified of problems, and potential problems, on your switches and fabrics.

Peering into the history of capacity alerts

You can now view historical information for alerts in easy-to-read charts that visualize how capacity trended over the previous 30 days. This information can help you identify not only the amount of capacity that changed and when usage reached a specified threshold, but also how quickly those changes occurred. With these charts in hand, you can get more insights into how your capacity might trend in the future and thus more confidently plan for your capacity needs.

Defining application filters is easier with a little help

Now when you define filters for including resources in an application, IBM Storage Insights provides a list of resources that you can select from. No more guessing or trying to remember resource names – click and pick.

Changing the connection credentials for more than one device at a time

You can now change the username and password for multiple devices at the same time, saving you valuable time from updating the devices individually and making it easier to keep IBM Storage Insights connected. Use Shift+click or Ctrl+click to select the devices from a list, right-click the selection, pick Connections > Modify Credentials, and then enter the new credentials.

Getting more information about DS8000 storage systems

When you view the firmware level of a DS8000® storage system, information about the code bundle version is now included alongside the SEA or LMC version.

Viewing the performance and workload of your CPUs just got easier

If you monitor the utilization and performance of the CPUs on your storage system nodes, this enhancement is for you. You can now view up to 32 cores on the same chart, at the same time. By comparing the workload of all the cores for a CPU in a single chart, you can quickly identify which cores are being over utilized. Finding the outliers in core performance is a snap!

Changes in Q1 2021 (March 22)

The following features and enhancements were available in IBM Storage Insights for Q1 2021:

Say goodbye to alert noise

IBM Storage Insights now analyzes alerts when they are triggered and generates a single consolidated alert for an issue that affects multiple resources. If multiple alerts are triggered by the same violations for the same device and at the same time, the following occur:

- A single alert is shown on the Alerts dashboard.
- A single email notification is sent.

IBM Storage Insights is faster

Because of key improvements to the infrastructure, viewing information about your storage can be as quick as 0.5 seconds, down from as high as 7 seconds previously. That's quite a performance boost! Spend less time waiting and more time monitoring and resolving issues with your storage.

Enhancements to task tracking for device management

All device management actions now run as background tasks and you can monitor the progress of the tasks. Examples of device management actions include stopping and restarting data collection, modifying credentials, and testing the connection to a device. Previously, only the actions for adding storage systems and creating tickets were run as background tasks.

You can also view additional details about the tasks that are running and why a task failed. For example, if you add a storage system and the action fails, you can now see whether the credentials were invalid or whether the device couldn't be reached by the data collector.

Adding filters to Volume reports

You can now add filters to refine the information that is shown in Volume reports. Use filters to create a report about how much capacity your thin-provisioned volumes have used and share it with your colleagues.

Enhancements to the Notifications dashboard

You spoke and we listened! The Notifications dashboard now displays only Call Home events. To see upgrade recommendations and best practice notifications, go to the Advisor page.

Changes in Q4 2020 (November 14)

The following features and enhancements were available in IBM Storage Insights for Q4 2020:

Monitoring snapshot information for volumes that are protected by Safeguarded Copy

With Safeguarded Copy in DS8000® 8.5.0 and later, you can improve cyber resiliency by frequently creating protected, point-in-time backups of critical data, with minimum impact and effective resource utilization.

You can now view snapshot information for volumes that are backed up using the Safeguarded Copy feature across all your monitored DS8000 storage systems. Use this information to monitor the volume capacity that is protected and the capacity that is used to store volume backups for Safeguarded Copy.

Viewing topology and location information for DS8000 Fibre Channel (FC) ports

You use IBM Storage Insights to monitor DS8000 storage systems, and you need to understand the port topology and the location of the ports in the hardware hierarchy? Not a problem. From the Resources menu, click Block Storage Systems, double-click a DS8000 storage system, and click FC Ports.

You can now check whether an FC port uses the FICON® or the SCSI FCP protocol and view the frame, I/O enclosure, and host adapter for the port.

Changes in Q3 2020 (August 22)

The following features and enhancements were available in IBM Storage Insights for Q3 2020:

Using the Monitor role for monitoring IBM Spectrum Virtualize

Now, users with a Monitor role can collect performance metadata from IBM Spectrum Virtualize 8.3.1.2 or later. So, when you add a storage system, just add the credentials of a user with the Monitor role and you'll get the key performance metadata that you need to monitor your storage environment.

Monitoring performance for Hitachi Virtual Storage Platform F and G Series

You can now monitor the performance of Hitachi Virtual Storage Platform F and G Series storage systems. You can also define

performance alerts so that you're notified of bandwidth, latency, and other issues before they impact your storage environment.

And, you can compare your storage workloads and response times across your entire storage environment.

Viewing the name and VOLSER properties for DS8000 CKD volumes

For DS8000, you can now view both the volume name and the volume serial number (VOLSER) for your count-key-data (CKD) volumes.

Determining the capacity to be licensed

The Managed Capacity page (Configuration > Managed Capacity) was updated to make it easier for you to understand how much capacity that you need to license for IBM Storage Insights Pro. The updates include:

- The names of column headings were changed and the hover help was revised to help you complete your compliance check.
- The capacity to be licensed and other capacity columns are now shown in tebibytes (TiB) to make it easier to compare the values with the value shown at the top of the page.

Changes in Q2 2020 (May 30)

The following features and enhancements were available in IBM Storage Insights for Q2 2020:

Setting capacity limits

Set capacity limits for storage systems and pools. You want to know how much capacity you have left before your storage systems or pools are 80% full? Just set a capacity limit and you'll know how close you are to reaching your capacity limit. Then, check the Capacity-to-Limit (GiB) value and see how much capacity you can use before you reach your limit.

Support for Pure Storage devices

You can now monitor FlashArray//M and FlashArray//X devices. View information about the capacity, space usage, and performance of this non-IBM storage. Other features, such as alerting, health monitoring, advanced analytics, and reporting are also supported.

Monitoring DS8000 capacity on flash drives

Monitor the volume capacity that Easy Tier® places on Tier 1 and Tier 2 flash, high-capacity drives on DS8000 storage systems.

View the capacity and available capacity of Tier 1 and Tier 2 flash drives in a pool and the distribution of volume extents across each of the Easy Tier drive classes.

Assigning data collectors to devices

You can now assign which data collectors collect metadata from your storage devices. For example, you can configure your data collection services as follows:

- Assign data collectors to devices based on the locations of the data centers.
- Assign data collectors to devices by production, development, or test platform to comply with your company's data governance rules.
- Assign multiple data collectors to devices so that if one data collector fails another data collector takes over.
- Assign data collectors to groups of devices to optimize and balance data collection services.

Renaming data collectors

You can now change the name of the data collector that is displayed in the GUI so that it's easier to identify. From the Configuration menu, click Data Collectors. Right-click the data collector that you want to rename, and click Rename. Change the data collector name in Rename Data Collector.

Additional OS support for data collectors

The IBM Storage Insights data collector now supports RHEL 7.x on Little Endian POWER8® (PPC64LE). The data collector on Linux® PPC64LE has the limitation that you *cannot* monitor non-IBM devices and FlashSystem A9000, XIV®, and IBM Spectrum® Accelerate devices.

Changes in Q1 2020 (March 7)

The following features and enhancements were available in IBM Storage Insights for 1Q 2020:

Creating reports

In the free version of IBM Storage Insights, you can now create, schedule, and send:

- Capacity reports for storage systems and pools
- Inventory reports for storage systems

Share information with your colleagues to help them plan capacity purchases and keep them up-to-date with the configuration and properties of their storage systems. If you like what you see in these reports and want more, just [upgrade to IBM Storage Insights Pro](#).

Hot tip: In both IBM Storage Insights and IBM Storage Insights Pro, you can now send reports as PDF files. Just click the PDF option when scheduling the delivery of your report.

Enhancements to capacity reporting and terminology

- Gain even more insights into capacity usage and capacity growth. On the Overview charts, you can now easily gauge how much capacity you have, how much capacity you've used, and how much capacity is still available. Use the new metrics,

Recent Fill Rate (%) and Recent Growth (GiB), to see which storage systems and pools are experiencing the most growth or are running out of capacity the quickest.

- To enhance your experience of our products and to provide a unified and simplified view of capacity concepts, IBM Storage is aligning the capacity terms across all IBM Storage products. To ensure that we use the same capacity term for the same capacity concept across our products, IBM Storage Insights has changed 47 of the capacity terms that it uses, removed 4 terms that are no longer needed, and added 1 new term.

[Learn more about the capacity terminology changes.](#)

Monitoring more IBM FlashSystem® devices

The new FlashSystem family is supported. View information about the capacity, space usage, and performance of FlashSystem 5000, FlashSystem 5100, FlashSystem 7200, and FlashSystem 9200 storage systems.

Enhanced support for IBM Spectrum Virtualize in IBM Storage Insights Pro

- Monitor the cache fullness of pools and the aggregated cache fullness of nodes to identify which ones are experiencing heavy cache usage.
- Monitor and alert on unmap operations at the host connection level. Determine how much unmap workload each host is contributing by measuring the performance of unmap volume commands.
- Monitor Storage Class Memory (SCM). You can now monitor the volume capacity that Easy Tier places on SCM drives on IBM Spectrum Virtualize systems, such as IBM FlashSystem 9100, IBM FlashSystem 7200, and the IBM Storwize® family.
- Create and schedule predefined reports about the IP ports on the nodes in IBM Spectrum Virtualize systems, such as SAN Volume Controller, IBM FlashSystem 9100, FlashSystem V9000, and the IBM Storwize family.

Adding IP ports to general groups

You can now add IP ports to general groups so that you can receive alert notifications about changes in the configuration or attributes of the IP ports in a general group.

Monitoring disk utilization for RAID arrays on DS8000 storage systems

For RAID arrays on DS8000 version 8.5.0 and later, the disk utilization values were updated in performance charts and reports. You can now more accurately check how busy the disks in the array are over a period and identify arrays that are underutilized and overutilized.

Preventing gaps in your performance data during service outages

To help prevent gaps in your performance data during service outages, data collectors continue to collect performance metadata when your instance of IBM Storage Insights is offline during service outages.

Removing data collectors

You can now remove the data collectors that you are no longer using from IBM Storage Insights.

Support for dynamic changes to IP addresses

IBM Storage Insights can now use the host name of storage systems to collect data. Before this update, if you added a storage system by using a host name, IBM Storage Insights still used the IP address to collect data.

Changes in Q4 2019 (November 16)

The following features and enhancements were available in IBM Storage Insights for 4Q 2019:

Important capacity updates

Capacity values in reports, views, and charts were updated to better reflect capacity usage in devices that support hardware compression. The devices affected by this update are:

- Storage systems such as FlashSystem 9100, FlashSystem 900, and Storwize V7000 Gen3, which contain IBM FlashCore® Modules with hardware compression
- SAN Volume Controller and Storwize storage systems that are configured as storage virtualizers, and which use back-end storage systems with hardware compression

In historical capacity charts for storage systems and pools, you'll see a sharp drop in capacity and used space. That's because capacity values are now measured based on the physical capacity rather than the effective capacity. Before, for example, the capacity value measured for your device was 250 TiB. Now it's 100 TiB. That's because the capacity savings achieved by hardware compression are no longer included when capacity is measured.

Don't worry, you can still monitor the capacity values that show the capacity savings that are achieved with hardware compression! To capture this information, new columns were added to the Block Storage Systems and Pools pages. Just check the column names that begin with *Effective*, such as Effective Capacity (GiB) and Effective Used Capacity (%).

Monitoring non-IBM storage

You can now add Dell EMC Unity and NetApp storage systems running ONTAP 9 to the list of non-IBM storage systems that you can monitor and report on in IBM Storage Insights Pro.

Monitoring IBM Spectrum Virtualize IP ports

You can now view detailed information about the IP ports on the nodes on IBM Spectrum Virtualize systems, such as SAN Volume Controller, IBM FlashSystem 9100, FlashSystem V9000, and the IBM Storwize family.

Use this information to monitor the health and status of the IP ports, and to determine whether the ports are used for hosts, storage, or remote copy. Alerting is also supported for IP ports.

Monitoring IBM Spectrum Virtualize for Public Cloud storage systems

You can now monitor IBM Spectrum Virtualize for Public Cloud storage systems. You can view information about the capacity, space usage, and performance of the storage systems. Other features, such as alerting, health monitoring, advanced analytics, and reporting are also supported.

Monitoring whether reclamation is causing a performance issue on IBM Spectrum Virtualize

You can now review node metrics that measure the operations that are used to free up and reclaim capacity in data reduction pools such as:

- The number of volume extents that were reclaimed
- The amount of capacity that can be reclaimed
- The rate at which capacity is recovered for reuse

You can use these metrics to help determine if reclamation is affecting performance. Track these metrics over time in the performance charts to measure the amount of capacity can be reclaimed and the rate at which it can be recovered by the garbage collection process.

Monitoring the cache fullness of nodes on IBM Spectrum Virtualize

You can now quickly see how full your cache is by adding new cache fullness metrics to the performance charts when you view the performance of nodes for your storage systems. Add and track cache fullness metrics to identify the nodes that are experiencing heavy cache usage. This heavy usage might cause latency issues such as write operations being queued and slow response times for the volumes that are managed by the node.

Use the cache fullness information to help investigate problems for volumes in a pool and to determine whether to move a volume to a different I/O group where the pool's cache partition does not have a cache fullness problem. You can select the following cache metrics for node performance:

- Peak Read Cache Fullness (%)
- Peak Write Cache Fullness (%)
- Read Cache Fullness (%)
- Write Cache Fullness (%)

Selecting metrics made easier

Want to add or track new or other metrics? A single click and you clear the metrics you don't want in the chart. To build the chart, scroll and select the metrics you want from the list of categories, and as you build, you'll see which metrics you've selected in the pane on the right. Save your changes and get the chart that you need to track your metrics. For example, you can now quickly select the metrics you need in performance charts so you can rapidly investigate performance issues.

With the new metrics selection dialog, you can:

- Determine the available categories of performance metric at a glance, for example, volume, disk, port, and node
- Scan all of the metrics within a category
- Quickly navigate to and view the desired metric
- Clear selected metrics
- See the number of selected metrics for each category

Changes in Q3 2019 (September 29)

The following features and enhancements were available in IBM Storage Insights for 3Q 2019:

What's happening in my environment?

Want to quickly understand what's happening in your environment so that you can easily identify which storage systems need your attention? Are you focused on triaging the health of your storage to minimize downtime and maximize performance? With the new Operations dashboard, grab your morning cup of coffee and quickly assess which block storage systems in your inventory need attention. Storage systems are listed in order of their health status to help you rapidly diagnose and address the types of issues that are happening. Simply drill down into the components where an error is identified to view the details of the issue.

Now, the health status of storage systems in IBM Storage Insights is based on the status that the storage system reports for itself and all of its components. In previous versions, the health status was based on Call Home events. The health status in IBM Storage Insights is closer now to what is shown in the storage system's GUI and CLI.

Monitoring IBM Spectrum Virtualize IP ports

You can now view detailed information about the IP ports on the nodes on block storage systems that run IBM Spectrum Virtualize, such as IBM FlashSystem family, SAN Volume Controller, and the IBM Storwize family.

Monitoring unmap operations on IBM Spectrum Virtualize

You can now measure the performance of unmap volume commands and define alerts so that you are notified when unmap operations values fall outside thresholds you specify. Metrics, such as the average number of MiBs that are unmapped from volumes, I/O rates, data rates, and response times for unmap operations, are collected and shown at the pool, node, and I/O group levels.

Sending alert notifications only after sustained threshold violations

Now you can use enhanced notification frequency settings to specify that alerts are only triggered after a problem has occurred for a sustained period of time. You can further fine-tune your notification frequency by combining this setting with other notification frequency settings. Other frequency settings include send once until the problem clears, send every time the problem occurs, or send at regular time intervals.

Automatic upgrade of your data collectors

Now you can benefit from the automatic upgrade of your data collectors as soon as new versions are available. Automatic upgrades ensure that you're running the most up-to-date version of the data collector with all the latest fixes.

New versions of OS data collector support

IBM Storage Insights now supports Windows Server 2019 and CentOS releases 6 and 7.

Changes in Q2 2019 (June 2)

The following features and enhancements were available in IBM Storage Insights for 2Q 2019:

Viewing notifications for your storage

See what needs attention in your storage environment in one place: the Notifications dashboard. Click Dashboards > Notifications to view call home events sent by your devices, upgrade recommendations, and best practice notifications.

Viewing recommendations for your storage

IBM Storage Insights analyzes your device data to identify violations of best practice guidelines and other risks, and to provide recommendations about how to address these potential problems. Click Insights > Advisor to view these recommendations.

Specifying which users are emailed about service outages

Control which users are notified about service outages for your instance of IBM Storage Insights. By default, all emails about outages are sent to the owner of the instance. Now you can decide who is notified when service outages occur.

Monitoring IBM Storwize V5000E storage systems

Monitor Storwize V5000E storage systems. You can view information about the capacity, space usage, and performance of the storage systems. Other features, such as alerting, health monitoring, advanced analytics, and reporting are also supported.

Viewing application workload

View the total workload of an application that is consuming storage. Previously, to investigate the workload of an application, you had to review the workloads of the individual volumes. Now you can select an application on the Applications page and click View Performance to view its Total I/O Rate and Total Data Rate.

Faster ways to view and acknowledge your alerts

Now it's easier and faster to view and acknowledge your alerts. On the Alerts dashboard, just double-click an alert to see the details of the alert on the same page, including a performance chart for performance alerts. You can view summary details of several alerts at the same time, and acknowledge them all with a single click.

Viewing more IBM FlashSystem and XIV notifications

See more notifications from FlashSystem 900, FlashSystem A9000, and XIV storage systems. You can also see recommendations for FlashSystem A9000 and XIV storage systems.

IBM Storage Insights for IBM Spectrum Control

IBM Storage Insights for IBM Spectrum Control is an IBM Cloud® service that can help you predict and prevent storage problems before they impact your business. It is complementary to IBM Spectrum Control and is available at no additional cost if you have an active license with a current subscription and support agreement for IBM Virtual Storage Center, IBM Spectrum Storage Suite, or any edition of IBM Spectrum Control.

Changes in Q1 2019 (March 3)

The following features and enhancements were available in IBM Storage Insights for 1Q 2019:

Configuring alerts using alert policies

Use alert policies to configure alerts for groups of resources rather than just for individual resources. Simply create an alert policy and specify the alerts that you want, and those alerts are automatically applied to all the resources that you include in the policy.

Modifying alerts for resources is also a snap because the changes that you make are automatically applied to all the resources in the policy at the same time.

Reporting

- Selecting the resources you're interested in is made easier. Now, you can easily generate predefined capacity reports about the resources that you are interested in. It just takes a click to select managed disks by storage systems, pools by storage systems, servers by applications, volumes by servers.
- Send custom and predefined reports as CSV and HTML attachments. Your colleagues want to add information or modify the report? Just attach the report as a CSV file so that they can download and open the report in a spreadsheet!
- Send scheduled reports now. Your colleagues can't wait for the next run of a monthly report? Just click and run the report now to share the information with your colleagues!

Monitoring compression savings for RAID arrays in IBM FlashSystem 900, model AE3 storage system

For FlashSystem 900, model AE3 with firmware version 1.6, view the amount of capacity that is saved when the flash modules in the RAID array use inline data compression.

Identifying mirrored volume relationships on storage systems that run IBM Spectrum Virtualize

Some volume properties were renamed to make it easier to identify the primary and secondary copies in mirrored volume relationships. For example, on the Volumes page:

- Target is now named Mirror Role and shows the value "Primary" or "Secondary".

- Mirror is now named Copy ID.

Changes in Q4 2018 (November 18)

The following features and enhancements were available in IBM Storage Insights for 4Q 2018:

Reporting

- From a single page, create predefined capacity reports that you can schedule and send by email. Just pick the type of report that you want to create, such as a capacity report for storage systems, pools, or servers.
- Create predefined inventory reports for your storage systems and for the storage resources that they use, such as nodes.
- Add filters to custom reports.

Stopping and restarting data collections

Stop data collection during maintenance work on storage systems to minimize the number of informational, warning, and error alerts that are generated. You can restart data collection when the maintenance work is complete. Restarting the data collection might also help if data is not being collected for a storage system.

Defining alerts for attributes and capacity of resources

Monitor capacity and configuration to keep a close watch on critical resources and resolve issues before they affect your storage environment. You can now create attribute and capacity alerts for your storage systems to monitor changes in your environment.

Monitoring the condition and status of resources

Monitor the health of your storage environment in IBM Storage Insights Pro by checking the operational condition of your storage systems and the status of their internal resources. Before now, the state of a resource was represented based on the call home events that were received. Fresh information is now received from resources about the internal status, such as when a volume or pool goes offline.

Monitoring the state of your storage environment

Capacity and configuration data is now immediately received from resources when changes occur, such as when volumes are created or pools deleted. For example, as soon as changes occur in your environment, you can now see the live information such as capacity information on the dashboard and configuration information on the storage systems details page and properties pages.

Previously this information was updated once per day.

Monitoring IBM Storwize V7000 Gen3 storage systems

Monitor Storwize V7000 Gen3 storage systems. You can view information about the capacity, space usage, and performance of the storage systems. You can also view the savings that are achieved when data is reduced, compressed, and deduplicated.

Changes in Q3 2018 (September 9)

The following features and enhancements were available in IBM Storage Insights for 3Q 2018:

Monitoring IBM FlashSystem 9100 storage systems

Monitor IBM FlashSystem 9100 storage systems. You can view information about the capacity, space usage, and performance of the storage systems. You can view the savings that are achieved when data is reduced, compressed, and deduplicated. Other features, such as alerting, health monitoring, advanced analytics, and reporting are also supported.

Enhanced support for IBM FlashSystem 900, model AE3 storage system

Prevent your FlashSystem 900 from running out of capacity by monitoring the physical capacity of the storage system. View how much pool capacity is provisioned and the used and available physical capacity for the RAID array.

Tracking the status of ticket tasks

Collecting and uploading logs for tickets can take 20 minutes or more. Use the new icons in the page banner to easily view progress when you create or update tickets.

Adding multiple storage systems

Adding storage systems is now a lot faster: You can add multiple storage systems instead of adding them individually.

Checking your support for block storage systems

Check if you are entitled to support for your block storage systems.

Viewing inventory information for SAN Volume Controller storage systems

View the list of nodes and enclosures in your inventory and the type of enclosure. You can see whether IBM Storage Insights has determined that the node or enclosure has an active maintenance or warranty contract.

Reporting

- From any table view for a storage resource, you can create, customize, and schedule custom reports.
- Create, schedule, and send chargeback reports by email to make the owners of resources, such as applications, departments, or physical servers, aware of the amount and cost of the storage that their resources consume.
- Create storage consumption reports to make the owner of a specific resource aware of the amount and cost of the block storage that their resources consumes.

Other changes

It was called Home. Now, it's called Dashboards. In IBM Storage Insights, it's your operations center for monitoring your block storage in tile or table view, and it's where you can view the custom dashboards that you create. In IBM Storage Insights Pro, not

only do you get the Operations center dashboard, but you also have access to the Overview and Alerts dashboards.

Changes in Q2 2018 (June 10)

The following features and enhancements were available in IBM Storage Insights for 2Q 2018:

Allowing IBM® Support to collect logs without contacting you

To save time when IBM® Support is working on your ticket, give IBM® Support permission to collect and upload log packages without contacting you. You can set this permission for each storage system.

Creating customized dashboards to manage your storage

Create customized dashboards to manage selected storage systems in your environment at a glance.

Managing capacity and performance at a glance using the dashboard table

Use the table view of the dashboard to quickly monitor the health, capacity, and performance of a range or all of your storage systems.

Viewing storage system properties and specifying custom tags

Easily access properties information about your storage systems from the dashboard and update the name, location, and custom tags.

Monitoring IBM Spectrum Virtualize enclosures

View detailed information and Call Home events about the enclosures for block storage systems that run IBM Spectrum Virtualize, such as FlashSystem V9000, FlashSystem 900, SAN Volume Controller, and the IBM Storwize family.

Monitoring capacity savings for IBM Spectrum Virtualize

Use the new overview charts for storage systems to answer key physical capacity, volume capacity, and capacity savings questions:

- How much space is available.
- How much of your thin-provisioned volume space is used.
- How much space you are saving by using compression, deduplication, and thin provisioning.

Enhanced security for support

Blue Diamond Enhanced Secure Support is now integrated with IBM Storage Insights. Clients who need to comply with Health Insurance Portability and Accountability Act (HIPAA) regulations can now use IBM Storage Insights.

Changes in Q1 2018 (March 11)

The following features and enhancements were available in IBM Storage Insights for 1Q 2018:

Monitoring spare nodes on IBM Spectrum Virtualize systems Version 8.1.0 or later

Monitor the availability of clusters by checking which nodes have spare nodes. You can also check the status of the spare nodes, such as which nodes are online and which nodes are on standby.

Monitoring compression metrics for volumes on IBM Spectrum Virtualize systems

Monitor the workload of compressed volumes on storage systems that run IBM Spectrum Virtualize. You can view I/O rate, data rate, and response time metrics for compressed volumes and uncompressed volumes.

Choosing the storage systems you want to monitor

On the dashboard, you can add block storage systems that were not automatically added based on your customer number and add storage systems that you removed but now want to monitor. You can also remove nodes and enclosures that were not assigned to storage systems.

Managing users and their roles

Add and remove IBM Storage Insights Pro users and assign roles. The roles that are assigned to a user determine the product features that are available.

Changes in Q4 2017 (November 19)

Getting support, detecting existing and potential issues, and collecting basic information about your inventory of block storage systems is easier than ever. In the 4Q 2017 update of IBM Storage Insights Pro, you can quickly monitor and assess the basic health, status, and performance of block storage systems. If a problem is detected, you can get help to investigate and troubleshoot the problem and minimize the impact of hardware and software issues before they impact the performance of your critical business applications.

In this update, you can:

- Get an enterprise-wide, dashboard view of the health, capacity, and key performance indicators for all of your block storage systems.
- Improve the signal-to-noise ratio by focusing on only storage-related events that require your attention.
- Get support for all your IBM block storage systems in a few, simple steps.
- Upload support logs automatically to get tickets investigated and closed efficiently and quickly

Changes in Q3 2017 (September 10)

The following features and enhancements were available in IBM Storage Insights for 3Q 2017:

Alerting on performance conditions

Use alerts to prevent performance issues from developing into critical situations. For example, you know what the acceptable response times are for the volumes that a critical application uses. To make sure that you are notified if the response times drop below acceptable levels, you define alerts for the volumes so that you know when the warning or critical thresholds that you set are exceeded.

Agentless servers are created automatically

Before, you had to manually create agentless servers to monitor the storage resources that were being consumed by your physical servers. Now, you don't have to because agentless servers are automatically created when your storage systems are probed, which means less configuration and more capacity planning!

Renaming tiers

Change the default names of the tiers that are shown in IBM Storage Insights. For example, you might have tiers such as Tier 0 or Tier 1.5, which are not default tier names. You can now rename the tiers so that they match the names of the tiers in your storage environment.

Modifying the properties of multiple resources

Add or change properties, such as the location or custom tags, for multiple servers or storage systems. You can use the properties to filter or sort the resources in the GUI or in an external application if the data is shared or exported.

Changes in Q2 2017 (June 4)

The following features and enhancements were available in IBM Storage Insights for 2Q 2017:

Viewing capacity metrics for read-intensive flash drives on IBM Storwize

View information about Storwize flash drives by tier in storage pools and volumes. For storage pools, you can view the capacity and available capacity for solid-state drives (Tier 0) and for read-intensive flash storage (Tier 1). For volumes, you can view the capacity for solid-state drives (Tier 0) and for read-intensive flash storage (Tier 1).

Enhancements for IBM Cloud Object Storage

- Add COS Vaults to applications and general groups so you can track how much space is being consumed by logically related vaults and how that consumption trends over time.
- Monitor access risk and storage risk for COS Vaults and COS Slicestor® nodes.
- View information about the tolerance of COS Slicestor nodes to drive failures.
- View information about the tolerance of COS Vaults to drive failures.
- View information about the internal resources of IBM Cloud Object Storage that are used by IBM Spectrum Scale clusters.

Viewing Unprotected Volumes

View a list of all the primary volumes that are not protected by a copy data relationship. Use this information to identify volumes that might need copy data protection.

Identifying Quorum Disks in a stretched cluster

The Managed Disk page includes a new hidden column that identifies the Active Quorum disk in a stretched cluster.

Viewing the site name of each node in a stretched cluster

See the site name of each node in a stretched cluster. The site name is populated by probes. The site name identifies the physical location of the nodes.

Viewing host connections that are associated with a host or cluster

For DS8000 storage systems, you can now see the hosts and host clusters that host connections belong to.

Viewing port delay performance metrics on IBM Spectrum Virtualize

View the following port delay metrics for storage systems that run IBM Spectrum Virtualize:

- Port Delay Time
- Port Delay I/O Percentage

Use these metrics to investigate whether lack of buffer credits is causing performance problems if the Zero Buffer Credit Timer metric is not available.

Changes in Q1 2017 (March 5)

The following features and enhancements were available in IBM Storage Insights for 1Q 2017:

Monitoring EMC storage systems

View information about the capacity, space usage, and performance of the following EMC storage systems when you add them for monitoring:

- EMC VMAX
- EMC VNX
- EMC VNXe

Support for versions of EMC SMI-S Provider or EMC Solutions Enabler that are compliant with SMI-S 1.6 provides a representative view of VMAX, VNX, and VNxe storage systems. For example, you can view information about:

- Thin provisioning
- Compression
- Meta volumes and private volumes

Gaining insights into the external storage that is used by IBM Spectrum Scale

- View capacity values for the external storage that clusters and file systems use.
- Check whether you have enough internal space to recall data that was migrated to external storage.

Viewing host connections that are associated with a cluster

For storage systems that run IBM Spectrum Virtualize, see the cluster that host connections belong to.

Enhancements for IBM Cloud Object Storage

- View information about the hard disk drives, solid-state drives, and flash modules in COS Slicestor nodes.
- In the Vaults by Accessers chart, you can now clearly see the vaults that cannot be accessed and the vaults that are at risk of access failure.
- In the Vaults by Accessers chart, you can now clearly see the vaults that cannot be accessed and the vaults that are at risk of access failure.

Replication capacity planning

On the new VDisk Mirrors and HyperSwap® pages in the Copy Data panel, you can analyze storage device relationships across your block storage environment to identify how redundancy is affecting available capacity.

Changes in Q4 2016 (December 4)

The following features and enhancements were available in IBM Storage Insights for 4Q 2016:

Enhancing the collection of asset, capacity, and performance metadata

Deploy multiple data collectors to collect and send the data about the storage systems in your data centers to IBM Storage Insights Pro. When you add a storage system, the data collector with the best response time is selected to collect the data. If you install multiple data collectors and a probe or performance monitor fails to collect data from the storage system, the response times for the data collectors are tested again, and the collector with the best response time is activated to collect the data.

Monitoring IBM FlashSystem A9000 and IBM FlashSystem A9000R storage systems

Monitor FlashSystem A9000 and FlashSystem A9000R storage systems. You can view information about the capacity, space usage, and performance of the storage systems. You can view details about the savings that are achieved by data reduction, compression, and data deduplication. You can also view details about the flash drives in the storage systems.

Gaining insights about external storage that is used by IBM Spectrum Scale

View the amount of external storage that is being used by the file systems in a IBM Spectrum Scale cluster. External storage can be provided by IBM Cloud Object Storage, Amazon Simple Storage Service (S3), OpenStack Swift, IBM Spectrum Archive, IBM Spectrum Protect, and other cloud services.

Monitoring IBM Cloud Object Storage

You can now monitor sites, mirrors, and vault quotas for IBM Cloud Object Storage. For example, you can:

- Monitor the capacity and space usage of sites. See which COS Slicestor and COS Accesser® nodes are located at each site and which sites cannot tolerate COS Accesser node failures.
- View the space quotas that are configured for vaults and see whether any vaults are violating the soft or hard quota limits.
- View information about mirrors, such as the pair of vaults in each of the mirrors, and the number of COS Accesser nodes that are configured to access the mirrors. You can also see the storage pools and sites for the vaults in the mirror.

Changes in Q3 2016 (August 28)

The following features and enhancements were available in IBM Storage Insights for 3Q 2016:

Viewing performance metrics for IBM FlashSystem 900

View the following key performance metrics for IBM FlashSystem 900 storage systems:

- Response times
- I/O rates and data rates
- The condition of the storage system

Investigating capacity and space usage trends

Review the capacity charts to detect capacity shortages and investigate trends in storage growth for your tiers. You can view and select capacity metrics in the chart and table views. Use the insights that you gain about space usage in your storage environment to determine when you need more capacity and to identify the storage resources that are underutilized.

Monitoring IBM Cloud Object Storage

Monitor the status, capacity, and space usage of IBM Cloud Object Storage.

Identifying which IBM Spectrum Scale file systems use cloud storage

Identify which file systems in a Spectrum Scale cluster use external pools for storage. External pools can include storage that is provided by IBM Cloud Object Storage, Amazon Simple Storage Service (S3), OpenStack Swift, IBM Spectrum Archive, IBM Spectrum Protect, and other cloud services.

Scheduling probes automatically

Automated probe scheduling simplifies the process of scheduling probes and helps to avoid excessive load on the product server. To minimize the number of concurrent probes, you can define the time window for scheduled automated probes to start. If you want to run a probe at a specific time, you can manually schedule a probe.

Changes in Q2 2016 (June 5)

The following features and enhancements were available in IBM Storage Insights for 2Q 2016:

Identifying performance issues with storage systems that run IBM Spectrum Virtualize

Identify key performance metrics that are outside of a standard range on IBM SAN Volume Controller and IBM Storwize storage systems. You can quickly compare the workloads on your storage resources with best practice guidelines.

Exporting performance data for storage systems

Export performance data for storage systems to a compressed file. If you contact IBM Support to help you analyze a performance problem with a storage system, you might be asked to send this file.

Investigating capacity and space usage trends

Review the capacity charts to detect capacity shortages and investigate trends in storage growth for your block, file, and object storage resources. You can review capacity trends for these storage resources:

- Block storage systems, pools, and space-efficient volumes such as compressed, thin-provisioned, and Easy Tier volumes.
- File storage resources such as file systems, file system pools, and filesets.
- Object storage resources such as containers.

Investigating the capacity and space usage of tiered storage

Review the capacity and space usage that the tiered storage in your environment consumes. You can see when your tiered storage will run out of space and the weekly growth rate in storage usage for each tier.

Monitoring groups of resources using general groups

Create general groups to quickly view information about storage resources that have common characteristics. For example, you might group the subset of ports on a SAN Volume Controller storage system that are used for inter-node communication or the storage systems that are used by a critical business application.

Viewing virtualized and non-virtualized capacity

View the values for the capacity of virtualized storage and non-virtualized storage to understand how capacity is used when storage virtualization is implemented in your storage environment.

Viewing the types of resources that are added to applications

View the resource types that were explicitly added to an application or subcomponent in the Members section of the details page.

Changes in Q1 2016 (February 28)

IBM is constantly updating the infrastructure, security, and stability of IBM Storage Insights to improve your experience. Enhanced analytics, troubleshooting capabilities, and general fixes are built-in to this update, so the IBM Support team can better assist you in monitoring your storage environment.

Changes in Q4 2015 (December 13)

The following features and enhancements were available in IBM Storage Insights for 4Q 2015

Monitoring IBM Spectrum Scale performance

You can now view the performance of clusters, nodes, and file systems in IBM Spectrum Scale. For example, you can:

- Analyze the performance of multiple clusters over a period to determine which clusters have the heaviest I/O loads or the longest response times
- View which of the nodes that mount a file system have the heaviest I/O loads, highest CPU loads, or highest memory usage
- Compare the file systems on a cluster to determine which file systems have the heaviest I/O loads and the longest response times

Monitoring object storage systems

You can now monitor object storage systems on IBM Spectrum Scale. For example, you can:

- View the GPFS file system that is associated with the object storage system. Combined with the ability to view the relationship between IBM Spectrum Scale and its SAN-attached storage, you can now troubleshoot all the resource

connections in the data path. For example, if you are troubleshooting an object storage problem, you can view the file system that is used by an object container and then view the back-end storage systems that are used by the file system.

- View capacity and space usage for object storage systems and for specific accounts and containers.
- Monitor the object count and space quotas for accounts and containers.
- Plan for capacity by reviewing the capacity growth of GPFS clusters that are used for object storage.

Viewing capacity charts for pools

You can now view charts that show the current and historical capacity of your block storage pools. To check when the available space will run out, based on the historical capacity and space usage trends for the pool, see the value that is shown in the Zero Capacity column.

Checking the capacity that is managed by IBM Storage Insights Pro

You can go to Configuration > Managed Capacity to compare how much capacity is managed by IBM Storage Insights Pro with the total amount of capacity that you are entitled to manage.

Checking the capacity and distribution of volume extents in pools that use Easy Tier

On the Pools page and on the Volumes page, you can now view information about the capacity for each of the drives that Easy Tier can use to tier or distribute volume extents. You can also see the distribution of the volume extents across each Easy Tier drive or tier in the pool, such as the percentage of volume extents on SSDs, on Enterprise HDDs, and on Nearline HDDs.

Checking which volumes are replicated or mirrored

You can see the chart that shows the volumes that are replicated and that are not replicated in your data center. You can also see the number of synchronous and asynchronous replicas, FlashCopy® pairs, and VDisk mirrored volumes.

Connecting the data collector to a server or proxy server

You can now specify whether you want to connect to a proxy server when you install the data collector. You can also add the user's credentials to authenticate with the proxy server.

Configuring IBM Storage Insights Pro to comply with FIPS 140-2

You can now configure IBM Storage Insights Pro so that it complies with Federal Information Processing Standard (FIPS) 140-2.

Changes in Q3 2015 (August 23)

The following features and enhancements were available in IBM Storage Insights for 3Q 2015:

Gaining insights into IBM Spectrum Accelerate storage systems

You can now gain insights into the capacity, space usage, and performance of IBM Spectrum Accelerate, which is a software-defined storage system and a member of the IBM Spectrum Storage™ family.

Getting a snapshot of monitored resources on the Dashboard page

On the Dashboard page, you can now see, besides the capacity, reclamation, and tiering charts:

- The number of file and block storage systems that you added for monitoring
- The number of servers that you added for monitoring
- The number of applications that you created to troubleshoot critical applications
- The number of departments that you created to monitor the capacity of the application's storage resources that departments consume

Excluding and including volumes in the tiering analysis

You might not want to get tiering recommendations for some of the volumes in your data center. For example, if you don't want to down-tier volumes that belong to critical applications, you can go to Insights > Tier Planning and exclude the volumes from the tiering analysis.

If you change your mind, you can click the Excluded tab and include the volumes in the tiering analysis.

Viewing information about protocol nodes in GPFS clusters

You can see the protocol nodes for GPFS clusters and the protocols that are supported by the protocol nodes on the Nodes page.

Nodes in GPFS clusters are designated as protocol nodes so that non-GPFS clients can access the data on the GPFS cluster. The following protocols are supported:

- Network File System (NFS)
- Common Internet File Systems (CIFS)
- Object

Information about protocol nodes is available for IBM Spectrum Scale version 4.1.1 and later.

- **Capacity terminology changes**

IBM Storage is making the capacity terminology that is used in IBM Storage products consistent. In Q1 2020, the capacity terminology was made clearer and simpler across IBM Storage products, including IBM Storage Insights.

Release notes for IBM Storage Insights

IBM® manages and updates IBM Storage Insights for you and constantly strives to address vulnerabilities and bugs before they impact your business. Learn about the latest security updates, compatibility issues, and bug fixes.

Security updates

When security issues or vulnerabilities are discovered in IBM Storage Insights or the cloud, the IBM Product Security Incident Response Team (PSIRT) analyzes the issue and applies a fix automatically. Issues that require you to take action, such as upgrading your data collectors, are communicated through emails that are sent to the owner of your IBM Storage Insights instance.

To learn more about IBM security updates and PSIRT, check out the following links:

- [View a list of IBM security bulletins](#)
- [Learn more about PSIRT](#)

More information about security: For more information about security in IBM Storage Insights, check out these topics:

- [Updates and maintenance for IBM Storage Insights](#)
- [How is the metadata protected](#)
- [Who can access the metadata](#)
- [\[PDF\] IBM Storage Insights Security Guide](#)

Bug fixes and improvements

In every update of IBM Storage Insights, IBM addresses bugs that are reported by internal teams and by our customers. Along with fixes, improving the operation and stability of the offering is also a priority. To track a fix, an Authorized Program Analysis Report (APAR) is created, which is a formal report from IBM development to customers that notified IBM of a problem or suspected defect.

To view the bugs that were fixed in this update of IBM Storage Insights, see the [APAR fix list for IBM Storage Insights and IBM Spectrum Control](#).

Tip: The list includes APAR fixes for IBM Storage Insights and IBM Spectrum Control. However, not all of the APAR fixes apply to both offerings, so it's recommended that you read an APAR fix for more details.

Limitations and known issues

IBM strives to keep issues in IBM Storage Insights to a minimum, but occasionally they can't be avoided. Learn about the latest issues and limitations in the Q3 2021 update:

Monitoring limitations for switches and fabrics

- You can't monitor the following Cisco switches at this time:
 - Cisco switches that run NX-OS Release 8.5.
 - The Cisco Nexus family switches.
 - Cisco switches with the following SAN Extension module installed: DS-X9334-K9. To view the installed modules, use the `show mod` command on the switch CLI.
- You can't monitor the IP storage modules (ethernet ports) or the Fiber Channel over IP (FCIP) tunnels on Cisco switches.
- Any custom name that you apply to a fabric does not persist. When you edit the name of a fabric by right-clicking it, selecting View Properties, and clicking Edit, the name that you apply is reset when the next probe is run for that fabric.

Capacity By Tier chart is not available

On the details page for a storage system, pool metadata is not being displayed on the Overview > Capacity By Tier chart.

Incorrect overhead capacity

For some block storage systems, an incorrect value for overhead capacity might be reported.

IBM is aware of these issues and is working hard to address them as quickly as possible. Thank you for your patience.

Sponsor user program

Sponsor users interact directly with designers and developers to improve the user experience and to help shape the future of the overall storage portfolio.

IBM® needs your experience and expertise as an active participant to work with our designers and developers to create new features for the future and help improve the overall look and feel of our IBM Storage products.

Are you ready to align us with your reality of what a product should do?

Are you a real user or a potential user of an IBM Storage software product?

IBM wants you to be excited about being an active participant and establishing a collaborative and fluid relationship between your company and our design and development teams.

Express® your thoughts and get your ideas heard! Then, as the discussion moves forward, we will integrate your insights and feedback into our decision making process and make them action items. In addition, as an active program user you get a peek into upcoming storage releases and gain beta access to new products.

Note: If you are interested in joining the IBM Storage Sponsor User Program or just want to get additional information, complete the following form: [IBM Storage Sponsor User](#).

Important: Always remember your information is kept confidential and is only used by the IBM Design and Development for product development purposes.

Beta program

The IBM® Storage Insights Pro Beta is a continuous program. It gives you a first look at upcoming features, a chance to influence design, an opportunity to test the new features in your own environment, and a direct voice into the product development process.

There are many reasons why new and existing customers, IBM Business Partners, and even current members of IBM become part of the Beta program as a tester.

Benefits

Some benefits of IBM's Beta program include:

Gain early access to the latest updates so you can evaluate new product features and enhancements

As part of the Beta program, you get access to new features before they're generally available so that you can validate and test those features directly in your environment. You can then identify and fix any concerns before the features are officially released, saving you precious time and preventing any production issues later on. When the update is made publicly available, you'll be ready to take advantage of all the new capabilities.

Interact with design and development

The product designers, architects, developers, and testers are integrated into the Beta program to help support the participants. They can assist you with any issues that you might encounter. You can also request an advocate to work with you during the process and post questions on the Beta forum.

Collaborate with other Beta customers

The Beta program includes group meetings that provide you with an opportunity to interact with other program participants about your configuration and testing experiences with the beta features. Participants are encouraged to share their experiences with the development team.

Participate in product education

The Beta program provides the participants with education on the new features and functions that are available in a Beta. The education is usually done in presentation form on a web conference where you can get a head start in learning about the capabilities.

Become an IBM reference customer

After your positive Beta experience, IBM invites you to participate in the reference program. The IBM Marketing team helps you craft a message to let other potential Beta testers know about your success when you adopt and use beta features.

Get enrolled!

To enroll in the Beta program, complete the [IBM Storage Insights Pro Beta Sign up form](#).

Product overview

Learn about the cloud services that IBM® Storage Insights and IBM Storage Insights Pro offer to monitor storage.

IBM Storage Insights is offered free of charge to customers who own IBM block storage systems. It is an IBM Cloud storage service that monitors IBM block storage.

Get IBM Storage Insights: If you have IBM block storage systems, click [Get IBM Storage Insights](#).

IBM Storage Insights Pro is the subscription-based offering of IBM Storage Insights. It expands the offering to include services such as alerts, performance troubleshooting, capacity planning, reclamation, and custom reports. And, in addition to monitoring IBM block storage, you can monitor IBM block, file, object, and software-defined storage (SDS) systems. You can also monitor non-IBM block and file storage systems, such as:

- Dell EMC storage systems.
- Hitachi storage systems.
- NetApp storage systems.
- Pure storage systems.

Get IBM Storage Insights Pro: If you want to subscribe, click [Subscribe to IBM Storage Insights Pro](#).

These key features are common to both IBM Storage Insights and IBM Storage Insights Pro:

- Dashboards
 - The NOC and the Operations dashboards, which help you to identify at a glance the IBM block storage systems in your storage environment that require attention.
 - The Switches dashboard and Fabrics dashboard, which provide you with diagnostic information for monitoring end-to-end connectivity, performance, and the health of your switches and fabrics.
 - The Notifications dashboard, which provides you with a single-pane view of Call Home events.
 - The Advisor, which provides you with recommendations on the remedial steps that can be taken to manage risk and resolve issues that might impact storage services.
- Support
 - Integrated and streamlined support experience.
 - Seamless ticket management from opening and automatically uploading diagnostic information to updating and tracking tickets.

The following features are exclusive to IBM Storage Insights Pro:

- The Alerts dashboard that provides you with key information about the alerts that are generated, such as alert severity, and information about the resources that are affected.
- Resource views of servers, storage systems, and storage system resources such as pools and volumes that provide you with extensive inventory, capacity, and performance information. In the charts, you can compare and track storage usage and availability and you can compare and track key performance metrics.
- Resource views that provide detailed information about all of the metadata that is collected for Brocade and Cisco switches and fabrics.
- Capacity, inventory, chargeback, and consumer reports that you can create and share by email with your colleagues.
- **Tour the key features**
IBM Storage Insights and IBM Storage Insights Pro are easy to deploy and set up so you can quickly access essential insights into your storage environment.
- **Supported devices in IBM Storage Insights**
Find out which storage devices and products that you can monitor with IBM Storage Insights. View the types of fabrics and switches that you can monitor.
- **IBM Storage Insights**
Getting support, detecting potential and existing problems, and collecting basic information about your inventory of storage systems has never been easier. In IBM Storage Insights, you can monitor the basic health, status, and performance of storage systems. When problems occur, you can get help to identify and troubleshoot those problems and minimize potential downtime, where and when you need it. To more effectively manage network resources, you can also monitor your inventory of fabrics and switches.
- **IBM Storage Insights vs IBM Storage Insights Pro**
Compare the features of IBM Storage Insights and IBM Storage Insights Pro.
- **Determining the capacity to be licensed**
Determine the capacity to be licensed for the storage systems that IBM Storage Insights Pro manages in your environment.
- **Social media for IBM Storage Insights**
Watch videos, read blogs, and explore social media to learn more about how to use IBM Storage Insights and IBM Storage Insights Pro to monitor and manage your storage environment.
- **Dashboards**
Dashboards are a quick way to get insights into key aspects of your storage at a glance. Identify storage systems that need your attention, monitor notifications of events that occur on your devices, get an overview of your environment, and more. And you can also use dashboards for switches and fabrics to gain quick access to health, performance, and diagnostic information. Knowing which dashboards to view, and when, can help you find and resolve problems on your storage before they impact your business.
- **Navigation**
Explore the IBM Storage Insights GUI to gain insights into your storage environment. Go to the pages where you add and administer storage resources, modify data collection schedules, and view charts and information about the storage resources. Also go to the pages where you add and monitor fabrics and switches to view charts and information about them and their internal and related resources.

- [**Units of measurement for storage data**](#)
IBM Storage Insights uses decimal and binary units of measurement to express the size of storage data.
- [**Updates and maintenance for IBM Storage Insights**](#)
IBM Storage Insights is an IBM Cloud® service. Because it's a cloud service, IBM manages and upgrades the service for you. Learn about what to expect during maintenance updates and service outages.
- [**IBM Storage Insights for IBM Spectrum Control**](#)
IBM Storage Insights for IBM Spectrum Control is an IBM Cloud service that can help you predict and prevent storage problems before they impact your business. It is complementary to IBM Spectrum Control and is available at no additional cost if you have an active license with a current subscription and support agreement for IBM Virtual Storage Center, IBM Spectrum® Storage Suite, or any edition of IBM Spectrum Control.

Related concepts

- [Gaining insights](#)

Related reference

- [Getting started](#)
- [Supported devices in IBM Storage Insights](#)

Related information

-  [Supported Brocade and Cisco switches and fabrics](#)

Tour the key features

IBM® Storage Insights and IBM Storage Insights Pro are easy to deploy and set up so you can quickly access essential insights into your storage environment.

Just take a snap tour of the key features such as the task-oriented, customizable dashboards that tell you in one location all you need to know about your storage resources. Then review the integrated support experience that helps you to open, update, and track tickets to achieve a quick resolution.

See how you can determine cost savings. Gain insights into planning for capacity and into troubleshooting issues with performance, capacity, and configuration.

Then see how you can easily use the advanced reporting features of IBM Storage Insights Pro to get a thorough understanding of your storage resources. For example, use predefined or customizable consumable reports to quickly assess your storage requirements.

Let's get going!

1. [How it works](#)
Deploy IBM Storage Insights and enable Call Home to get the information that you need to effectively monitor your storage environment.
2. [Ready, steady, go](#)
Get the most out of IBM Storage Insights by deploying data collectors, enabling Call Home, and adding the storage resources that you want to monitor.
3. [Dashboard overviews](#)
Learn about the dashboard features you can leverage to monitor and optimize your storage environment.
4. [Integrated support experience](#)
You want issues to be resolved efficiently and quickly and you want IBM Support to act before application and service issues impact your storage environment.
5. [Cost savings](#)
Use the features that you get when you subscribe to IBM Storage Insights Pro to help you to reduce costs.
6. [Capacity planning](#)
Learn more about how you can plan capacity and detect capacity shortfalls by using IBM Storage Insights Pro to monitor your storage environment. Use predictive analytics and capacity insights so that you know how much capacity you need and when you'll need it.
7. [Performance, capacity, and configuration troubleshooting](#)
Learn more about the features that IBM Storage Insights and IBM Storage Insights Pro provide to troubleshoot the performance, capacity, and configuration of your storage environment.

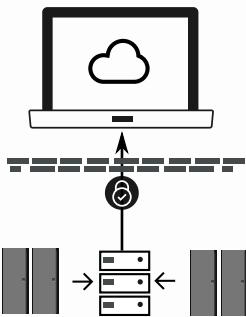
8. Reporting overview

Subscribers to IBM Storage Insights Pro can easily create inventory reports, capacity and performance reports, and reports about storage consumption. IBM Storage Insights users can create predefined reports.

How it works

Deploy IBM® Storage Insights and enable Call Home to get the information that you need to effectively monitor your storage environment.

A lightweight data collector is installed in your data center to stream performance, capacity, asset, and configuration metadata to your IBM Cloud instance.



The metadata flows in one direction: from your data center to IBM Cloud over HTTPS. In the IBM Cloud, your metadata is protected by physical, organizational, access, and security controls.

IBM Storage Insights is ISO/IEC 27001 Information Security Management certified.

GDPR: IBM Storage Insights can assist customers in meeting the requirements of the EU General Data Protection Regulation (GDPR).

↓ [IBM Storage Insights Security Guide](#).

↓ [IBM Storage Insights Fact Sheet](#).

Next topic: [Ready, steady..go](#)

Ready, steady, go

Get the most out of IBM® Storage Insights by deploying data collectors, enabling Call Home, and adding the storage resources that you want to monitor.

Complete these actions:

- Enable Call Home to activate the notifications for diagnostic events.
- Deploy the data collector to get inventory, configuration, capacity, and performance information and upload and send support logs automatically.
- Add the connection details for the storage systems that you want to monitor.
- Add the connection details for the switches so that you can monitor Brocade and Cisco switches and fabrics.

Complete these actions to get started:

 Call Home <p>Get a diagnostic stream of events and notifications about the hardware and software health and status of your storage systems.</p> <ul style="list-style-type: none">  Get diagnostic events  Enable Call Home 	 Deploy Data Collectors <p>Get insights into the capacity and performance of your storage resources and enable the collection of diagnostic packages.</p> <ul style="list-style-type: none">  Download and install  Deploy multiple data collectors  Learn more about collecting metadata
 Add Resources <p>Add the resources, storage systems, fabrics and switches that you want to monitor.</p> <ul style="list-style-type: none">  Add storage systems  Add Brocade switches and fabrics  Add Cisco switches and fabrics 	 Manage Users <p>Control access by adding and assigning roles to users.</p> <ul style="list-style-type: none">  Add users  Modify or remove user accounts

Previous topic: [How it works](#)

Next topic: [Dashboard overviews](#)

Dashboard overviews

Learn about the dashboard features you can leverage to monitor and optimize your storage environment.

Compare the dashboards in the IBM® Storage Insights and IBM Storage Insights Pro offerings:

Table 1. Dashboards in IBM Storage Insights and IBM Storage Insights Pro

Dashboard	IBM Storage Insights (free)	IBM Storage Insights Pro (subscription)
NOC dashboard	✓	✓
Operations dashboard	✓	✓
Notifications dashboard	✓	✓
Advisor dashboard	✓	✓
Alerts dashboard		✓

Note: Unless otherwise stated, the name IBM Storage Insights is used to refer to the features that are common to both IBM Storage Insights and IBM Storage Insights Pro.

NOC dashboard

With IBM Storage Insights, you can monitor the health of your block storage environment in your network operations center on the NOC dashboard:

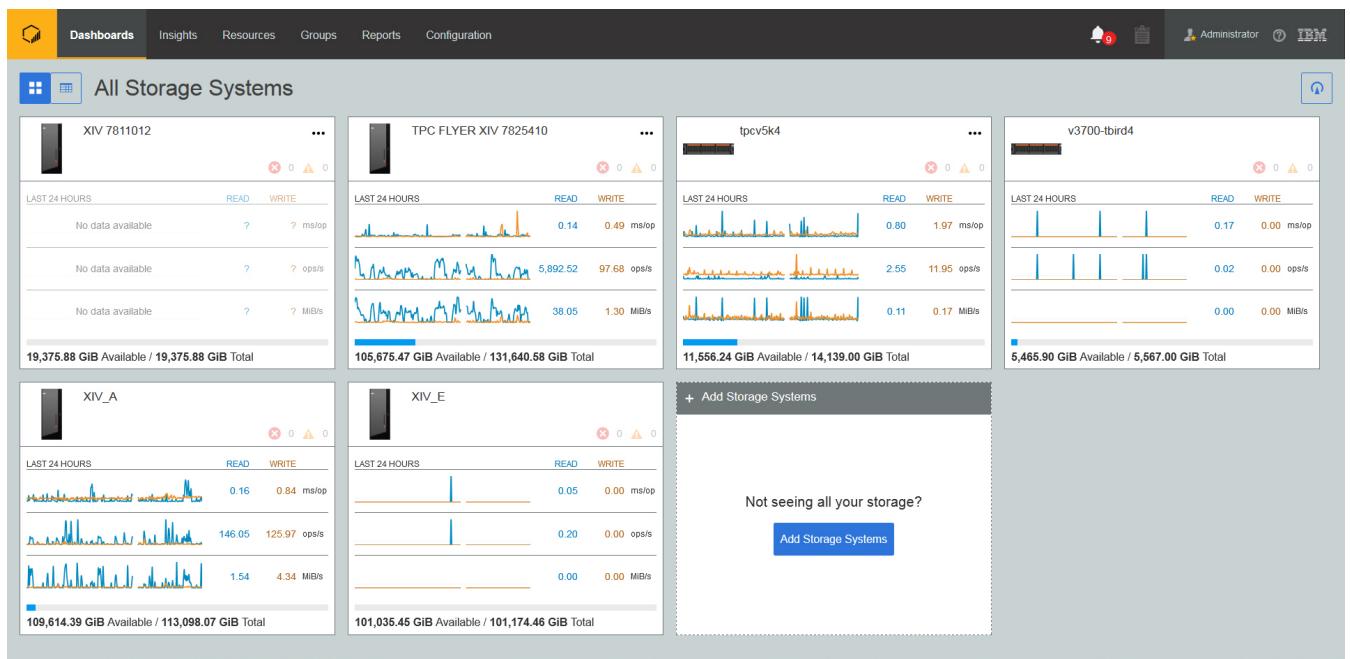
- Key performance information so that you know whether the performance of your storage systems meet your operational requirements is shown.
- Key capacity information so you know whether you've got enough capacity to meet your storage demands is shown.

To take a close look at the storage systems that are being monitored, click Dashboards > NOC and click the storage system that you're interested in.

When you click a storage system, you get:

- An overview that shows trending charts for the key capacity and performance information.

- The notifications of Call Home events. You can click Dashboards > Notifications to see the notifications for all the storage systems that you monitor on a single page.
- The tickets that were open and closed.
- The properties of the storage system.



Tips:

Create a custom dashboard if you don't want to see all of the storage systems that are being monitored. Just click the Dashboard icon in the upper-right corner of the dashboard and create the dashboards that you need.

Check whether IBM Storage Insights has confirmed that the hardware has an active maintenance or warranty contract. Click a tile and open the Properties tab. For nodes and enclosures in IBM SAN Volume Controller, click the Inventory tab and check the Support Contract field.

Operations dashboard

With IBM Storage Insights, you get the information that you need to monitor the health of your block storage environment and fabrics on the Operations dashboard:

Block Storage Systems

Block storage systems is a default dashboard shown when you navigate to Operations dashboard.

- Overview of the health of the storage system components or resources is shown. You can open the GUI for the storage system from the Component Health overview.
- Key capacity information is shown so you know whether you've got enough capacity to meet your storage demands.
- Key performance information is shown so that you know whether the performance of your storage systems meet your operational requirements.

To take a close look at the storage systems that are being monitored, click Dashboards > Operations. Then click the storage system that you're interested in the list on the left of the dashboard.

When you click a storage system, you get:

- An overview that shows the health of the storage system components or resources, and trending charts for the key capacity and performance information.
- The notifications of Call Home events. You can click Dashboards > Notifications to see the notifications for all the storage systems that you monitor on a single page.
- The tickets that were open and closed.
- The properties of the storage system.

For example, you can see the health, capacity, and performance information for a block storage system in the Operations dashboard. The storage system is colored red because there are problems with nodes and logical components.

Fabrics

With IBM Storage Insights, you get the information that you need to monitor the health of your fabrics on the Fabrics dashboard:

- Overview of the health of the fabric components or resources is shown. You can open the GUI for the fabric from the Component Health overview.
- Key performance information is shown for all switches in the fabric so that you know whether the fabric's components meet your operational requirements.

To take a close look at the fabrics that are being monitored, click Dashboards > Operations. Then select the Fabrics dashboard from the Default Dashboards drop down. Then click the fabric that you're interested in the list on the left of the dashboard to get:

- An overview that shows the health of the fabric components or resources, and trending charts for the key performance information for the switches in the fabric.
- The properties of the fabric.

Custom

You can create a custom dashboard if you want to view a specific set of resources at a glance. Each dashboard can only contain resources of the same type that is either Block Storage Systems or Fabrics. You can create as many custom dashboards as you like.

Notifications dashboard

Click Dashboards > Notifications to view all Call Home events in your storage environment in one place.

Advisor dashboard

To review the recommendations that IBM Storage Insights provides to help you address issues in your storage environment, click Insights > Advisor. Based on an analysis of the information that is sent by your devices, IBM Storage Insights recommends the actions that you can take to manage risks and resolve issues that might impact storage services.

Advisor

Keep your infrastructure healthy with these recommendations.

Unacknowledged Recommendations: 802 | (20 Error) | (23 Warning) | (759 Informational) | (102 Acknowledged)

Event	Severity	Time
Running out of space (10% or less remaining)	Warning	Apr 15, 2019, 22:58:51
Running out of space (5% or less remaining)	Warning	Apr 15, 2019, 22:09:19
Running out of space (10% or less remaining)	Warning	Apr 15, 2019, 21:23:53
Running out of space (10% or less remaining)	Warning	Apr 15, 2019, 21:18:49
Running out of space (10% or less remaining)	Warning	Apr 15, 2019, 19:15:49
Running out of space (10% or less remaining)	Warning	Apr 13, 2019, 04:49:55
Running out of space (10% or less remaining)	Warning	Apr 12, 2019, 20:49:46
Running out of space (10% or less remaining)	Warning	Apr 12, 2019, 15:21:10
Running out of space (10% or less remaining)	Warning	Apr 11, 2019, 05:19:10
Running out of space (10% or less remaining)	Warning	Apr 10, 2019, 23:31:06
Running out of space (10% or less remaining)	Warning	Apr 10, 2019, 21:50:05
Running out of space (10% or less remaining)	Warning	Apr 10, 2019, 18:30:59
Running out of space (10% or less remaining)	Warning	Apr 10, 2019, 00:23:37
Running out of space (10% or less remaining)	Warning	Apr 9, 2019, 19:57:03
Running out of space (10% or less remaining)	Warning	Apr 9, 2019, 19:33:05
Running out of space (10% or less remaining)	Warning	Apr 9, 2019, 09:46:57
Running out of space (10% or less remaining)	Warning	Mar 13, 2019, 15:38:51
Running out of space (10% or less remaining)	Warning	Mar 13, 2019, 10:09:36
Running out of space (10% or less remaining)	Warning	Mar 10, 2019, 16:41:24
Running out of space (10% or less remaining)	Warning	Mar 10, 2019, 10:49:06
Running out of space (10% or less remaining)	Warning	Mar 9, 2019, 23:43:24

Showing 23 items | Selected 1 item

Refreshed a few moments ago

Running out of space (10% or less remaining)

Apr 15, 2019, 22:58:51

Acknowledge Unacknowledge

Device: DNB_SBA_LR_clstr1

The total system capacity has less than 10% available space.

Critical Diskspace Threshold	Percent Free Space	Total Free Space
0.05	0.00249	56586194124

Consider adding more capacity to the system or clean up unneeded volumes.

Alerts dashboard

With IBM Storage Insights Pro, you also get the Alerts dashboard.

To view, evaluate, and manage the alerts for the resources that you monitor, open the Alerts dashboard.

Resources	Alert Name	Condition	Violation	Severity	Occurrence Time
smcho_test_lun02	Status	Error	Error	Warning	Jan 10, 2021, 13:21:21
2 Volumes	Available Capacity	<= 1 TiB	Multiple	Critical	Jan 9, 2021, 19:26:21
2 Volumes	Available Capacity	<= 1 TiB	Multiple	Critical	Jan 9, 2021, 19:26:21
2 Volumes	Available Capacity	<= 1 TiB	Multiple	Critical	Jan 9, 2021, 19:26:21
2 Volumes	Written Capacity	>= 250 MiB	Multiple	Critical	Jan 9, 2021, 19:26:21
2 Volumes	Used Capacity	<= 2 %	Multiple	Critical	Jan 9, 2021, 19:26:21
dedup_comp_lun_snap	Capacity	>= 100 GiB	113 GiB	Critical	Jan 9, 2021, 19:26:21
smcho_test_lun02	Status	Error	Error	Warning	Jan 9, 2021, 13:28:21
NetApp_Cluster_01_SAS_1	Total I/O Rate - overall	>= 400 ops/s	716.68 ops/s	Warning	Jan 8, 2021, 23:43:21
NetApp_Cluster_01_SAS_1	Overall Transfer Size	>= 200 KiB/op	298.68 KiB/op	Warning	Jan 8, 2021, 23:43:21
NetApp_Cluster_01_SAS_1	Total I/O Rate - overall	>= 400 ops/s	786.52 ops/s	Warning	Jan 8, 2021, 23:18:21
NetApp_Cluster_01_SAS_1	Overall Transfer Size	>= 200 KiB/op	289.46 KiB/op	Warning	Jan 8, 2021, 22:28:21
NetApp_Cluster_01_SAS_1	Storage-TotalDataRate_Pools-ReadD...	3 Conditions	Multiple	Critical	Jan 8, 2021, 22:28:21
NetApp_Cluster_01_SAS_1	Overall Transfer Size	>= 200 KiB/op	290.99 KiB/op	Warning	Jan 8, 2021, 22:28:21
NetApp_Cluster_01_SAS_1	Total I/O Rate - overall	>= 400 ops/s	802.33 ops/s	Warning	Jan 8, 2021, 22:13:21
NetApp_Cluster_01_SAS_1	Multiple	Storage-TotalDataRate_Pools-ReadD...	3 Conditions	Critical	Jan 8, 2021, 22:13:21
NetApp_Cluster_01_SAS_1	Overall Transfer Size	>= 200 KiB/op	282.42 KiB/op	Warning	Jan 8, 2021, 21:28:21
NetApp_Cluster_01_SAS_1	Total I/O Rate - overall	>= 400 ops/s	523.3 ops/s	Warning	Jan 8, 2021, 21:08:21
NetApp_Cluster_01_SAS_1	Multiple	Storage-TotalDataRate_Pools-ReadD...	3 Conditions	Critical	Jan 8, 2021, 20:28:21
NetApp_Cluster_01_SAS_1	Overall Transfer Size	>= 200 KiB/op	434.92 KiB/op	Warning	Jan 8, 2021, 20:28:21
NetApp_Cluster_01_SAS_1	Total I/O Rate - overall	>= 400 ops/s	650.02 ops/s	Warning	Jan 8, 2021, 20:08:21
NetApp_Cluster_01_SAS_1	Multiple	Storage-TotalDataRate_Pools-ReadD...	3 Conditions	Critical	Jan 8, 2021, 19:28:21
NetApp_Cluster_01_SAS_1	Overall Transfer Size	>= 200 KiB/op	440.61 KiB/op	Warning	Jan 8, 2021, 19:28:21
NetApp_Cluster_01_SAS_1	Total I/O Rate - overall	>= 400 ops/s	609.2 ops/s	Warning	Jan 8, 2021, 19:08:21
NetApp_Cluster_01_SAS_1	Multiple	Storage-TotalDataRate_Pools-ReadD...	3 Conditions	Critical	Jan 8, 2021, 18:28:21
NetApp_Cluster_01_SAS_1	Overall Transfer Size	>= 200 KiB/op	322.39 KiB/op	Warning	Jan 8, 2021, 18:28:21
NetApp_Cluster_01_SAS_1	Total I/O Rate - overall	>= 400 ops/s	KR1.75 mops/s	Warning	Jan 8, 2021, 18:18:21

Showing 500 of 112711 items | Selected 1 items on page

Refreshed 30% minutes ago

Page 1 of 224

Overall Transfer Size

Jan 8, 2021, 23:43:54

Acknowledge Unacknowledge Remove

Condition: Pool Overall Transfer Size >= 200 KiB/op

Resource: NetApp_Cluster Alert Source: NetApp_Cluster Violation: 298.68 KiB/op

Affected Pool

Pools	Overall Transfer Size (KiB/op)
NetApp_Cluster_01_SAS_1	298.68

Showing 1 item | Selected 0 items on page

Refreshed a few moments ago

Performance

Pool Overall Transfer Size >= 200 KiB/op

All alerts are shown, so you can monitor and address the critical storage events in your environment in one place.

Previous topic: Ready, steady, go

Next topic: Integrated support experience

Integrated support experience

You want issues to be resolved efficiently and quickly and you want IBM® Support to act before application and service issues impact your storage environment.

The Operations and NOC dashboards in IBM Storage Insights dynamically react to changes in your storage environment. To help you determine whether you need to complete an action, storage systems that have error or warning conditions float to the top of the dashboard to grab your attention. You can see what the issue is, whether IBM Support opened a ticket, or whether you must complete an action such as update the firmware for a storage system. If a ticket wasn't opened or you encounter an issue, IBM Support is just a click away.

You can open, update, and track tickets, and you can attach screen captures and add comments to help IBM Support get that issue resolved quickly. You don't have to manually collect logs or support packages because IBM Storage Insights automatically collects and sends the diagnostic data to IBM Support.

Opening a support ticket and collecting support data 

Let IBM Support help you: To get that ticket closed quickly, IBM Support might need fresh or more diagnostic data. If you want to allow IBM Support to get that data without contacting you each time they need more data, click Configuration > Settings.

IBM Support keeps a close watch on issues that might impact the performance of IBM Storage Insights such as interruptions in storage services and issues with the application.

 Create Tickets	 Get Help
<p>The information that is needed to investigate tickets is automatically collected and uploaded to IBM Support.</p> <p> Open, update, and track tickets</p> <p> Give IBM Support permission to upload support logs</p>	<p>Check these support and help options:</p> <p> Support and self-help options</p> <p> FAQ</p>

Previous topic: [Dashboard overviews](#)

Next topic: [Cost savings](#)

Cost savings

Use the features that you get when you subscribe to IBM® Storage Insights Pro to help you to reduce costs.

Use cost saving features such as:

- Reclaim unused storage to reduce capacity purchases.
- Track storage consumption by tier so the capacity that you purchase is the type of capacity that you need.
- Use predictive analytics and capacity insights so that you know how much capacity you need and when you'll need it.
- Configure performance alerts and use performance tracking information for resources, such as business-critical applications, to prevent interruptions and loss of revenue.

Cost saving tips for IBM Storage Insights Pro subscribers:

Storage Reclamation

Use the recommendations that are automatically generated to reclaim unused storage.



View the list of reclaimable volumes



Exclude volumes from the reclamation analysis



Learn more

Tiering

Assign pools to tiers to monitor the performance and capacity of your tiered storage.



Assign pools to tiers



Monitor

Previous topic: [Integrated support experience](#)

Next topic: [Capacity planning](#)

Capacity planning

Learn more about how you can plan capacity and detect capacity shortfalls by using IBM® Storage Insights Pro to monitor your storage environment. Use predictive analytics and capacity insights so that you know how much capacity you need and when you'll need it.

To help you plan capacity and detect capacity shortfalls, IBM Storage Insights Pro analyzes the capacity metadata that it collects about storage systems, back-end storage systems, and internal resources such as pools, volumes, and disks.

To plan capacity, you need information such as:

- How much capacity you currently have
- How much capacity you currently consume
- How much capacity can be reclaimed
- How much capacity can be placed on cheaper storage media

You need historical capacity information to identify trends in storage consumption such as dips and surges in the demand for block, file, or object storage. To help you get the most out of the storage that you purchase, you need to know what cost savings are achieved when you use reduced pools, compress your data, deduplicate your data, or thin provision volumes.

To plan capacity purchases efficiently, IBM Storage Insights Pro provides you with:

- Capacity depletion charts, which analyze historical storage consumption to predict when you will run out of block and file storage.
- Summary capacity information about physical capacity, available capacity, and the capacity savings that were achieved.
- Capacity information presented in tables and charts that allow you to review current and historical capacity consumption.
- Capacity reporting. You can now use custom reports to easily create, customize, schedule, and send capacity reports by email. You can also create chargeback and storage consumption reports about the cost and the amount of storage that is consumed by physical servers, applications, and departments.
- Exporting capacity information feature that allows you to export capacity data to a spreadsheet, PDF file, or HTML file.

Tip: To help you prioritize capacity purchases, you can create general groups and applications to identify the capacity that is being consumed by critical business applications or groups of storage resources such as the storage resources that are used by your production platform.

Check out these capacity planning features:

Capacity Planning

Reports



[Capacity Reports](#)



[Inventory Reports](#)



[Custom Reports](#)



[Consumer Reports](#)



[Export Data](#)

Forecasts, Capacity Limits, and Fill Rates



[Forecasts](#)



[Capacity Limits](#)



[Fill Rates](#)

Tables and Charts



[Table Views](#)



[Trending Charts](#)

Previous topic: [Cost savings](#)

Next topic: [Performance, capacity, and configuration troubleshooting](#)

Performance, capacity, and configuration troubleshooting

Learn more about the features that IBM® Storage Insights and IBM Storage Insights Pro provide to troubleshoot the performance, capacity, and configuration of your storage environment.

IBM Storage Insights Pro subscribers can use the performance information that is collected, analyzed, and presented in summary views, table views, and trending charts to identify performance anomalies such as performance bottlenecks and slow response times. This includes performance information for switches.

To help you detect performance issues before they impact the storage environments, you can complete these actions:

- Use alert policies to manage alert definitions for groups of resources.
- Define alerts for individual resources, such as storage systems, servers, switches, and fabrics. If multiple alerts are triggered by the same violations, only one consolidated alert is displayed.
- Define alerts for storage resources that are assigned to applications and general groups.
- Identify whether the performance of their storage systems that run IBM Spectrum Virtualize comply with best practice guidelines for key performance indicators.
- Use the performance trending charts to identify and investigate performance issues.

Specify email addresses to be notified when alerts are triggered. Alerts can be triggered by changes to the attributes, capacity, and performance of resources. When the warning threshold for a storage resource is exceeded, you are notified so that you can act before the situation becomes critical.

Tip: To help you define warning and critical thresholds you are provided with recommended values for threshold values that do not vary much between environments.

To detect performance anomalies, you can use the key performance indicator charts to compare the metric values for the storage systems that run IBM Spectrum Virtualize with the best practice values that were established by the historical analysis of storage environments. If the performance metric values for your storage systems exceed the best practice value or range of values, you can investigate further and determine whether you need to take remedial action.

Storage systems that run IBM Spectrum Virtualize: IBM SAN Volume Controller, IBM Storwize® family, IBM FlashSystem® V9000 storage systems, and to the IBM Spectrum Virtualize software-only solution.

In the performance table views and performance trending charts, you can investigate the performance of your storage systems and their internal resources. You can investigate and compare the performance of storage systems and investigate the performance of internal

resources such as disks and volumes.

In the performance trending charts, you can select the performance metrics that you want to use to compare the performance of storage resources. If you detect an issue, you can change the time range to determine whether the issue recurs, or occurs at a specific time or on a specific day or days.

 Alerts	 Performance Analysis
To notify you of issues that affect the performance of your storage environment, use default or custom alert policies.  Use alert policies for types of storage systems, switches, and fabrics  Create custom alerts for critical resources  Create alerts for the resources that are used by general groups  Create alerts for the resources that are used by applications	Provide IBM Support with the information that they need to resolve issues.  Monitor storage systems with the highest I/O rates  Investigate the performance of storage resources  Export performance information
 Performance Metrics	 IBM Spectrum Virtualize
Review the performance metrics that are collected and analysed for storage systems and switches.  Performance metrics for storage systems  Performance metrics for switches	Provide IBM Support with the information that they need to resolve issues.  Key performance metrics  Performance metrics  Performance issue detection

Previous topic: [Capacity planning](#)

Next topic: [Reporting overview](#)

Reporting overview

Subscribers to IBM® Storage Insights Pro can easily create inventory reports, capacity and performance reports, and reports about storage consumption. IBM Storage Insights users can create predefined reports.

You use custom reports to create, schedule, and send reports by email about the capacity, performance, and configuration of your storage resources. And, you use chargeback and storage consumption reports to make the owners of resources aware of the amount and cost of the storage that their resources consume.

Your colleagues can't wait for the next run of a report?

Tip: Try it out! Click Reports. Right-click one or more reports and click Run Now from the Actions menu.

Predefined capacity and inventory reports

From a single page, you can generate predefined reports about the capacity usage and the configuration and properties of your assets. Just pick the type of report you want to create, such as a capacity report about your block storage systems or pools or an inventory report for your block storage systems, specify the scope of the report, choose the information that you want to include, and schedule the report. To refine the information the report and make sure that the recipients of your report get the information they need, you can add up to four filters.

Now, you can easily generate predefined capacity reports about the resources that you are interested in, such as managed disks by storage systems, volumes by servers, and much more.

Tip: Try it out! Click Reports. Click Create Report. Pick the Volumes capacity report. Name the report, choose capacity information about one or more resources, and make a selection.

You can now send predefined reports as CSV and HTML attachments. Your colleagues want to add information or modify the report? Just attach the report as a CSV file so that they can download and open the report in a spreadsheet!

Create reports in the free version of IBM Storage Insights: In the free version of IBM Storage Insights, you can create these predefined reports and share the reports with your colleagues and management:

-  Capacity reports for block storage systems and pools
-  Inventory reports for block storage systems

Try it out! From the menu, click Reports, and then click Create Report.

[Learn more.](#)

Custom reports

From the table view for any storage resource, create, customize, and schedule reports that include performance or asset, capacity, configuration, and health status information. To create performance reports, just click View Performance and create a performance report for the resource.

You can schedule custom reports to keep a close watch on critical resources, or you can send them immediately to alert your colleagues about performance anomalies or capacity issues.

You can add up to four filters to custom capacity and inventory reports. For example, if you want to notify resource administrators or owners about capacity shortfalls, you can set threshold values for capacity information. Or if you want to exclude information that is not of interest to the report's recipients, you can add a filter. The report preview is refreshed when you apply filters so that you can make sure that the recipients of the report will get the information that they need.

You can now send custom reports as CSV and HTML attachments. Your colleagues want to add information or modify the report? Just attach the report as a CSV file so that they can download and open the report in a spreadsheet! [Learn more](#)

Chargeback and storage consumption reports

You manage or own applications, departments, or physical servers, and you want to know how much storage is being consumed and how much it costs to maintain the storage that is consumed. And, you want that information in your inbox now, every week or month so that you can keep a close eye on storage costs and capacity consumption.

You create chargeback reports to share information about the storage cost and consumption of all of your applications, or departments, or physical servers. [Learn more](#).

You create storage consumption reports to share information about the storage cost and consumption of a single application, or department, or physical server. [Learn more](#).

[Previous topic: Performance, capacity, and configuration troubleshooting](#)

Supported devices in IBM Storage Insights

Find out which storage devices and products that you can monitor with IBM® Storage Insights. View the types of fabrics and switches that you can monitor.

In IBM Storage Insights, you can monitor IBM block storage only. In IBM Storage Insights Pro, you can monitor IBM block storage, and the following additional storage:

Table 1. Storage systems that can be monitored in IBM Storage Insights and IBM Storage Insights Pro

Storage System	IBM Storage Insights	IBM Storage Insights Pro
Click a storage system to view its supported versions.		
DS8000®	✓	✓
Dell EMC Unity		✓
Dell EMC VMAX		✓
Dell EMC VNX, VNXe		✓
FlashSystem 5000	✓	✓
FlashSystem 5100	✓	✓
FlashSystem 5200	✓	✓
FlashSystem 7200	✓	✓
FlashSystem 9100	✓	✓
FlashSystem 9200	✓	✓
FlashSystem V9000	✓	✓
FlashSystem 900	✓	✓
FlashSystem A9000	✓	✓
FlashSystem A9000R	✓	✓
Hitachi VSP		✓
IBM Cloud Object Storage		✓

Storage System	IBM Storage Insights	IBM Storage Insights Pro
IBM Spectrum Accelerate	✓	✓
IBM Spectrum Scale (ESS and GSS)		✓
IBM Spectrum Virtualize software-only clusters	✓	✓
IBM Spectrum Virtualize for Public Cloud	✓	✓
NetApp ONTAP 9		✓
Pure FlashArray//M and FlashArray//X		✓
SAN Volume Controller	✓	✓
Storwize® V3500	✓	✓
Storwize V3700	✓	✓
Storwize V5000	✓	✓
Storwize V7000	✓	✓
IBM Flex SystemFlashSystem V7000 Storage Node	✓	✓
Storwize V7000 Unified	✓ (block storage only)	✓
XIV®	✓	✓

To monitor fabrics and switches in IBM Storage Insights Pro and IBM Storage Insights, you can add the following types of switches:

- Brocade
- Cisco

For a complete list of the supported switches, see <https://www.ibm.com/support/pages/node/6249365>.

Restriction: IBM Storage Insights doesn't support monitoring non-IBM software-defined storage devices. However, it can monitor IBM software-defined storage devices, such as IBM SAN Volume Controller. For a list of storage devices that can be monitored, check out <https://www.ibm.com/support/pages/node/6249369>.

Tips:

- Share or bookmark <https://ibm.biz/insightsdevices> as a handy reference for viewing the supported devices in IBM Storage Insights and IBM Storage Insights Pro.
- To see a list of web browsers that you can use with IBM Storage Insights, see [Web browser support](#).

Related reference

- [IBM Storage Insights vs IBM Storage Insights Pro](#)

IBM Storage Insights

Getting support, detecting potential and existing problems, and collecting basic information about your inventory of storage systems has never been easier. In IBM® Storage Insights, you can monitor the basic health, status, and performance of storage systems. When problems occur, you can get help to identify and troubleshoot those problems and minimize potential downtime, where and when you need it. To more effectively manage network resources, you can also monitor your inventory of fabrics and switches.

Availability

IBM Storage Insights Pro subscribers: If you're currently a IBM Storage Insights Pro subscriber, the functions in IBM Storage Insights are automatically available at no additional charge, so you can immediately take advantage of new streamlined support and event monitoring capabilities. To access the functions, go to Dashboards>Operations.

Signing up for IBM Storage Insights: Do you manage IBM block storage systems, but aren't an IBM Storage Insights Pro subscriber or currently don't have access to IBM Storage Insights? If so, and you want a unified view of a storage environment that includes diagnostic event information, an integrated support experience, and key capacity and performance metrics at no charge, consider signing up today! To sign up, go to <http://ibm.biz/InsightsReg> and apply. An IBM representative will contact you soon to get you started. It's that simple, and it's free, so why wait?

Product support at your finger tips

Detecting and resolving issues in a storage environment is the focus of IBM Storage Insights. It combines storage management capabilities with a simplified yet robust IBM Support experience to help you spend less time troubleshooting storage problems and more time planning for your future storage needs.

With features such as Call Home, data collectors, a streamlined ticketing process, and proactive support, you can feel confident that your storage environment is stable, performing well, and has the capacity to meet your applications' requirements. And if a problem does occur, you can get help promptly through the unified support experience by completing the following tasks:

- Open IBM Support tickets for a resource and automatically add a log package to the ticket
- Update tickets with a new log package
- View the tickets that are open for a resource
- View the ticket history for a resource

Additionally, IBM Support has read-only access to diagnostic information about monitored storage systems, so they can help troubleshoot and resolve problems.

Tip: You can give IBM Support permission to collect and upload log packages for the resource without contacting you every time. To set this permission, click Configuration > Settings. Then click Edit in the IBM Support Log Permissions section.

Calling home

The Call Home feature transmits operational and event-related data about your storage to IBM Storage Insights through a Simple Mail Transfer Protocol (SMTP) server connection. These events are shown in the Notifications dashboard in real time, so you can be aware of hardware failures and potentially serious configuration or environmental issues when they occur.

Data collection and monitoring

Track the availability, capacity, and performance of the storage that your organization consumes by deploying a lightweight data collector to monitor resources. When problems occur, you'll also be able to add log packages to tickets and upload them automatically to ensure IBM Support has the information it needs to help.

Your storage inventory, at a glance

The dashboard presents you with a single-pane view of the current state of the capacity, performance, and health of your storage environment.

For each storage system that is monitored, you can also view the following information:

- The name of the storage system
- The number of nodes and enclosures
- The number of error and warning conditions that were detected
- Key performance and capacity metrics

Use the table view of the dashboard to evaluate the current state of capacity across your block storage systems. You can also assess the status of the storage systems and access configuration information.

You can create customized dashboards to selectively monitor particular storage systems in your environment. Use the Notifications dashboard to quickly view and sort the latest Call Home events that were detected on your IBM block storage systems. Simply click an event to view more details about it.

Use the Switches and Fabrics operations dashboards to get a single-pane view of the health and performance of switches and fabrics.

Use the Resources menu to see inventory information about your block storage systems, fabrics, and switches. Double-click a resource for more details. You can also add resources for monitoring.

Customizing your experience

With so much information that is available to you in IBM Storage Insights, being able to customize dashboards to show the key information and events that you care about are critical to helping you identify where and when problems occur.

Unlocking the full potential of IBM Storage Insights Pro

You've just read about IBM Storage Insights, the free version of IBM's cloud-based, monitoring solution for block storage devices. But what if your environment is more complex and heterogeneous, and needs advanced capabilities, such as:

- A more comprehensive view of the performance, capacity, and health of not only your IBM block storage devices, but also your non-IBM block storage devices such as Dell EMC Unity, NetApp, and Hitachi Virtual Storage Platform.
- Support for monitoring IBM file, object, software-defined storage (SDS) systems.
- A more comprehensive view of the performance and health of your switches and fabrics.

- Access to features like intelligent capacity planning, storage reclamation, storage tiering, and advanced performance metrics to help you reduce costs and optimize your data center.

IBM Storage Insights Pro might be the answer. It's the capacity-based, subscription version of the cloud-based monitoring solution and includes all the features of IBM Storage Insights, plus all the advanced features listed above!

Compare IBM Storage Insights and IBM Storage Insights Pro: To help you decide on whether upgrading to IBM Storage Insights Pro is the right decision for you, compare the offerings at [IBM Storage Insights vs IBM Storage Insights Pro](#).

Upgrading to IBM Storage Insights Pro is a snap! In the menu bar of IBM Storage Insights, just click Unlock the full potential of IBM Storage Insights Pro to learn more about the pro version and start your trial.

Related tasks

- [Want to try or buy IBM Storage Insights Pro?](#)
-  [Getting Started Guide \[PDF\]](#)

Related reference

- [Deploying data collectors to get capacity and performance insights and to upload logs](#)
- [Monitoring resources with Call Home](#)
- [Viewing information about resources](#)
- [Dashboards](#)
- [Opening, updating, and tracking IBM Support tickets](#)
- [Security](#)

Deploying data collectors to get capacity and performance insights and to upload logs

The data collector sends the asset, capacity, configuration, and performance metadata that is collected for your storage systems for analysis. The metadata is used to analyze storage usage and performance and to upload logs automatically when you open or update support tickets. Asset, configuration, and performance information for fabrics and switches is also collected and analyzed.

Get key performance and capacity metadata

You want a holistic view of your storage environment in a single pane. So, you enable Call Home to get the events that are generated when you have hardware and software issues and you deploy the data collector to get a snapshot of the storage usage and the performance of your storage systems. You also get a snapshot of performance information for fabrics and switches.

Tip: If you subscribe to IBM® Storage Insights Pro, you can access all of the metadata that is collected to monitor capacity trends, capacity depletion, track dips and peaks in performance over time, and determine the root causes of performance bottlenecks.

Automatically upload support logs

When you deploy the data collector, you can automatically upload logs for your IBM block storage systems so that IBM Support can efficiently and quickly investigate and close the tickets that you open or update.

Remember: IBM Storage Insights is part of the IBM Storage Insights Pro offering and although the same metadata, with some exceptions, is collected about your block storage systems and sent for analysis, only a subset of the metadata is available in the GUI for users who don't subscribe to IBM Storage Insights Pro. However, IBM Support can access all of the metadata that is needed to diagnose, investigate, and resolve open tickets. IBM Support has read-only access to the metadata that is needed to investigate and resolve issues.

Security: The information that is collected by data collectors flows in one direction, out of your data center to your instance of IBM Storage Insights Pro or IBM Storage Insights. To secure the outbound data flow, HTTPS connections are used between the data collector and your server and between your server and your instance. From your data center to your instance, the metadata is protected by the physical, technical, and organizational access and security controls that are provided by IBM Cloud data centers. See [IBM Storage Insights Security Guide](#).

Related reference

- [What is the data collector](#)

IBM Storage Insights vs IBM Storage Insights Pro

Compare the features of IBM® Storage Insights and IBM Storage Insights Pro.

- The free version is called IBM Storage Insights and provides a unified view of a storage environment with diagnostic event information, an integrated support experience, and key capacity and performance metrics. This includes component health overviews for switches and fabrics with key performance metrics. IBM Storage Insights is available at no cost to IBM Storage Insights Pro subscribers and owners of IBM block storage systems who [sign up](#).
- The capacity-based, subscription version is called IBM Storage Insights Pro and includes all the features of IBM Storage Insights plus a more comprehensive view of the performance, capacity, and health of storage resources. This includes key health, performance, and diagnostic information for switches and fabrics. It also helps you reduce storage costs and optimize your data center by providing features like intelligent capacity planning, storage reclamation, storage tiering, and advanced performance metrics. The storage systems that you can monitor are expanded to include IBM file, object, software-defined storage (SDS) systems, and non-IBM block and file storage systems, such as Dell EMC storage systems.

In both versions, when problems occur on your storage, you can get help to identify and resolve those problems and minimize potential downtime, where and when you need it.

Compare the features in these two offerings:

Table 1. Features in IBM Storage Insights and IBM Storage Insights Pro

Resource Management	Functions	IBM Storage Insights (free)	IBM Storage Insights Pro (subscription)
Monitoring	Inventory management	IBM block storage, switches, and fabrics	IBM and non-IBM block storage, file storage, object storage, switches, and fabrics
	Logical configuration	Basic	Advanced
	Health	Call Home events	Call Home events
	Performance	Basic <ul style="list-style-type: none">3 storage system metrics: used capacity, available capacity, total capacity, and compression savings aggregated for storage systems4 switches metrics: port saturation, port congestion, port hardware errors, and port logical errors	Advanced <ul style="list-style-type: none">100+ metrics for storage systems and their components40+ metrics for switches and related components
	Capacity	Basic <ul style="list-style-type: none">4 metrics: used capacity, available capacity, total capacity, and compression savings aggregated for storage systems	Advanced <ul style="list-style-type: none">25+ metrics for storage systems and their components
	Drill down performance workflows to enable deep troubleshooting		✓
	Explore virtualization relationships		✓
	Explore replication relationships		✓
	Retention of configuration and capacity data	2 years (Only the last 24 hours is shown)	2 years
	Retention of performance data	1 year (Only the last 24 hours is shown)	1 year
Service	Exporting performance data to a file		✓
	Filter events to quickly isolate trouble spots	✓	✓
	Hassle-free log collection	✓*	✓
	Simplified ticketing	✓	✓
	Show active PMRs and ticket history	✓*	✓

Resource Management	Functions	IBM Storage Insights (free)	IBM Storage Insights Pro (subscription)
Reporting	Inventory, capacity, performance, and storage consumption reports	<ul style="list-style-type: none"> Capacity reports for block storage systems and pools Inventory reports for block storage systems 	All reports
Alerting	Predictive Alerts	✓	✓
	Customizable, multi-conditional alerting, including alert policies		✓
Analytics	Performance planning		✓
	Capacity planning		✓
	Business impact analysis (applications, departments, and groups)		✓
	Optimize data placement with tiering		✓
	Optimize capacity with reclamation		✓
Security	ISO/IEC 27001 Information Security Management standards certified	✓	✓
Pricing	Entitlements	Free	Capacity-based subscription

Restriction: *If you have access to IBM Storage Insights but are not an IBM Storage Insights Pro subscriber, you must have a current warranty or maintenance agreement for an IBM block storage system to open tickets and send log packages.

In IBM Storage Insights, you can monitor IBM block storage only. In IBM Storage Insights Pro, you can monitor IBM block storage, and the following additional storage:

Table 2. Storage systems that can be monitored in IBM Storage Insights and IBM Storage Insights Pro

Storage System	IBM Storage Insights	IBM Storage Insights Pro
Click a storage system to view its supported versions.		
DS8000®	✓	✓
Dell EMC Unity		✓
Dell EMC VMAX		✓
Dell EMC VNX, VNxe		✓
FlashSystem 5000	✓	✓
FlashSystem 5100	✓	✓
FlashSystem 5200	✓	✓
FlashSystem 7200	✓	✓
FlashSystem 9100	✓	✓
FlashSystem 9200	✓	✓
FlashSystem V9000	✓	✓
FlashSystem 900	✓	✓
FlashSystem A9000	✓	✓
FlashSystem A9000R	✓	✓
Hitachi VSP		✓
IBM Cloud Object Storage		✓
IBM Spectrum Accelerate	✓	✓
IBM Spectrum Scale (ESS and GSS)		✓
IBM Spectrum Virtualize software-only clusters	✓	✓
IBM Spectrum Virtualize for Public Cloud	✓	✓
NetApp ONTAP 9		✓
Pure FlashArray//M and FlashArray//X		✓
SAN Volume Controller	✓	✓
Storwize® V3500	✓	✓
Storwize V3700	✓	✓
Storwize V5000	✓	✓
Storwize V7000	✓	✓

Storage System	IBM Storage Insights	IBM Storage Insights Pro
IBM Flex SystemFlashSystem V7000 Storage Node	✓	✓
Storwize V7000 Unified	✓ (block storage only)	✓
XIV®	✓	✓

- [Want to try or buy IBM Storage Insights Pro?](#)

If you're looking for a robust, cloud-based storage management platform, or are already an IBM Storage Insights user and want even more storage management capabilities, you can easily purchase a license for IBM Storage Insights Pro or activate a 60-day trial.

Related reference

- [What's new in IBM Storage Insights](#)
-

Want to try or buy IBM Storage Insights Pro?

If you're looking for a robust, cloud-based storage management platform, or are already an IBM® Storage Insights user and want even more storage management capabilities, you can easily purchase a license for IBM Storage Insights Pro or activate a 60-day trial.

Before you begin

If you manage IBM block storage systems, but don't already have the *free* version of IBM Storage Insights, sign up today at <http://ibm.biz/InsightsReg>!

With IBM Storage Insights, you get a unified view of a storage environment that includes diagnostic event information, an integrated support experience, and key capacity and performance metrics. This includes component health overviews for switches and fabrics with key performance metrics. It also provides you with an easy path to try or buy IBM Storage Insights Pro, so why wait?

What you need to know about signing up for IBM Storage Insights: You'll need an IBM ID. It will be your administrator account and single point of access to IBM Storage Insights. It's also used by IBM to communicate key updates, announcements, and your unique URL. Ensure that the email address associated with your IBM ID is valid and keep an eye out for important messages from IBM.

If you don't have an IBM ID, don't worry. Getting one is easy. Just complete [this short form](#).

Procedure

If you already have IBM Storage Insights, or want to jump straight to IBM Storage Insights Pro, complete the following steps:

1. Choose your path to IBM Storage Insights Pro:

Who are you?	Steps
I'm an IBM Storage Insights user	<ul style="list-style-type: none"> For a 60-day trial of IBM Storage Insights Pro: <ul style="list-style-type: none"> In the IBM Storage Insights GUI, click Unlock the full potential of IBM Storage Insights Pro at the top of the page. Click Start Trial. This trial is a one-time upgrade to IBM Storage Insights Pro at no charge and automatically reverts to IBM Storage Insights at the end of 60 days. At any time during or after the trial, you can purchase a full subscription to IBM Storage Insights Pro. To purchase a full subscription to IBM Storage Insights Pro: <ul style="list-style-type: none"> Go to IBM Marketplace for Storage Insights. Click Purchase now to learn about and purchase a subscription.
I'm a new user	<ol style="list-style-type: none"> Go to IBM Marketplace for Storage Insights. Click Purchase now to learn about and purchase a subscription.

2. When you receive a validation email, follow the instructions to get started!

Determining the capacity to be licensed

Determine the capacity to be licensed for the storage systems that IBM® Storage Insights Pro manages in your environment.

Overview

Use the Managed Capacity page (Configuration > Managed Capacity) to understand how much capacity that you need to license for IBM Storage Insights Pro.

Storage System	Capacity to be Licensed (TiB)	Total Capacity (TiB)
IBM.2107-75MT371	271.83	271.83
XIV_E 7825826	221.35	221.35
FLYER 7825410	146.73	146.73
XIV_A 7825429	145.27	145.27

The Managed Capacity value at the top of the page is the sum of the Capacity to be Licensed for your managed storage systems. The Capacity to be Licensed value for each storage system is rounded up to the nearest whole number before the Managed Capacity value is calculated.

To verify that your purchased license covers the capacity that is managed, compare the value in your purchased license to the Managed Capacity value.

Check out the following video to learn how the capacity values are calculated:

Calculating the capacity to be licensed for your storage systems

Capacity to be licensed is the usable capacity of the storage systems that are being monitored and that is made available for storage consumption. Apart from IBM Spectrum Scale and IBM Cloud Object Storage, the capacity to be licensed is based on the usable capacity of the RAID arrays on the storage system.

Information about the calculation of capacity to be licensed:

- Capacity that is reserved for overheads, such as RAID management is not included.
- Data reductions savings at the storage system level, such as compression and deduplication, are not included. For storage systems that use data reduction technologies, the capacity to be licensed is the usable capacity, not the effective capacity.
- Capacity to be licensed is the total capacity of the storage system after RAID is applied and spare disks and capacity are deducted. So, capacity to be licensed is the capacity that can be provisioned to servers, when no over-provisioning is used. Any form of cache,

for example, DRAM, SSD, or flash storage is not included, and the capacity to be licensed is less than the raw capacity of the storage system.

The method by which capacity to be licensed is calculated varies among storage systems. Refer to the information that follows.

Storage virtualization systems

Capacity to be licensed is calculated for the following storage virtualizers:

- Storage systems that run IBM Spectrum Virtualize, such as IBM SAN Volume Controller and IBM FlashSystem® 9100.
- Non-IBM storage systems such as Hitachi VSP.

A storage virtualizer includes capacity from other storage systems. Capacity from back-end storage systems that are not monitored by IBM Storage Insights Pro is counted in the capacity to be licensed of the virtualizer. Capacity from back-end storage systems that are monitored by IBM Storage Insights Pro is not counted. The license for the monitored back-end storage is recorded separately and has its own record on the Managed Capacity page.

For storage virtualizers that have internal capacity, such as IBM Storwize® V7000, FlashSystem 7200, and IBM FlashSystem 9100, the capacity to be licensed is calculated as:

```
sum of the physical capacity of the internal RAID arrays +  
sum of the capacity of the external MDisks from unmonitored back-end systems
```

For storage virtualizers that do not have internal capacity, such as some models of IBM SAN Volume Controller, the capacity to be licensed is calculated as:

```
sum of the capacity of the external MDisks from unmonitored back-end systems
```

Block and file storage systems

The capacity to be licensed is the sum of the physical capacity of the RAID arrays on the storage system.

Exception: For FlashSystem A9000, FlashSystem A9000R, and IBM XIV® Storage System, the capacity to be licensed is the overall physical capacity of the storage system.

For the following storage systems, the capacity to be licensed is not calculated because IBM Storage Insights Pro does not collect the RAID array information from the device. The value **Unavailable** is shown in the Capacity to be Licensed column on the Managed Capacity page.

- Block and file storage systems that are managed by SMI-S providers. For example:
 - DS4000®, DS5000, and DS6000™
 - NetApp Data ONTAP 8.1
 - Dell EMC VMAX, VNX, and VNXe
 - Hitachi VSP F series

To get a complete picture of your licensing requirements, you must manually add the physical capacity of the RAID arrays on the storage system to the Managed Capacity value at the top of the page.

IBM Spectrum Scale storage systems

The capacity to be licensed is the sum of the capacity of the Network Shared Disks (NSDs) that are assigned to the file system pools. NSD capacity from back-end storage systems that are not monitored by IBM Storage Insights Pro is included.

The following capacity is not included in the capacity to be licensed:

- NSDs that are not assigned to a pool.
- NSD capacity from back-end storage systems that are monitored by IBM Storage Insights Pro. The license for the monitored back-end storage is recorded separately and has its own record on the Managed Capacity page.
- NSD capacity on external pools.

For IBM Spectrum Scale storage systems that are configured for file and object storage, the capacity to be licensed for the object storage is included in the file system pool capacity and is not counted separately.

IBM Cloud Object Storage systems

The capacity to be licensed is the sum of the capacity of the COS Slicestor® nodes in IBM Cloud Object Storage.

Information about storage system values

The following information is shown for each storage system on the Managed Capacity page.

Capacity to be Licensed (TiB)

The capacity that must be licensed for the storage system. Capacity that is reserved for formatting or RAID management is not included. For storage virtualizers and IBM Spectrum Scale, this value includes the capacity that is provided by back-end storage systems that are not being monitored by IBM Storage Insights Pro.

Capacity from back-end storage systems that are monitored by IBM Storage Insights Pro is recorded separately on the Managed Capacity page and is not included in this value.

Monitored Back-end Capacity (TiB)

For storage virtualizers and IBM Spectrum Scale, the capacity that is provided by back-end storage systems that are being monitored by IBM Storage Insights Pro.

This capacity is not included in the capacity to be licensed of the virtualizer or IBM Spectrum Scale. Each monitored back-end storage system has a separate record on the Managed Capacity page.

Unmonitored Back-end Capacity (TiB)

For storage virtualizers, the capacity that is provided by back-end storage systems that are not being monitored by IBM Storage Insights Pro. This capacity is included in the capacity to be licensed of the virtualizer. Unmonitored storage systems do not have their own record on the Managed Capacity page.

Total Capacity (TiB)

The total capacity of the storage system, including all monitored and unmonitored back-end storage.

Total Capacity = Capacity to be Licensed + Monitored Back-end Capacity

- [Licensing examples](#)

See how the capacity to be licensed and other values on the Managed Capacity page are calculated for different storage systems and configurations.

Related information

- [Pricing](#)
-

Licensing examples

See how the capacity to be licensed and other values on the Managed Capacity page are calculated for different storage systems and configurations.

In these examples, SVC-1 is an IBM® SAN Volume Controller and is monitored by IBM Storage Insights.

Example 1: Back-end capacity is not monitored

This example uses the following configuration:

- SVC-1 has no internal storage and does not receive capacity from storage systems other than the ones used in this example.
- Flash-1 is a Storwize® V5000 with a 600 TiB RAID array.

Here's the situation:

- Flash-1 is not monitored by IBM Storage Insights.
- Flash-1 provides 300 TiB of capacity to SVC-1.

The following values are shown on the Managed Capacity page:

Storage System	Capacity to be Licensed (TiB)	Monitored Back-end Capacity (TiB)	Unmonitored Back-end Capacity (TiB)	Total Capacity (TiB)
SVC-1	300	0	300	300

Explanation:

The 300 TiB Flash-1 capacity that is provided to SVC-1 is shown as unmonitored back-end capacity and is included in the capacity to be licensed for SVC-1.

The remaining 300 TiB capacity on Flash-1 is not provided to storage systems that are monitored by IBM Storage Insights and does not need to be licensed.

Example 2: Back-end capacity is monitored

Configuration:

- SVC-1 has no internal storage and does not receive capacity from storage systems other than the ones used in this example.
- Flash-1 is a Storwize V5000 with a 600 TiB RAID array.

Situation:

- Flash-1 is monitored by IBM Storage Insights.
- Flash-1 provides 300 TiB of capacity to SVC-1.
- SVC-1 receives an additional 800 TiB of capacity from other storage systems that are not monitored by IBM Storage Insights.

The following values are shown on the Managed Capacity page:

Storage System	Capacity to be Licensed (TiB)	Monitored Back-end Capacity (TiB)	Unmonitored Back-end Capacity (TiB)	Total Capacity (TiB)
Flash-1	600	0	0	600
SVC-1	800	300	800	1100

Social media for IBM Storage Insights

Watch videos, read blogs, and explore social media to learn more about how to use IBM® Storage Insights and IBM Storage Insights Pro to monitor and manage your storage environment.

- [Videos for IBM Storage Insights](#)

Watch videos to learn more about how to use IBM Storage Insights and IBM Storage Insights Pro to monitor and support your storage environment.

- [Blogs for IBM Storage Insights](#)

Read blogs from storage management experts and follow us on Twitter to get the latest tips about how to use IBM Storage Insights and IBM Storage Insights Pro to manage and support your storage environment.

Videos for IBM Storage Insights

Watch videos to learn more about how to use IBM® Storage Insights and IBM Storage Insights Pro to monitor and support your storage environment.

Important: These videos were recorded by using multiple versions of IBM Storage Insights and IBM Storage Insights Pro, but are at least partially applicable to the current version of the service.

► Latest updates

Watch these videos to see the new features and enhancements of IBM Storage Insights.

What's new - August 2021

[Learn about the new features and enhancements in the Q3 2021 update of IBM Storage Insights.](#)



What's new - June 2021

[Learn about the new features and enhancements in IBM Storage Insights.](#)

[What's new in IBM Storage Insights - June 2021](#) (3:54)

What's new - March 2021

[Learn about the new features and enhancements in the Q1 2021 update of IBM Storage Insights.](#)

[What's new in IBM Storage Insights - March 2021](#) (3:54)

What's new - November 2020

[Learn about the new features and enhancements in the Q4 2020 update of IBM Storage Insights.](#)

[What's new in IBM Storage Insights - November 2020](#) (2:56)

What's new - August 2020

[Learn about the new features and enhancements in the Q3 2020 update of IBM Storage Insights.](#)

[What's new in IBM Storage Insights - August 2020](#) (2:43)

What's new - May 2020

Learn about the new features and enhancements in the Q2 2020 update of IBM Storage Insights.

[What's new in IBM Storage Insights - May 2020](#) (4:33)

What's new - March 2020

Learn about the new features and enhancements in the Q1 2020 update of IBM Storage Insights.

[What's new in IBM Storage Insights - March 2020](#) (4:33)

Important capacity updates - November 2019

Learn about the important capacity updates in the Q4 2019 update of IBM Storage Insights.

[Capacity updates in IBM Storage Insights - November 2019](#) (3:12)

What's new - September 2019

Learn about the new features and enhancements in the Q3 2019 update of IBM Storage Insights.

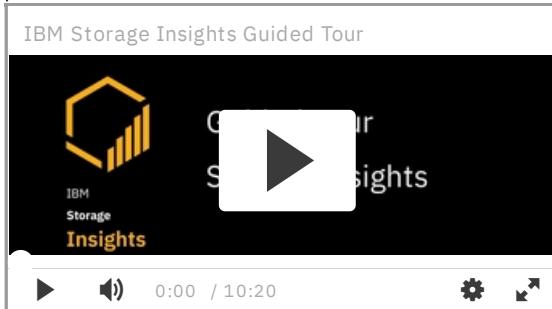
[What's new in IBM Storage Insights - September 2019](#) (4:49)

► Get an overview

Watch these videos to get a quick overview of IBM Storage Insights.

Guided tour of IBM Storage Insights

Take a tour of IBM Storage Insights and see how it can help you monitor the performance, capacity, and health of your storage portfolio.



Tip: Follow along with this video on your own by checking out the [interactive demo environment for IBM Storage Insights](#).

Predictive monitoring

Learn how IBM can become part of your operational team with predictive monitoring in IBM Storage Insights.



► Get started

Watch these videos to learn the basics of how to get up and running quickly with IBM Storage Insights.

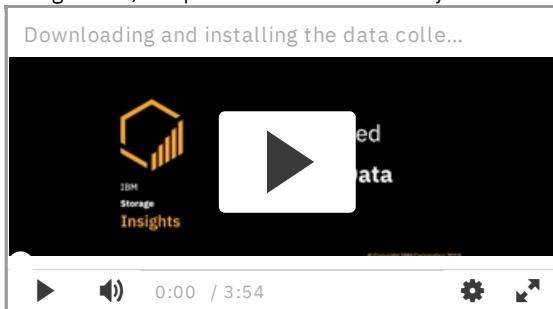
Getting started with IBM Storage Insights

Because IBM Storage Insights runs in IBM Cloud®, getting started is a snap. Watch this short video for a quick walk-through of how to register and start monitoring your storage.



Downloading and installing the data collector for IBM Storage Insights

Learn how to download and deploy the metadata collector. The collector is a lightweight application that streams capacity, configuration, and performance metadata to your IBM Storage Insights instance.



Assigning data collectors

Learn how to assign data collectors for specific storage systems. You can also change the name of the data collector that is displayed in the GUI making it easier to identify in IBM Storage Insights.



Adding storage systems to monitor in your storage environment for IBM Storage Insights

See how to add storage systems that you want to monitor in IBM Storage Insights. You can add multiple storage systems at the same time, or add them one by one.



Managing users

Learn how to manage users and their access rights that are associated with the Administrator and Monitor roles for IBM Storage Insights and IBM Storage Insights Pro.



Organizing storage resources - Applications in IBM Storage Insights Pro

Learn how to organize your storage resources into applications in order to monitor the capacity, space usage, and the performance of the applications and the application subcomponents in your data center with IBM Storage Insights Pro.



Organizing storage resources - Departments in IBM Storage Insights Pro

Learn how to organize your storage resources into departments in order to monitor the capacity and space usage of departments and subdepartments and the performance of the applications and the application subcomponents that are added to departments and subdepartments in IBM Storage Insights Pro.



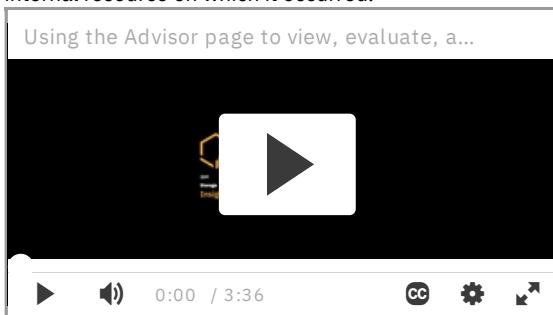
Organizing storage resources - Groups in IBM Storage Insights Pro

Learn how to group your resources, such as the storage systems with lease agreements that end in the current year, so that you can view information about the resources at one location in the GUI. Grouping your resources into general groups and their subgroups can be helpful when you want to quickly view information about a group of resources in IBM Storage Insights Pro.



Keeping your infrastructure healthy with the Advisor page in IBM Storage Insights Pro

Use the Advisor page in IBM Storage Insights Pro to view, evaluate, and manage events that include a recommended action. For each event that includes recommended actions, you can view details such as the severity, the time it occurred, the device, and the internal resource on which it occurred.



Setting permissions for IBM Support to collect logs from storage systems in IBM Storage Insights

See how you can permit IBM Support to collect and upload log packages for storage systems without contacting you every time.



Opening an IBM Support ticket in IBM Storage Insights

Get your hardware and software issues resolved by opening and updating tickets for IBM Support in IBM Storage Insights.



► Get advanced

Watch these videos to learn some advanced techniques for using IBM Storage Insights.

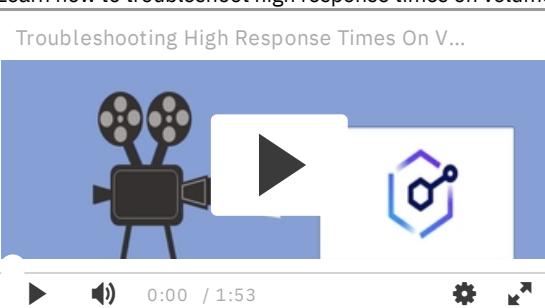
Troubleshooting a port send delay alert

Learn how to troubleshoot an alert about a port send delay on an FlashSystem 9100 storage system that was caused by a monitored host in IBM Storage Insights Pro.



Troubleshooting high response times on volumes

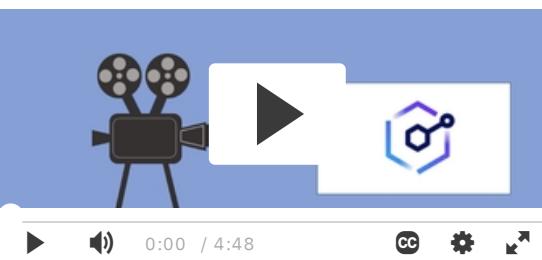
Learn how to troubleshoot high response times on volumes in IBM Storage Insights.



Troubleshooting a port utilization alert with IBM Storage Insights Pro

Learn how to troubleshoot the source of a port bandwidth utilization alert in IBM Storage Insights Pro.

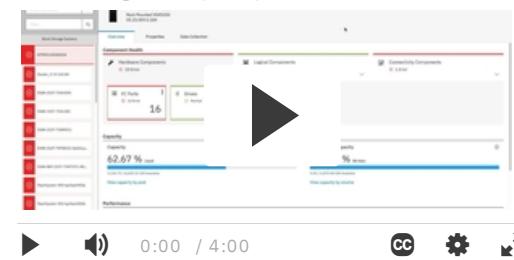
Troubleshooting a port utilization alert wit...



Determining storage capacity to be licensed for your monitored storage systems

Learn how to determine the storage capacity to be licensed for your monitored storage systems in IBM Storage Insights.

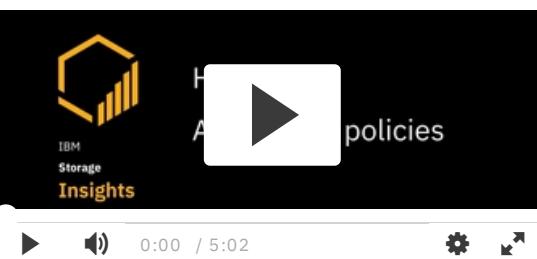
Determining the capacity to be licensed in ...



Creating alert policies in IBM Storage Insights Pro

See how you can create alert policies and apply policy-based notifications across many devices, at the same time, in IBM Storage Insights Pro.

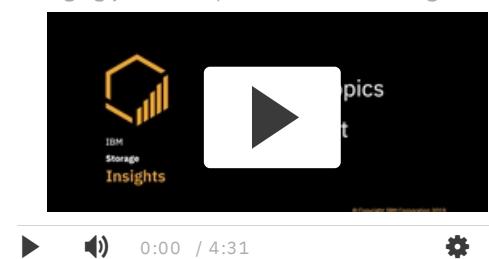
How to create alert policies in IBM Storag...



Managing your alert policies in IBM Storage Insights Pro

Learn about an alternative way to manage your alert policies in IBM Storage Insights Pro and a workaround to adding storage to an alert policy and then losing the alerts that you already defined on that storage in your environment.

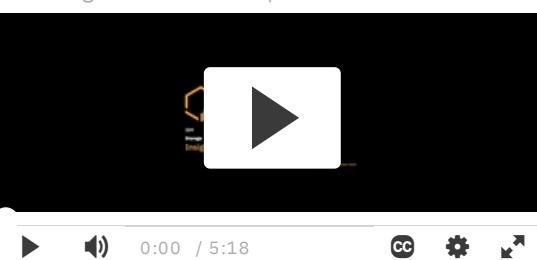
Managing your alert policies in IBM Storag...



More on alert policies - Creating alerts with multiple conditions in IBM Storage Insights Pro

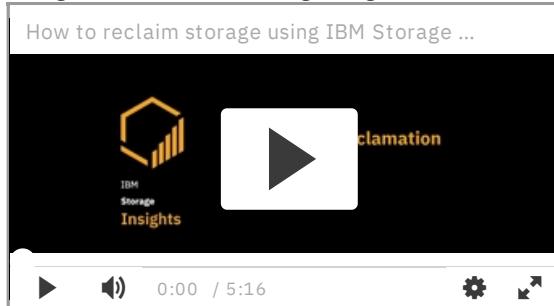
Learn how to create a complex alert in order to analyze multiple configurations, capacity, and performance conditions together to determine whether an urgent situation occurred in your storage.

Creating alerts with multiple conditions



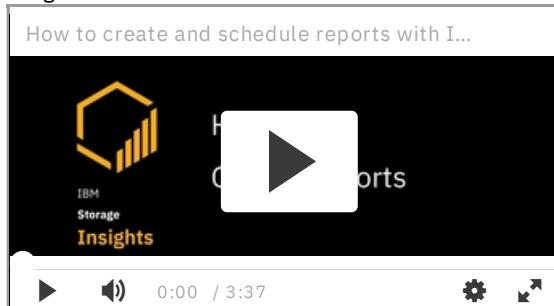
How to reclaim storage using IBM Storage Insights Pro

Learn how to reclaim allocated storage space that is unused and can be reclaimed and re-allocated elsewhere; this helps keep your storage costs down. IBM Storage Insights Pro.



How to create and schedule reports with IBM Storage Insights Pro

See how easy it is to share information about your storage environment using the flexible reporting capabilities of IBM Storage Insights Pro.



Defining performance alerts for IBM SAN Volume Controller storage systems in IBM Storage Insights Pro

See how you can use individual resource alerts in IBM Storage Insights Pro to detect and notify storage administrators when the performance of a IBM SAN Volume Controller storage system is slowing down. See how you can create performance alerts for a SVC system that is not managed by an alert policy. You can also define alerts for any storage systems that are not managed by the default alert policy for the storage system type.

[Defining performance alerts for IBM SAN Volume Controller storage systems in IBM Storage Insights Pro](#) (5:28)

Blogs for IBM Storage Insights

Read blogs from storage management experts and follow us on Twitter to get the latest tips about how to use IBM® Storage Insights and IBM Storage Insights Pro to manage and support your storage environment.

IBM Storage Insights and IBM Storage Insights Pro have a strong presence on social media. Explore blogs, data sheets, and forums to read the perspectives of storage management experts and gain insights about how to best use the offerings.

Key social media links:

- [Technical community](#)
- Blog series:
 - [Blogs for IBM storage](#)
 - [Inside IBM Storage Networking with David Green](#)
- Twitter:
 - [#IBMSStorage](#)
 - [#ibmsystems](#)
 - [#softwaredefined](#)
 - [Product news and announcements](#)
 - [Documentation hints and tips](#)

Table 1. Blogs and articles about IBM Storage Insights

Blogs and articles	Summary
Fibre channel switch and fabric support in IBM Storage Insights	Learn about the switch and fabric support for Brocade and Cisco Fibre Channel switches. With Fibre Channel connectivity now included in IBM Storage Insights, you and IBM Support now have the complete end to end picture of the server, fabric and storage system connectivity in SAN environments.
Big changes in IBM Storage Insights you never knew were there	Learn about the new core architectural changes to the IBM Storage Insights code base.

Blogs and articles	Summary
Alerting notification frequencies in IBM Storage Insights	Learn about the improvements that were made to the way alerts are displayed. Now there is a consolidation of the displayed alerts, instead of displaying every single alert that is getting triggered and creating a lot of noise (for example in case a volume status changes from Normal to Error), it's coalesced under a single alert with a reference to the number of occurrences.
Alert consolidation, performance improvements and task tracking for device management among the latest updates for IBM Storage Insights	Learn about the updates that were made in IBM Storage Insights for the 1st quarter of 2021.
Want to know more about storage capacity terms?	Learn more about the capacity concepts and terms that IBM Storage uses for data reduction and data compression technologies.
2020 4th quarter updates for IBM Storage Insights have arrived!	Learn about the updates that were made in IBM Storage Insights for the 4th quarter of 2020.
IBM Storage Insights: Favorite custom alerts -- Are my Safeguarded Copy volumes being backed up?	Learn how to create a custom alert in IBM Storage Insights that triggers when a volume that is configured for Safeguarded Copy is not being backed up.
IBM Storage Insights licensing - How is my managed capacity calculated?	Learn how to determine the storage capacity to be licensed for your monitored storage systems in IBM Storage Insights.
Data sheet: IBM Storage Insights	Read about how IBM Storage Insights combines analytics leadership and a rich history of storage management expertise with a cloud-based delivery model.
Using the IBM Storage Insights Pro Grouping Features	Learn about the grouping and organizing storage resources feature in IBM Storage Insights Pro.
IBM Storage Insights: Are there best practices for deploying data collectors?	Learn the best practices about deploying data collectors in IBM Storage Insights Pro.
Real world practicality using Application, Departments and General Groups	Learn about a real life example in a storage environment and how to use the concepts of Applications, Departments and General Groups in IBM Storage Insights Pro to solve an issue.
Organizing resources into General Groups to analyze data for volumes	Learn how to look at performance data and how to analyze affected volumes using General Groups in IBM Storage Insights Pro.
Dear IBM Spectrum® Control users,,you might already have access to IBM Storage Insights	Learn how IBM Storage Insights for IBM Spectrum Control, which is an IBM Cloud® service, can help you predict and prevent storage problems before they impact your business. It is complementary to IBM Spectrum Control and is available at no additional cost if you have an active license with a current subscription and support agreement for IBM Virtual Storage Center, IBM Spectrum Storage Suite, or any edition of IBM Spectrum Control.
Creating a new, smarter relationship	Read about how the key capabilities of IBM Storage Insights can enhance your experience with IBM block storage, and your relationship with IBM.
Important capacity changes for devices with FlashCore Modules in 4Q 2019	Learn about the changes in how we report capacity for storage systems that use hardware compression. IBM Storage Insights makes it easier to see when you are running out of space on your devices.
Pearls in the documentation	Delve into the IBM Storage Insights Knowledge documentation to discover information and tips that you might not be aware of but could find useful.
IBM Storage Insights: Goodbye alert spam!	Find out how IBM Storage Insights can help you to fine-tune your alerts so that you only get the alerts you care about.
Got #IBMStorage? Now get the most out of it!	Read about how IBM Storage Insights can help you detect and resolve storage-related problems.
IBM Storage Insights - Getting support has never been so easy!	Learn how IBM Storage Insights significantly enhances the IBM storage support experience.
Connect your storage environment to the cloud with IBM Storage Insights Now more cognitive and AI capabilities!	Read about the proactive AI and cognitive storage management capabilities of IBM Storage Insights that enable a high service quality through error reduction and consequently faster incident resolution.
What's up, Storage?	Learn how you can use IBM Storage Insights to give your storage a checkup, including viewing diagnostic events and key capacity and performance data.

Blogs and articles	Summary
Simplified support through a single pane of glass in IBM Storage Insights	Getting support, detecting potential and existing problems, and viewing basic information about your inventory of block storage systems has never been easier. Learn about the enterprise dashboard in IBM Storage Insights, where you can monitor the basic health, capacity, and performance of IBM block storage systems from a single pane of glass.
I can monitor all the ports on my SAN Volume Controller but can I separately monitor subsets of the ports?	Learn how to use general groups to monitor <i>all</i> the ports on your SAN Volume Controller (SVC) and separately monitor a specific subset of ports.
Capacity reporting is vital and I need to know how much capacity is consumed by replication. Are there any new enhancements to help me?	Learn how to analyze storage resource relationships across your block storage environment to identify how redundancy is affecting available capacity.
Rejuvenate the management of your complex storage environments with more cognitive and AI support	Learn how IBM Storage Insights increases in value over time and offers unparalleled visibility to help you manage your storage infrastructure.
May the fastest data collectors win!	Learn why data collectors are an important way to leverage the powerful storage monitoring capabilities within IBM Storage Insights.
IBM Storage Insights: Are there best practices for deploying data collectors?	Learn about the best practices for deploying data collectors in your storage environment for IBM Storage Insights.

Blogs: Pearls in the documentation

These blogs are part of a continuing series that explore the content in the IBM Documentation for IBM Storage Insights and IBM Spectrum Control to discover information and tips that you might not be aware of but could find useful.

- [Pearls in the documentation for 2020](#)
- [Pearls in the documentation for 2019](#)
- [Pearls in the documentation for 2018](#)
- [Pearls in the documentation for IBM Spectrum Control 5.2.15 \(2017\)](#)
- [Pearls in the documentation for IBM Spectrum Control 5.2.14 \(2017\)](#)
- [Pearls in the documentation for IBM Spectrum Control 5.2.13 \(2017\)](#)
- [Pearls in the documentation for IBM Spectrum Control 5.2.12 \(2016\)](#)

Dashboards

Dashboards are a quick way to get insights into key aspects of your storage at a glance. Identify storage systems that need your attention, monitor notifications of events that occur on your devices, get an overview of your environment, and more. And you can also use dashboards for switches and fabrics to gain quick access to health, performance, and diagnostic information. Knowing which dashboards to view, and when, can help you find and resolve problems on your storage before they impact your business.

How to access dashboards: From the Dashboards menu, just click the dashboard that you want to view.

Table 1. Dashboards in IBM Storage Insights

What are you looking for	Where to go	IBM Storage Insights (free)	IBM Storage Insights Pro (subscription)
The state of your storage environment (morning cup of coffee not included)	Use the Operations dashboard to quickly see which storage systems require your attention.	✓	✓
Heads-up display	Place the NOC dashboard on a dedicated screen and monitor changes on your storage systems at a glance.	✓	✓
Call Home events in the last 24 hours	Use the Notifications dashboard to monitor the Call Home events for your devices.	✓	✓
Changes in the environment that are meaningful to you	Use the Alerts dashboard to view, evaluate, and manage the alerts that you've configured, such as violations of performance and capacity thresholds.		✓

What are you looking for	Where to go	IBM Storage Insights (free)	IBM Storage Insights Pro (subscription)
Recommendations from IBM for keeping your storage environment healthy	Use the Advisor dashboard in the Insights menu to view the risks, best practices, and tips based on an in-cloud analysis of your storage environment.	✓	✓
Summary view of switch health and performance	Use the Switches dashboard to get a high-level view of switch health and performance.	✓	✓
Summary view of fabric health and performance	Use the Fabrics dashboard to get a high-level view of fabric component health and performance.	✓	✓

- [**NOC dashboard**](#)

Monitor events and storage systems in your inventory at a glance. The NOC dashboard provides key insights and analysis about the health, capacity, and performance of your block storage in one, central location. You can create customized dashboards to selectively monitor particular storage systems.

- [**Operations dashboard**](#)

Identify which block storage systems or fabrics in your inventory need attention, such as those with error or warning conditions. You can manage your storage and fabrics in the Operations dashboard by using key insights and analysis about health, capacity, and performance.

- [**Notifications dashboard**](#)

Monitor notifications of Call Home events that occur on your devices at a glance. The Notifications dashboard shows Call Home events that might need your attention in one location.

NOC dashboard

Monitor events and storage systems in your inventory at a glance. The NOC dashboard provides key insights and analysis about the health, capacity, and performance of your block storage in one, central location. You can create customized dashboards to selectively monitor particular storage systems.

To view the NOC dashboard, go to Dashboards > NOC. Display it on a dedicated monitor in your network operations center so you can monitor storage system changes at a glance.

The block storage systems that are being monitored are displayed in tiles or in rows on the dashboard. Call Home must be enabled on the storage systems that are monitored.

Use the Tile view to quickly access essential information about your storage systems, including the overall condition. The overall condition is determined by the most critical status that was detected for the storage system's internal resources. Storage systems with error conditions are displayed at the top of the dashboard, followed by storage systems with warning conditions.

On each tile, a snapshot of performance and capacity is displayed. Click the tile to view the following information:

- Overview of the health of the storage system components or resources, key capacity metrics including compression savings, and key performance metrics. You can open the GUI for the storage system from the Component Health overview.
- (IBM® Storage Insights Pro only) You can view more details about the storage system and components from the overview.
- Notifications details and actions you can take to manage events.
- Tickets details and actions you can take to manage tickets.
- Properties details including editable name, location, and custom tag fields, and support information.
- (IBM Storage Insights Pro only) Inventory of nodes and enclosures for a SAN Volume Controller storage system, including support information, if available.

Use the Table view to evaluate the current state of capacity in your storage environment. You can view current asset and configuration information and support information for your block storage systems. You can access user-defined information such as the location and custom tag fields. Information displayed is dependent on whether Call Home is enabled and a data collector is deployed and connected. For additional information about some of the columns displayed, see [Block storage systems](#).

Tip: For a resource inventory of your block storage, use the Resources menu. Then double-click a storage system in the list to view more detailed information. You can also add storage systems for monitoring.

Related tasks

- [Creating customized dashboards to monitor your storage](#)
- [Removing storage systems](#)

Operations dashboard

Identify which block storage systems or fabrics in your inventory need attention, such as those with error or warning conditions. You can manage your storage and fabrics in the Operations dashboard by using key insights and analysis about health, capacity, and performance.

To view the Operations dashboard, click Dashboards and then click Operations. With IBM® Storage Insights, you get the information that you need to monitor the health of your block storage environment and fabrics on the Operations dashboard:

Block Storage Systems

The block storage systems that are being monitored are displayed in a list on the left of the dashboard. Storage systems with error conditions and warning conditions are at the top of the list. Detailed information about the selected storage system is displayed on the right of the dashboard.

You can create customized dashboards to monitor particular storage systems or to help troubleshoot issues. For example, you might have dashboards to monitor storage by data center location or to monitor storage usage by production platform.

Click a storage system in the list to view the following information about the storage system:

- Overview of the health of the storage system components or resources, key capacity metrics including compression savings, and key performance metrics. You can open the GUI for the storage system from the Component Health overview.
- (IBM Storage Insights Pro only) You can view more details about the storage system and components from the overview.
- Notifications details and actions you can take to manage events.
- Tickets details and actions you can take to manage tickets.
- Properties details including editable name, location, and custom tag fields, and support information.
- (IBM Storage Insights Pro only) Inventory of nodes and enclosures for a SAN Volume Controller storage system, including support information.
- Data collection details such as the status of the data collection, when the most recent data collection occurred, and a list of the available data collectors.

Tips:

- The condition of a storage system determines its position in the list on the left of the dashboard. The condition is derived from the most critical status of the system or its components. The health of the components in the dashboard is derived from the most critical status of the components. Therefore, a storage system that has an Error condition might appear at top of the list, even if its components all have Normal status.
- For a resource inventory of your block storage, use the Resources menu. Then, double-click a storage system in the list to view more detailed information.

»

Fabrics

When you add switches, key diagnostic information is collected and analyzed about the switches and the fabrics that the switches belong to and presented in IBM Storage Insights.

Based on the analysis of the metadata, health, hardware, and connectivity issues that can affect the performance of the fabric's SAN components are reported. The information is organized so that the fabrics that require the most attention are shown at the top of the dashboard.

Data collection schedules: The performance metadata for the switches is collected every 5 minutes. The inventory metadata for the fabrics is collected every 24 hours.

Click a fabric and complete these actions:

- To check which of the fabric's components, such as switches, blades, or switch ports, caused the error or warning conditions, click the down-arrow on each of the component's tiles.
- To identify the switch ports that are congested or saturated, review the charts. Both port congestion and port saturation adversely affect the performance of the fabric and its components. Port congestion and saturation can also adversely affect the performance of the host that initiates the transaction requests, and the storage systems that respond to the transaction requests.
- Review the number of hardware errors that were detected. High numbers of hardware errors might indicate the failure of a hardware component.
- Review the number of logical errors that were detected.

Check the information that is shown on the tabbed pages. On the Events tab you're notified of events that might affect the performance of your fabrics such as:

- Domain ID changes.
- Fabric segmentation.
- Percentage of port bandwidth that is being used by outgoing traffic.
- Zone changes.



More actions for IBM Storage Insights Pro

By default, when you add a fabric, it is automatically added to the fabric policy. Notifications are automatically generated when the condition of the fabric changes to `error`.

You can use the alert policy to create a custom alert policy. You can add more alerts, modify alert thresholds, and specify who is notified when an alert occurs.

Review this information to find out more about fabrics and their components:

	Alerts About alerts Triggering conditions		Monitor Fabrics
	Inventory reports Fabrics		Fabric's components: Switches, blades, ISLs, ports, and zone sets.
	Tutorials Slow drain		Fabric's connected resources: Servers, storage systems, discovered ports, NPV switches

- [**Capacity overview charts**](#)

Review the capacity charts and tables to monitor storage usage and to identify the pools with the highest rates of storage consumption.

Related concepts

- [Monitoring the status and condition of resources](#)

Capacity overview charts

Review the capacity charts and tables to monitor storage usage and to identify the pools with the highest rates of storage consumption.

In the Capacity section of the Operations dashboard, the Capacity chart shows how much capacity is available and used by the storage system.

The Capacity chart at the top of the Overview page shows how much capacity is used and how much capacity is available for storing data.

The Provisioned Capacity chart shows the written capacity values in relation to the total provisioned capacity values before data reduction techniques are applied. The following values are shown:

The screenshot shows the Operations dashboard with the following details:

- Top Navigation:** Dashboards, Insights, Resources, Groups, Reports, Configuration.
- Left Sidebar:** SAN Volume Controller - 2145, SVC-svc4 ▾.
- Overview Section:**
 - Capacity:** 33.84 % Used
 - Provisioned Capacity:** 64.48 % Written
 - Total Savings:** 5,329.29 GiB
 - Capacity Savings:** 0.00 GiB Pool Compression, 0.50 GiB Deduplication, 5,328.80 GiB Thin-Provisioning

- The capacity of the data that is written to the volumes as a percentage of the total provisioned capacity of the volumes. In the illustration of the Provisioned Capacity chart, the written capacity as a percentage of the total provisioned capacity is 60.60%.
- The amount of capacity that is still available for writing data to the thin-provisioned volumes. It is the difference between the provisioned capacity and the written capacity, which is the thin-provisioning savings. In the illustration of the Provisioned Capacity chart, 5,175.64 GiB out of a total provisioned capacity of 13,137.70 GiB is still available for writing data.

A breakdown of the total capacity savings that are achieved when the written capacity is stored on the thin-provisioned volumes is also provided.

»

- To get a capacity breakdown of the storage system by pool and the fill and growth rate for each pool, click View capacity by pool.
- To view the capacity savings of a storage system with data reduction metrics and savings summary that includes duplication, thin provisioning, drive compression, and pool compression, click View capacity savings.

«

Exclusive to IBM Storage Insights Pro: In IBM® Storage Insights Pro, users with Administrator privileges, can set capacity limits for storage systems and pools. When you hover over the capacity overview chart, you can see the value for the Capacity Limit and the Capacity-to-Limit. The Capacity-to-Limit is the amount of capacity that is left before the capacity limit is reached.

- Capacity by pool**

Monitor the capacity, fill rate %, and growth rate for your pools. IBM® Storage Insights Pro users can also check, when they set a capacity limit for pools, the amount of capacity that is left before the pools reach the capacity limit.

Monitor the provisioned capacity of your volumes to identify the volumes that have sufficient capacity to meet your storage needs.

Capacity by pool

Monitor the capacity, fill rate %, and growth rate for your pools. IBM® Storage Insights Pro users can also check, when they set a capacity limit for pools, the amount of capacity that is left before the pools reach the capacity limit.

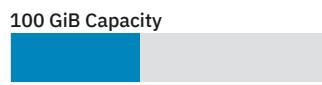
Exclusive to IBM Storage Insights Pro: In IBM Storage Insights Pro, users with Administrator privileges can set capacity limits for storage systems and pools. When the capacity limit is set values for the following capacity limit metrics can be added to the table Adjusted Used Capacity (%), Capacity Limit (%), and Capacity Limit (GiB). By default, the column Capacity-to-Limit (GiB) is added to the table. To help you make decisions about the capacity that you need to store data, monitor the growth in used capacity and the following key capacity metrics:

Adjusted Used Capacity (%)

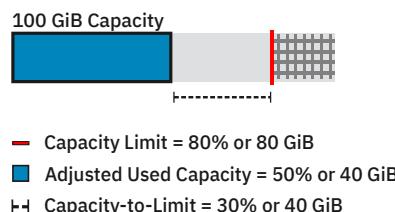
The amount of capacity that can be used without exceeding the capacity limit.

Example: Adjusted Used Capacity

Before Capacity Limit Was Set



After Capacity Limit Was Set



The formula for calculating Adjusted Used Capacity (%) is (Used Capacity in GiB/Capacity Limit in GiB)*100. For example, if the capacity is 100 GiB, the used capacity is 40 GiB, and the capacity limit is 80% or 80 GiB, then the value for Adjusted Used Capacity (%) is (40 GiB/80 GiB)* 100 or 50%. So, in this example, you can use 30% or 40 GiB of the usable capacity of the resource before you reach the capacity limit.

If the used capacity exceeds the capacity limit, the value for Adjusted Used Capacity (%) is over 100%.

To add the Adjusted Used Capacity (%) column, right-click any column heading on the Pools page.

See these related values for more information Capacity Limit (%) and Capacity-to-Limit (GiB).

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Available Capacity (GiB)

The amount of usable capacity that is not yet used in the pool.

Capacity (GiB)

The amount of capacity that is available for storing data in the pool after formatting and RAID techniques are applied.

Capacity Limit (%) and Capacity Limit (GiB)

The limit that was set on the capacity that is used by your pools. For example, the policy of your company is to keep 20% of the usable capacity of your pools in reserve. So, you log into the GUI as Administrator and set the capacity limit of your pools to 80%.

Example: Administrator Sets Capacity Limit to 80%

100 GiB Capacity



■ Used Capacity = 40 GiB
□ Available Capacity = 60 GiB

100 GiB Capacity



— Capacity Limit = 80% or 80 GiB



Click the illustration above to find out how to set capacity limits.

The GiB value for the capacity limit for the pool is calculated when you set the value for the Capacity Limit (%).

To add the Capacity Limit (%) and the Capacity Limit (GiB) columns, right-click any column heading on the Pools page.

See these related values for more information Adjusted Used Capacity (%) and Capacity-to-Limit (GiB).

Zero capacity: When you set the capacity limit for pools, the values shown for Zero Capacity are readjusted to take into account the capacity limit of the pool. The date will represent when the capacity limit of the pool is reached. If the pool has already reached the capacity limit, Depleted is shown. None is shown when a trend in storage consumption can't be detected because the pool's storage isn't being consumed or because not enough data was collected to predict storage consumption.

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Capacity-to-Limit (GiB)

The amount of capacity that is available before the capacity limit is reached.

Example: Capacity-to-Limit

100 GiB Capacity



— Capacity Limit = 80% or 80 GiB

■ Adjusted Used Capacity = 50% or 40 GiB

↔ Capacity-to-Limit = 30% or 40 GiB

The formula for calculating Capacity-to-Limit (GiB) is (Capacity Limit in GiB - Used Capacity in GiB). For example, if the capacity limit is 80% or 80 GiB and the used capacity is 40 GiB, then the value for Capacity-to-Limit (GiB) is (80 GiB - 40 GiB or 80% - 50%) which is 30% or 40 GiB.

See these related values for more information Capacity Limit (%) and Adjusted Used Capacity (%).

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Used Capacity (GiB) and Used Capacity (%)

The amount of usable capacity that is taken up by the data in the pool after data reduction techniques have been applied.

Availability: All storage systems, except FlashSystem A9000 and FlashSystem A9000R.

Recent Fill Rate (%)

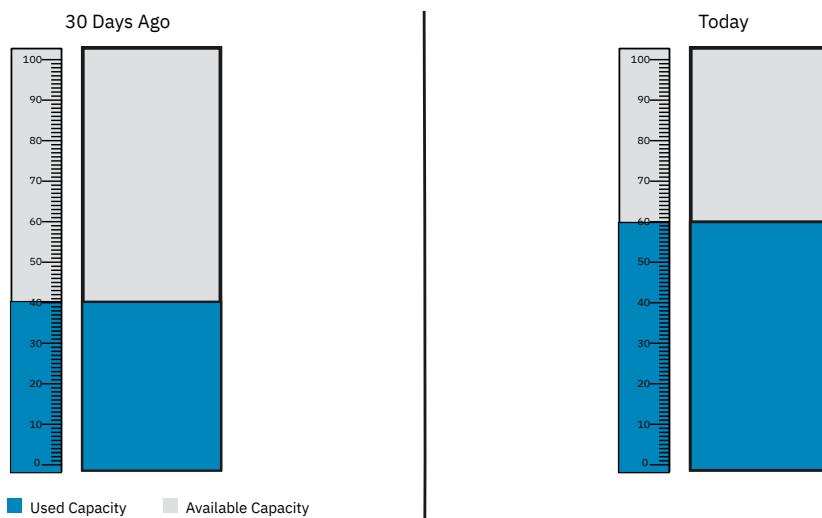
The rate at which the capacity of the pool is being consumed over the last 30 days. Use this value to see how quickly your pools are filling up.

The Recent Fill Rate (%) tells you how quickly your pools are filling up

The Recent Fill Rate (%) of the pool is the difference between the fill rate % of the pool 30 days ago and today's fill rate % of the pool.

The fill rate % of the pool is calculated by dividing the capacity of the pool by its used capacity and multiplying it by 100.

Example



The fill rate % of the pool 30 days ago was $(40/100) \times 100$, which is 40%.

The fill rate % of the pool today is $(60/100) \times 100$, which is 60%.

So, in this example, the Recent Fill Rate (%) for the pool is (60% - 40%), which is 20%.

If insufficient historical data is available to calculate the Recent Fill Rate (%), it is the difference between today's fill rate % and the oldest value for the fill rate % that can be calculated in the last 30 days.

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Recent Growth (GiB)

The growth in used capacity over the last 30 days. Use this value to identify the pools with the highest growth in storage consumption.

Recent growth is the difference between the current used capacity for the pool and the used capacity for the pool that was reported 30 days ago. If insufficient historical data is available, it is the difference between the current used capacity for the pool and the oldest value for the used capacity of the pool that was reported in the last 30 days.

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Tier Distribution (%)

For storage systems that support Easy Tier®, the distribution of the capacity of the volume extents across each drive class or tier.

Tip: To check the fill rate of all the pools in your storage systems, click Resources > Block Storage Systems. To check the growth in used capacity, right-click any column heading on the Block Storage Systems page and click Recent Growth (GiB).

Capacity by volume

Monitor the provisioned capacity of your volumes to identify the volumes that have sufficient capacity to meet your storage needs.

The following key capacity metrics provide information about storage usage and the availability of capacity for storing data:

Capacity (GiB)

The provisioned capacity of the volume.

Used Capacity (GiB) and Used Capacity (%)

The amount of provisioned capacity that is taken up by written data in a thin-provisioned volume after data reduction techniques are applied.

Unlike thin-provisioned volumes, which use capacity when it is needed, the capacity that is provisioned to standard-provisioned volumes is fully allocated and is no longer available to the pool. That is, the Used Capacity (%) of standard-provisioned volumes is

reported as Fully Allocated and the Used Capacity (GiB) is the same value as the provisioned capacity.

Available for: All storage systems, except FlashSystem A9000 and FlashSystem A9000R.

Available Capacity (GiB)

The difference between the provisioned capacity of the thin-provisioned volume and the used capacity of the thin-provisioned volume.

Because the pool's capacity is dedicated to the standard-provisioned volume, the Available Capacity (GiB) is reported as 0.00.

Tier Distribution (%)

For storage systems that support Easy Tier®, the distribution of capacity for the volume extents across each drive class or tier.

Notifications dashboard

Monitor notifications of Call Home events that occur on your devices at a glance. The Notifications dashboard shows Call Home events that might need your attention in one location.

To view the Notifications dashboard, click Dashboards > Notifications.

For more information about using the Notifications dashboard, see [Monitoring notifications](#).

Navigation

Explore the IBM® Storage Insights GUI to gain insights into your storage environment. Go to the pages where you add and administer storage resources, modify data collection schedules, and view charts and information about the storage resources. Also go to the pages where you add and monitor fabrics and switches to view charts and information about them and their internal and related resources.

Did you know?: You must subscribe to IBM Storage Insights Pro to access all menu items. In IBM Storage Insights, only the Dashboards (Operations) and Configuration (Data Collectors) menu items are available. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

Menu item	Description
Dashboards	Operations View information about the operation of block storage systems, fabrics, and switches that are being monitored in your data center. For block storage systems, you can open and update hardware and software support tickets, view open tickets, automatically upload logs, and view Call Home events.
Dashboards	Alerts Review the alerts that are generated when performance violations are detected.
Insights	Performance View the chart that shows the changes that occur in the overall I/O rates of storage systems over 12 months. Reclamation View the chart that shows the amount of storage that you can reclaim and a list of the volumes that you can reclaim. You can also view a chart that shows the amount of reclaimable space by storage system.

Menu item	Description
Resources	<p>Block Storage Systems Add the block storage systems that you want to monitor and view information about the capacity and space usage and performance of the storage systems that are added for monitoring.</p> <p>File Storage Systems Add the file storage systems that you want to monitor and view information about the capacity and space usage of the storage systems that are added for monitoring.</p> <p>Object Storage Systems Add the object storage systems that you want to monitor and view information about the capacity and space usage of the storage systems that are added for monitoring.</p> <p>Pools View information about all of the block storage pools in your data center such as whether the pools are assigned to tiers.</p> <p>Servers View information about the capacity and space usage of the servers that are added for monitoring. IBM Storage Insights Pro automatically generates agentless servers for the physical servers and virtual machines in your SAN environment, so that you can easily see how they are consuming storage. You do not need to create agentless servers manually, which saves you time and provides more insight into the storage consumption of your resources. You can review your agentless servers to make sure that they accurately represent your storage environment.</p> <p>Switches Add switches for monitoring and view asset, configuration, status, and performance information about the switches and their internal and related resources.</p> <p>Fabrics Add switches for monitoring and view asset, configuration, status, and performance information about the switches and their internal and related resources. If the switch belongs to a fabric, you can view inventory and configuration information about the fabric.</p>
Groups	<p>Applications Add the applications and application subcomponents that you want to monitor and view information about the capacity and space usage and performance of the storage resources that are associated with the applications and the application subcomponents that are added for monitoring.</p> <p>Departments Add the departments and subdepartments that you want to monitor and view information about the capacity and space usage and performance of the storage resources that are associated with the applications that the departments and subdepartments use.</p> <p>General Groups Add general groups to view information about storage resources that have common characteristics such as the storage systems with lease agreements that end in the current year or the storage systems that are used by critical business applications.</p>
Configuration	<p>Tiers Define the criteria for allocating tier levels to pools and for analyzing volumes to determine whether the volumes are tiered correctly.</p> <p>Data Collectors Download and run the data collectors to establish a connection with IBM Storage Insights Pro and to gather and analyze the capacity and performance data of your storage systems.</p>
	<p>View a list of tasks that failed, the reason for the failures, and when the tasks failed. You can also complete the following actions:</p> <ul style="list-style-type: none"> Retry the task. When you retry a task, the task is added to the list of running tasks. Clear the task from the list.
	<p>View a list of tasks that are running by using the running tasks icon. You can see when the tasks started.</p>
 user name	<p>Manage Users Add users, assign roles to users, and remove users. To manage users you must have the Administrator role.</p>

- Keyboard navigation**

You can use keys or key combinations to complete many menu actions that can also be completed with mouse actions.

- Tracking tasks**

View the progress of background tasks in the page banner. For example, when you create a ticket, you can see that task in the page

banner.

Keyboard navigation

You can use keys or key combinations to complete many menu actions that can also be completed with mouse actions.

Key and key combinations for navigating the GUI

To navigate the GUI and the context-sensitive help system, press the following keys or key combinations:

- Press the Tab key to navigate to the next link, button, or topic on a page.
- Press the Shift+Tab keys to move to the previous link, button, or topic on a page.
- Press Enter, when the object is in focus, to select the object.

Key and key combinations for Actions menu items

To navigate and complete actions in Actions menus, press the following keys or key combinations:

- Press the Tab key to navigate to the grid header. For example, on the Block Storage Systems page, you press the Tab key to go to the Add Storage System button.
- Press the Right Arrow key to go to the drop-down field.
- Press Enter to open the Actions drop-down menu.
- Press the Up Arrow key or the Down Arrow key to select the menu item. If the menu item has a submenu item, press the Right Arrow key to select the submenu item.
- Press Enter to start the action.

Key and key combinations for filters

To specify filter options and enter text, press the following keys or key combinations:

1. Press the Tab key to navigate to the grid header. For example, on the Block Storage Systems page, you press the Tab key to go to the Add Storage System button.
2. Press the Right Arrow key to go to the magnifying glass icon.
3. Press the Down Arrow key or the Up Arrow key to navigate the filtering list.
4. Press Enter to select a filtering option. When a filtering option is selected, the cursor moves to the filter text box.
5. Type the filter text and press Enter.
6. To reset a filter, press Enter.

Key and key combinations for navigating text fields

To navigate to text fields, press the following keys or key combinations:

- Press Tab to navigate to text fields.
- Press Tab to navigate to the fields that can be edited.
- Press Tab to navigate to the next field or to complete the action.

Key and key combinations for navigating and completing actions in lists and tables

To navigate and complete actions in lists or tables, press the following keys or key combinations:

Navigate between column headers

Go to the column header and press the Left Arrow key and the Right Arrow key to move to other column headers.

Navigate between data cells

Go to a data cell and press the Left Arrow key, the Right Arrow key, the Up Arrow key, the Down Arrow key, the Page Up key, or the Page Down key.

Sort columns

Go to the column header and press Enter. The focus remains on the column header after the column is sorted.

Change the size of the column

Go to the column header, hold Shift+Control, and press the Left Arrow key or the Right Arrow key.

Follow links in data cells

Go to the data cell and press Shift+F9.

Tracking tasks

View the progress of background tasks in the page banner. For example, when you create a ticket, you can see that task in the page banner.

You can view tasks that are running and tasks that failed:



Running tasks

Click the running tasks icon to view a list of tasks that are running. You can see when the task started. When the task completes, it is no longer displayed in the list of running tasks.

Messages about service and maintenance updates for your instance of IBM® Storage Insights are also listed.



Failed tasks

Click the failed tasks icon to view a list of tasks that failed, the reason for the failures, and when the tasks failed. You can also complete the following actions:

- Retry the task. When you retry a task, the task is added to the list of running tasks.
- Clear the task from the list.

Tasks are listed in the running and failed tasks lists when you take any of the following actions:

- Create or update tickets.
- All device management actions, such as add storage systems, stop and restart data collection, modify credentials, and test the connection to a device.
- Add switches.

Units of measurement for storage data

IBM® Storage Insights uses decimal and binary units of measurement to express the size of storage data.

Decimal units such as kilobyte (KB), megabyte (MB), and gigabyte (GB) are commonly used to express the size of data. Binary units of measurement include kibibyte (KiB), mebibyte (MiB), and gibibyte (GiB). [Table 1](#) compares the names, symbols, and values of decimal and binary units.

Table 1. Comparison of binary and decimal units and values

Binary			Decimal		
Name	Symbol	Value (base 2)	Name	Symbol	Value (base 10)
kibibyte	KiB	2^{10}	kilobyte	KB	10^3
mebibyte	MiB	2^{20}	megabyte	MB	10^6
gibibyte	GiB	2^{30}	gigabyte	GB	10^9
tebibyte	TiB	2^{40}	terabyte	TB	10^{12}
pebibyte	PiB	2^{50}	petabyte	PB	10^{15}
exbibyte	EiB	2^{60}	exabyte	EB	10^{18}

Binary units of measurement express the size of data more accurately. When you compare the size of 100 KB to 100 KiB, the difference is relatively small, 2.35%. However, this difference grows as the size of the data values increases. When you compare the size of 100 TB to 100 TiB, the difference is 9.06%.

In general, IBM Storage Insights Pro uses base 2 values for memory and disk space values, and base 10 values for space on physical hard drives.

[Table 2](#) shows the percentage difference between decimal and binary values across a range of data sizes.

Table 2. Percentage difference between decimal and binary units

Decimal value	Binary equivalent of decimal value	Difference
100 kilobytes (KB)	97.65 kibibytes (KiB)	2.35%
100 megabytes (MB)	95.36 mebibytes (MiB)	4.64%
100 gigabytes (GB)	93.13 gibibytes (GiB)	6.87%
100 terabytes (TB)	90.94 tebibytes (TiB)	9.06%

Decimal value	Binary equivalent of decimal value	Difference
100 petabytes (PB)	88.81 pebibytes (PiB)	11.19%
100 exabytes (EB)	86.73 exbibytes (EiB)	13.27%

Updates and maintenance for IBM Storage Insights

IBM® Storage Insights is an IBM Cloud®™ service. Because it's a cloud service, IBM manages and upgrades the service for you. Learn about what to expect during maintenance updates and service outages.

What are planned updates

- **Frequency:** About 4 times per year
- **How you're notified:** An email is sent and a notification is displayed in the GUI.

Planned updates occur about four times per year or once per quarter. You'll be notified of the dates and times for each update in advance so you know when new features and enhancements are being added. To reduce the business impact of scheduled maintenance, the update occurs during non-business hours.

If any issues occur during the upgrade, you'll be notified promptly.

Unplanned service outages and updates: IBM is constantly improving the reliability and security of IBM Storage Insights. If an unscheduled update is required to address an urgent situation, a page is displayed that describes the cause of the update and the expected duration of the service interruption.

In cases where IBM Storage Insights becomes temporarily unavailable, rest assured that the IBM team is working hard to bring the service back online quickly.

What's updated

IBM is always adding new features and updating the infrastructure, security, and stability of IBM Storage Insights to improve your experience. Enhanced analytics, troubleshooting capabilities, more efficient data collection, and general fixes are built in to every update, so your experience is better and the IBM Support team can assist you more effectively.

In addition to the built-in updates, key features are added to improve the monitoring and support of IBM Storage Insights as a storage management service. To view descriptions of the new features and learn how you can benefit from the enhanced features, check out the what's new information that is provided with every update.

[What's New in IBM Storage Insights](#)

Is there any other impact

When the update to IBM Storage Insights is complete, data collection resumes sending metadata to IBM Storage Insights automatically. The data collectors continue to collect performance metadata when your instance of IBM Storage Insights is offline during service outages where there was no upgrade to the data collectors.

Upgrading data collectors after a service update:

If automatic upgrades are enabled, your data collectors are upgraded.

If automatic upgrades are disabled, you must manually upgrade your data collectors. To upgrade the data collectors, simply click the link in the notification message, or complete the following steps:

1. From the Configuration menu, click Data Collectors.
2. Click Upgrade All.

If you encounter issues and can't upgrade the data collectors, you might have to download and install the latest version of the data collector. For more information, see [Resolving upgrading issues](#).

Getting help

If you have questions or encounter any problems during an update, check out these resources:

- Open a support ticket on the IBM Support portal at <https://www.ibm.com/mysupport/>, for problems with the update or service.
- Connect directly with experts in the [IBM Storage Community](#).

Tip: Be sure to join the IBM Storage Community so that you can automatically receive notifications about the latest blogs, discussions, and other updates for IBM Storage Insights.

See [Getting support](#).

Legal

IBM Storage Insights and IBM Storage Insights Pro are governed by the terms in the following documents:

- [IBM Cloud Service Agreement](#)
- [IBM Storage Insights Service Description](#)
- [IBM Storage Insights Pro Service Description](#)

Your continued use of IBM Storage Insights or IBM Storage Insights Pro indicates your acceptance of the terms that are referenced in these documents.

Related reference

- [General troubleshooting](#)
-

IBM Storage Insights for IBM Spectrum Control

IBM® Storage Insights for IBM Spectrum Control is an IBM Cloud® service that can help you predict and prevent storage problems before they impact your business. It is complementary to IBM Spectrum Control and is available at no additional cost if you have an active license with a current subscription and support agreement for IBM Virtual Storage Center, IBM Spectrum® Storage Suite, or any edition of IBM Spectrum Control.

As an on-premises application, IBM Spectrum Control doesn't send the metadata about monitored devices offsite, which is ideal for dark shops and sites that don't want to open ports to the cloud. However, if your organization allows for communication between its network and the cloud, you can use IBM Storage Insights for IBM Spectrum Control to transform your support experience for IBM block storage.

Why use IBM Storage Insights for IBM Spectrum Control

IBM Storage Insights for IBM Spectrum Control and IBM Spectrum Control work hand in hand to monitor your storage environment. Here's how IBM Storage Insights for IBM Spectrum Control can transform your monitoring and support experience:

- Open, update, and track IBM Support tickets easily for your IBM block storage devices.
- Get hassle-free log collection by allowing IBM Support to collect diagnostic packages for devices so you don't have to.
- Use Call Home to monitor devices, get best practice recommendations, and filter events to quickly isolate trouble spots.
- Leverage IBM Support's ability to view the current and historical performance of your storage systems and help reduce the time-to-resolution of problems.

To compare the features of **IBM Spectrum Control** and **IBM Storage Insights for IBM Spectrum Control**, check out the [Feature comparison](#).

Important: To monitor the devices that you already monitor in IBM Spectrum Control, you must add them separately to IBM Storage Insights for IBM Spectrum Control. You must also deploy a data collector in IBM Storage Insights for IBM Spectrum Control to collect advanced metadata about devices.

Alerting tip: Alerts are a good way to be notified of conditions and potential problems that are detected on your storage. If you use **IBM Spectrum Control** and **IBM Storage Insights for IBM Spectrum Control** together to enhance your monitoring capabilities, it's recommended that you define alerts in one of the offerings and not both. By defining all your alerts in one offering, you can avoid receiving duplicate or conflicting notifications when alert conditions are detected.

How to get IBM Storage Insights for IBM Spectrum Control

To register for IBM Storage Insights for IBM Spectrum Control, go to <https://www.ibm.com/it-infrastructure/storage/storage-insights/registration> and follow the directions for current IBM Spectrum Control customers.

To see how easy it is to sign up and deploy a data collector, check out [Before you begin checklist for IBM Storage Insights](#).

Questions and answers

Find answers to other questions about IBM Storage Insights for IBM Spectrum Control.

What's the difference between IBM Storage Insights, IBM Storage Insights Pro, and IBM Storage Insights for IBM Spectrum Control?

- **IBM Storage Insights** is an off-premises, IBM Cloud service that is available free of charge if you own IBM block storage systems. It provides a unified dashboard for IBM block storage systems with a diagnostic events feed, a streamlined support experience, and key capacity and performance information.
- **IBM Storage Insights Pro** is an off-premises, IBM Cloud service that is available on subscription and expands the capabilities of IBM Storage Insights. You can monitor IBM file, object, and software-defined storage (SDS) systems, and non-IBM block and file storage systems such as Dell EMC storage systems. It also includes configurable alerts and predictive analytics that help you to reduce costs, plan capacity, and detect and investigate performance issues. You get recommendations for reclaiming unused storage, recommendations for optimizing the placement of tiered data, capacity planning analytics, and performance troubleshooting tools.
- **IBM Storage Insights for IBM Spectrum Control** is similar to IBM Storage Insights Pro in capability and is available for no additional cost if you have an active license with a current subscription and support agreement for IBM Virtual Storage Center, IBM Spectrum Storage Suite, or any edition of IBM Spectrum Control.

I already have a paid subscription to IBM Storage Insights Pro, does this service apply to me?

Yes! When your next renewal date for IBM Storage Insights Pro approaches, contact your IBM Sales representative to see if a move to IBM Storage Insights for IBM Spectrum Control is right for you.

Tip: If you want to cancel your subscription to IBM Storage Insights Pro and switch to IBM Storage Insights for IBM Spectrum Control, check out the IBM Cloud Service Agreement at

<https://www.ibm.com/support/customer/csol/contractexplorer/cloud/csa/us-en/9> for cancellation information.

If I already have IBM Storage Insights (the free service), can I upgrade it to IBM Storage Insights for IBM Spectrum Control?

Yes, if you have an active license for IBM Spectrum Control, you can upgrade IBM Storage Insights to IBM Storage Insights for IBM Spectrum Control. Just go to <https://www.ibm.com/it-infrastructure/storage/storage-insights/registration>, choose the option for IBM Spectrum Control, and follow the prompts.

Because IBM Storage Insights for IBM Spectrum Control is similar to IBM Storage Insights Pro in capability, does it use the same Service Level Agreement (SLA)?

No, IBM Storage Insights for IBM Spectrum Control doesn't include the service level agreement for IBM Storage Insights Pro. Terms and conditions for IBM Storage Insights for IBM Spectrum Control are available at
<http://www.ibm.com/software/sla/sladb.nsf/sla/sd-8410-01>.

Do IBM Spectrum Control and IBM Storage Insights for IBM Spectrum Control share the metadata that they collect about storage?

No, metadata cannot be shared between the offerings or exported from one offering to the other.

Are the devices that I monitor in IBM Spectrum Control automatically monitored by IBM Storage Insights for IBM Spectrum Control?

To monitor the devices that you already monitor in IBM Spectrum Control, you must also add them to IBM Storage Insights for IBM Spectrum Control.

To collect advanced metadata about devices, you must also deploy a data collector in IBM Storage Insights for IBM Spectrum Control. Storage Resource agents and device connections that are defined in IBM Spectrum Control aren't used in IBM Storage Insights for IBM Spectrum Control.

To see which devices that you can monitor in IBM Storage Insights for IBM Spectrum Control, check out the list for IBM Storage Insights Pro in [Supported resources](#).

If I use IBM Storage Insights Pro or IBM Storage Insights and switch to IBM Storage Insights for IBM Spectrum Control, is my existing metadata migrated?

Yes, the metadata that you collected in IBM Storage Insights Pro and IBM Storage Insights is automatically available in IBM Storage Insights for IBM Spectrum Control.

How is licensing handled?

IBM Storage Insights for IBM Spectrum Control uses the same licensing that you already have in place for IBM Spectrum Control.

IBM Spectrum Control can be licensed by capacity, by storage capacity units (SCU), or by number of slots in enclosures.

How long can I use IBM Storage Insights for IBM Spectrum Control?

You can use IBM Storage Insights for IBM Spectrum Control for as long as you have an active license with a current subscription and support agreement for IBM Spectrum Control license. If your subscription and support lapses, you're no longer eligible for IBM Storage Insights for IBM Spectrum Control.

If your subscription and support lapses, don't worry. To continue using IBM Storage Insights for IBM Spectrum Control, simply renew your IBM Spectrum Control license.

You can also choose to subscribe to IBM Storage Insights Pro. For information about how to subscribe, see [Want to try or buy IBM Storage Insights Pro?](#)

Because IBM Storage Insights for IBM Spectrum Control is a cloud service, I'm concerned about security. Where can I find out more information about its security measures?

IBM Storage Insights for IBM Spectrum Control runs in IBM Cloud and adheres to IBM's rigorous security standards. For more information, check out the [\[PDF\] IBM Storage Insights Security Guide](#).

Where can I learn more about IBM Spectrum Control?

For detailed information about IBM Spectrum Control, see the [IBM Spectrum Control documentation](#).

How do I get support for IBM Storage Insights for IBM Spectrum Control?

To contact IBM Support for help and report issues that you encounter in IBM Storage Insights for IBM Spectrum Control, follow these steps:

1. [Open a support case](#) against IBM Storage Insights.
2. Describe the problem. To help us troubleshoot, include the URL of your IBM Storage Insights for IBM Spectrum Control instance.
3. Submit the case.

Feature comparison

Compare the features of IBM Spectrum Control and IBM Storage Insights for IBM Spectrum Control.

Table 1. Features in IBM Spectrum Control and IBM Storage Insights for IBM Spectrum Control

Resource Management	Features	IBM Spectrum Control (Advanced edition)	IBM Storage Insights for IBM Spectrum Control
Monitoring	Inventory	IBM and non-IBM block storage, file storage, object storage, hypervisors, fabrics, and switches	IBM and non-IBM block storage, file storage, object storage, fabrics, and switches
	Call Home events		✓
	Performance	✓ (1-minute intervals)	✓ (5-minute intervals)
	Capacity	✓	✓
	Drill down performance workflows to troubleshoot bottlenecks	✓	✓
	Explore virtualization relationships	Storage and Server virtualization	Storage virtualization
	Explore replication relationships	✓	✓
Service	Retain performance data	Customizable	1 year
	Deployment method	On-premises	Off-premises (in IBM Cloud)
	Filter Call Home events to quickly isolate trouble spots		✓
	Hassle-free log collection		✓
	Simplified ticketing		✓
	Show active PMRs and ticket history		✓
Reporting	Active directory and LDAP integration for managing users	✓	
	Inventory, capacity, performance, and storage consumption reports	✓	✓
	Rollup reporting	✓	
Alerting	REST API	✓	
	Predictive Alerts	✓	✓
Analytics	Customizable, multi-conditional alerting, including alert policies	✓	✓
	Performance planning	✓	✓
	Capacity planning	✓	✓
	Business impact analysis (applications, departments, and groups)	✓	✓
	Provisioning with service classes and capacity pools	✓	
	Balance workload across pools	✓	
	Optimize data placement with tiering	✓	✓
	Optimize capacity with reclamation	✓	✓
	Transform and convert volumes	✓	
Pricing		On-premises licensing	No charge for IBM Spectrum Control customers

Getting started

Gain insights into the capacity, use of space, and performance of your storage systems and their storage resources. You can also gain insights into the status, health, and performance of your switches and fabrics.

Tip: To get a jump start with IBM® Storage Insights, check out the 2-page [Getting Started Guide \[PDF\]](#).

The data that is collected about your storage systems is analyzed and presented in charts that compare the activity of the storage systems, the capacity of the storage systems, and the performance of the storage systems. You are presented with views of the overall activity, capacity, and space usage of the storage systems and of the activity, capacity, and space usage of the resources of the storage system.

You can define criteria for tiering your storage and generate recommendations to determine the optimum placement of volumes and the tiers that are least used and most used. Based on the recommendations that are provided, you can determine which tiers meet the requirements of your storage environment and which tiers might require more storage resources.

You can scan your storage environment to identify volumes that are not being used. Based on the recommendations that are provided, you can reclaim the unused space and use your storage more efficiently.

For switches, the data that is collected is analyzed and presented in charts and you can see snapshots of switch and fabric performance, health, and configuration information. You can use charts that show current and historical performance information to help avoid glitches, reduce costs, and keep applications running at peak efficiency.

- [**Before you begin checklist for IBM Storage Insights**](#)

IBM Storage Insights is an off-premises, IBM Cloud® service. Because it's an IBM Cloud service, getting started is a snap. However, every environment is different, so to ensure that your getting started experience goes smoothly, use the following checklists as a guide.

- [**Downloading and installing data collectors**](#)

Deploy one or more data collectors to collect key capacity, configuration, and performance metadata about your monitored storage resources. The metadata is then mined, analyzed, and displayed to help you gain valuable insights into the performance of your storage systems and their internal resources, such as pools and volumes. Key asset, configuration, status, and performance metadata is also collected about fabrics and switches. You can gain insights into the operational condition of fabrics and switches and into the performance of your switches.

- [**Adding and removing users**](#)

Administrators can add and remove IBM Storage Insights Pro users and assign roles.

- [**Adding storage systems**](#)

Add the storage systems that you want to monitor in IBM Storage Insights.

- [**Adding switches and fabrics**](#)

Add Brocade and Cisco switches and fabrics so that you can detect and investigate performance issues throughout your storage environment. You can follow the trail of storage requests through the components in the SAN fabric to the target storage systems.

- [**Adding servers**](#)

IBM Storage Insights Pro creates and updates agentless servers automatically after it probes storage systems. It uses information about host connections on storage systems to create the agentless servers. It doesn't monitor direct-attached storage (DAS) or local disks on servers.

- [**Monitoring resources with Call Home**](#)

Call Home is a communication link between IBM storage systems, IBM Support, and IBM Storage Insights that monitors the health and status of your storage.

- [**Creating applications**](#)

Monitor the capacity, space usage, and performance of storage resources in your organization by grouping storage by application and then monitoring the applications.

- [**Creating departments**](#)

To monitor the capacity and space usage of departments and the performance of the applications that departments use, you create models of the departments in your organization.

- [**Creating general groups**](#)

Group your resources, such as the storage systems with lease agreements that end in the current year, so that you can view information about the resources at one location in the GUI.

- [**Viewing information about resources**](#)

Use IBM Storage Insights to view a quick snapshot of key statistics about your resources. You can use the Resources menu to see detailed inventory information about your block storage systems and to add storage systems for monitoring. You can also see inventory information about your switches and fabrics, and add them for monitoring.

Related information

-  [Getting Started Guide \[PDF\]](#)
-  [FAQs](#)
-  [Storage Insights Forum](#)

Before you begin checklist for IBM Storage Insights

IBM® Storage Insights is an off-premises, IBM Cloud® service. Because it's an IBM Cloud service, getting started is a snap. However, every environment is different, so to ensure that your getting started experience goes smoothly, use the following checklists as a guide.

- [Before you begin checklist](#)
- [Windows checklist](#)
- [AIX and Linux checklist](#)

Getting started in three easy steps

To fire up your instance of IBM Storage Insights, complete these steps:

1. Sign up. If you have IBM block storage systems and don't already have IBM Storage Insights, sign up at <https://ibm.biz/insightsreg>.
2. Deploy a metadata collector. The collector is a lightweight application that streams performance, capacity, and configuration metadata to IBM Storage Insights.
Pro tip: To ensure the availability of metadata collection, deploy two or more data collectors on separate servers in each of your data centers.
3. Add your storage and switches. Connect IBM Storage Insights to the storage that you want to monitor.

After you complete those steps, your dashboard is ready. It's that easy to elevate how you monitor and manage your storage environment!

Before you begin checklist

To jumpstart your IBM Storage Insights experience, preparation is key. Use this checklist to smooth the way.

Table 1. Read this first checklist

Check	Step	Description
<input type="checkbox"/>	Signing up	<p>After you sign up, you'll receive a Welcome email. In your inbox, look for emails that were sent by the following email addresses:</p> <ul style="list-style-type: none">• For IBM Storage Insights: sidevops@de.ibm.com• For IBM Storage Insights Pro: sistart@us.ibm.com (Storage Insights Welcome/Dallas/IBM) <p>The Welcome email includes a link to your unique instance of IBM Storage Insights and information to get you up and running quickly.</p>
<input type="checkbox"/>	Learning about security	<p>Protecting information about your storage is critical. Key highlights:</p> <ul style="list-style-type: none">• ISO/IEC 27001 ISM certified• Communication is one way, encrypted and compressed• Data at rest is AES 256-bit encrypted• Only metadata about your storage is collected• Personal, identity, and application data are never accessed <p>Need more information about security? See the IBM Storage Insights Security Guide [PDF]. For a 1-page security overview, see the IBM Storage Insights Security Sheet.</p>
<input type="checkbox"/>	Choosing your platform: Operating system requirements	<p>You can install the data collector on the following operating systems:</p> <ul style="list-style-type: none">• Windows Server 2012 and later.• POWER6® or later systems that use AIX® versions 7.x and later. The AIX data collector can run on a physical AIX installation or a logical partition (LPAR).• The Linux® data collector runs on 64-bit Linux operating systems on x86-64 and PPC64LE systems only.<ul style="list-style-type: none">◦ The supported Linux operating systems for x86-64 are Red Hat® Enterprise Linux 7 and later versions and CentOS 7 and later versions.◦ The supported Linux operating system for PPC64LE (POWER8® only) is Red Hat Enterprise Linux 7.x. The data collector on Linux PPC64LE has the additional limitation that you cannot monitor FlashSystem A9000, XIV®, IBM Spectrum Accelerate, and non-IBM devices. <p>Restriction: The data collector is not supported for Linux operating systems on IBM Power® systems (PPC64, Big Endian).</p> <p>When you install the data collector, you can configure it to connect to a proxy server.</p>

Check	Step	Description
<input type="checkbox"/>	<i>Choosing your platform:</i> Hardware requirements	<ul style="list-style-type: none"> Deploy data collectors on a server or virtual machine that has access to both the internal SAN-attached infrastructure and access to the internet to communicate with IBM Cloud. Deploy data collectors on a server or virtual machine that is located in the VLAN used for SAN switch and storage management within your environment. You can also deploy a data collector in a VLAN where routing is configured to allow it access across VLANs. On the server or virtual machine, you must provide at least 1 GB of RAM and 3 GB of disk space. Ensure that the operating system where you install the data collector has general or extended support for maintenance and security fixes. <p>The location where you install a data collector must be available 24X7:</p> <ul style="list-style-type: none"> Don't install a data collector on a laptop or personal workstation. Shutting down a laptop or personal workstation or putting it into sleep mode will interrupt data collection. Don't install the data collector to a file system that was mounted or mapped under a user login session. These file systems can be temporary and might not persist after the user logs out of the network. Note that you <i>can</i> install a data collector to a system-mounted or mapped file system because those file systems are typically more permanent.
<input type="checkbox"/>	Determining how many data collectors to install	<p>You can install multiple data collectors to fail over to another data collector when a metadata collection fails or to optimize the metadata collection from data centers in different locations.</p> <p>See Metadata collection with multiple data collectors.</p>
<input type="checkbox"/>	<i>Preparing for the data collector:</i> Firewalls and an outbound port configuration	<ul style="list-style-type: none"> Allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). To connect to your instance of IBM Storage Insights from the data collector, your firewall must be configured to allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). The User Datagram Protocol (UDP) is not supported. If a firewall exists between the data collector and the storage systems that it monitors, configure the firewall to allow SNMP traffic.
<input type="checkbox"/>	<i>Preparing for the data collector:</i> Antivirus software	<p>If your antivirus software is set on the maximum mode, it might prevent some of your changes from being accepted.</p> <p>Configure your antivirus software product on the server or virtual machine where you install the data collector to allow new executable files to be created in its installation directory. If your antivirus software prevents the monitoring of some of your devices, such as XIV, Hitachi VSP, Dell EMC, NetApp, or Pure storage, add the related executable files for those devices to your allowlist.</p>
<input type="checkbox"/>	Downloading the data collector	In the IBM Storage Insights GUI, go to Configuration > Data Collectors, and click Deploy Data Collector. Click your operating system to download the compressed file.
<input type="checkbox"/>	Ensuring that the data collector can access your storage systems	<ul style="list-style-type: none"> To collect metadata, the data collector connects to specific ports on your storage systems. To find out which ports must be open in your internal network, see Ports for collecting metadata from storage systems. The data collector also connects to a storage system with a user ID that has monitor or administrator privileges on that storage system. You can use an existing user ID for this connection, or to manage the monitoring of storage systems more efficiently, you can create a dedicated user ID for this purpose. To find out about the requirements for user IDs, see User roles for collecting metadata from storage systems.
<input type="checkbox"/>	Avoiding the use of special characters	In IBM Storage Insights, when you define custom tags, specify alert policy names, customize device names, and enter other configurable text, avoid using the following special characters: \$ ~ ` \ [] ; : ' " < >.

Windows checklist

If you install data collectors on servers or virtual machines that run Windows Server 2012 and later, you might find the following information useful.

Table 2. Windows checklist

Check	Step	Description
-------	------	-------------

Check	Step	Description
<input type="checkbox"/>	Choosing a location for the data collector .zip file	<ul style="list-style-type: none"> The directory must be on a local system disk that is available at system startup time and is not associated with a Windows user profile, home directory, or network share. Directory names must not include these special characters: % & ! () { } [] ; , ' ` ^ = \$ # ~ + @ \ / : * ? " < > The number of characters, which includes the number of characters in the path and in the file name, should not exceed 50 characters. If you plan to add non-IBM storage systems, directory names must not start with any of the Windows reserved words such as these: CON, PRN, AUX, NUL, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9
<input type="checkbox"/>	Viewing the contents of the data collector .zip file	After you extract data collector .zip file, here are some key files for you to use: <ul style="list-style-type: none"> The readme file with instructions for installing the data collector. The batch file for installing the data collector: installDataCollectorService.bat.
<input type="checkbox"/>	Installing the data collector as an administrator	To install the data collector, you must run installDataCollectorService.bat as an administrator. To run the batch file as an administrator, you can use the following methods: <ul style="list-style-type: none"> Windows explorer: Locate the file with Windows Explorer, right-click it, and click Run as administrator. Command prompt: Press Windows key+R to open the Run window, type cmd, and press Ctrl+Shift+Enter to run the command prompt as an administrator. To view all the steps for installing a data collector on Windows, see Installing data collectors on Windows .

AIX and Linux checklist

If you install data collectors on servers or virtual machines that run AIX or Linux, you might find the following information useful.

Table 3. AIX and Linux checklist

Check	Step	Description
<input type="checkbox"/>	Choosing a location for the data collector .gz file	<ul style="list-style-type: none"> Directory names must not include special characters such as these: % & ! () { } [] ; , ' ` ^ = \$ # ~ + @ \ / : * ? " < > The number of characters, which includes the number of characters in the path and in the file name, must not exceed 256 characters.
<input type="checkbox"/>	Viewing the contents of the data collector .gz file	After you extract data collector .gz file, here are the key files for you to use: <ul style="list-style-type: none"> The readme file with instructions for installing the data collector. The script file for installing the data collector: installDataCollectorService.sh.
<input type="checkbox"/>	Installing the data collector as root	To install the data collector, you must have root authority on the server or virtual machine where you run installDataCollectorService.sh. To view all the steps for installing a data collector on AIX or Linux, see Installing data collectors on AIX or Linux .

Need help?

As easy as getting started with IBM Storage Insights can be, unexpected problems might occur. If you get stuck, you can open an IBM Support case to get help. You can also access self-help resources, including posing questions to experts in the technical community.

For a directory of help options, see [Getting support](#).

Related reference

- [Getting started troubleshooting](#)

Downloading and installing data collectors

Deploy one or more data collectors to collect key capacity, configuration, and performance metadata about your monitored storage resources. The metadata is then mined, analyzed, and displayed to help you gain valuable insights into the performance of your storage systems and their internal resources, such as pools and volumes. Key asset, configuration, status, and performance metadata is also collected about fabrics and switches. You can gain insights into the operational condition of fabrics and switches and into the performance of your switches.

Before you begin

Why install a data collector?

- Metrics, metrics, and more metrics. Use the metrics that are collected by data collectors to measure the capacity and performance of your storage resources. With a data collector, IBM® Storage Insights Pro subscribers get access to over 125 metrics to help them monitor capacity trends and depletion, track dips and peaks in performance over time, and determine the root causes of performance bottlenecks. And you can use the metrics that are collected for switches to investigate the performance of switches and their ports.
- Logs are easy to upload so you can get help quickly, when you need it. With a data collector deployed, you can automatically upload logs for your IBM block storage systems so that IBM Support can efficiently investigate, respond to, and close the tickets that you open or update.
- It's lightweight and secure. You need only a few minutes to install a data collector and start streaming metadata. That metadata flows in one direction, out of your data center to your instance of IBM Storage Insights. To keep the metadata package safe on its journey to the cloud, the data collector uses Hypertext Transfer Protocol Secure (HTTPS), which encrypts the metadata and sends the metadata package through a secure channel to the IBM Cloud®. When the package is delivered, the metadata is decrypted, analyzed, and stored.

More about security and data collectors: The security of your network and devices are critical to us. When you add devices for monitoring, you must enter credentials for IBM Storage Insights to use when connecting to the devices. Those credentials are only used by the data collector and are only used to collect metadata about the devices. No application, personal, or identity data is ever collected. For more information about security and data collectors, go to [Security](#).

About this task

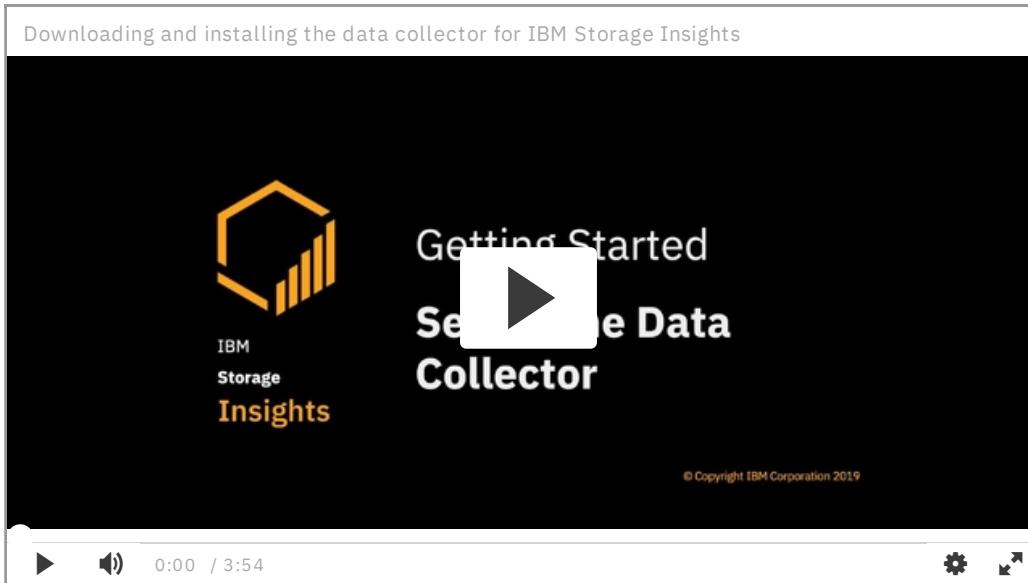
You can install one or multiple data collectors.

If you install one data collector, the metadata that is gathered about the storage systems in your data centers is sent through that data collector to be analyzed and shown in the IBM Storage Insights GUI.

If you install multiple data collectors, you can assign specific data collectors to gather metadata for each of the storage systems that you add. In addition, if the collection of asset and capacity or performance metadata fails, the procedure is as follows:

1. The next available assigned data collector is activated to collect the metadata.
2. The data collector is run again to collect the asset and capacity metadata.
3. The data collector collects the performance metadata at the next scheduled run of the data collection.

Watch a short video about how to download and install a data collector.



Important:

- To ensure the availability of metadata collection and to help balance workload, deploy two or more data collectors on *separate servers* in each of your data centers.
 - The server or virtual machine where you install a data collector must be able to access the storage systems that you want to monitor. Because the data collector connects directly to the storage systems, the server must be able to support these connections.
 - It's recommended that you do not install a data collector on a laptop or personal workstation. Shutting down a laptop or personal workstation or putting it into sleep mode will interrupt data collection. The server or virtual machine where you install a data collector must be available 24X7.
 - Don't install the data collector to a file system that was mounted or mapped under a user login session. These file systems can be temporary and might not persist after the user logs out of the network. Note that you *can* install a data collector to a system-mounted or mapped file system because those file systems are typically more permanent.
 - When you install data collectors, you can connect to a server or a proxy server.
- [**Installing data collectors on Windows**](#)
To gain insights into the capacity and performance of the storage systems in your data center, install data collectors. You also gain insights about your fabrics and switches, such as switch performance.
- [**Installing data collectors on AIX or Linux**](#)
To gain insights in the capacity and performance of the storage systems in your data center, install data collectors. You also gain insights about your fabrics and switches, such as switch performance.
- [**Adding, changing, or removing connections to proxy servers**](#)
You can add a connection to a proxy server after you install a data collector. You can also change the host name or port number or the credentials that you use to authenticate with the proxy server, or remove the connection to the proxy server.
- [**Learn more about installing data collectors**](#)
To help you install data collectors, information is provided about extracting the files, connecting securely to IBM Storage Insights Pro, and installing the data collector service. Guidelines are provided for setting the properties of your data collectors so that they continue to collect performance metadata during service outages.
- [**Metadata collection with multiple data collectors**](#)
You can deploy multiple data collectors to fail over to another data collector when a metadata collection fails or to optimize the metadata collection from data centers in different locations.
- [**Enabling the collection of metadata for devices that use TLS 1.0 or 1.1**](#)
Because of known security vulnerabilities with TLS 1.0 and 1.1, TLS 1.2 is used to initiate communication between the data collector and your devices. For devices that don't support TLS 1.2, you can enable the data collector to initiate communication for the collection of metadata by using TLS 1.0 or 1.1.

Related concepts

- [Before you begin checklist for IBM Storage Insights](#)

Related tasks

- [Adding storage systems](#)
- [Creating departments](#)
- [Adding, changing, or removing connections to proxy servers](#)

Installing data collectors on Windows

To gain insights into the capacity and performance of the storage systems in your data center, install data collectors. You also gain insights about your fabrics and switches, such as switch performance.

Before you begin

You can install data collectors on servers or virtual machines that run Windows Server 2012 and later.

Important: Microsoft support of Windows 7 SP2 and Windows Server 2008 R2 SP1 ended in January 2020, therefore IBM® Storage Insights no longer supports deploying data collectors to those operating systems. It's strongly recommended that you deploy your data collectors to a supported version of Windows. For more information about end of support for Windows operating systems, see [Microsoft support lifecycle](#).

Before you install a data collector, keep in mind the following considerations:

- On the server or virtual machine where you install the data collector, you must provide at least 1 GB of RAM and 3 GB of disk space.
- You must have Administrator authority on the server or virtual machine where you install the data collector.
- Ensure that the operating system on the server or virtual machine where you install the data collector has general or extended support for maintenance and security fixes.
- To connect to your instance of IBM Storage Insights from the server or virtual machine where you install the data collector, your firewall must be configured to allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). The User Datagram Protocol (UDP) is not supported.
- The server or virtual machine on which you install the data collector must be able to access the storage systems that you want to monitor.

Important:

- Don't install a data collector on a laptop or personal workstation. Shutting down a laptop or personal workstation or putting it into sleep mode will interrupt data collection. The server or virtual machine where you install a data collector must be available 24X7.
- Don't install the data collector to a file system that was mounted or mapped under a user login session. These file systems can be temporary and might not persist after the user logs out of the network. Note that you *can* install a data collector to a system-mounted or mapped file system because those file systems are typically more permanent.

Antivirus software considerations: Installing a data collector involves making use of your operating system in manners typical for installing new application software. If your antivirus software is set on the maximum mode, it might prevent some of your changes from being accepted.

To verify that your deployment completes correctly, enable your antivirus software product on the target server or virtual machine to allow new executable files to be created in the installation directory of the data collector. If your antivirus software prevents the monitoring of some of your devices, such as XIV, Hitachi VSP, Dell EMC, NetApp, or Pure storage, add the related executable files for those devices to your allowlist.

About this task

When you install a data collector, you must complete the following tasks:

- Identify or create a directory on the server or virtual machine where the data collector will run.
- Download the compressed file that contains the data collector.
- Extract the contents of the compressed file.
- Run the command or script that installs the data collector.

Procedure

For each data collector that you want to install, complete these steps:

1. On the target server or virtual machine where the data collector will run, identify or create an empty directory. This directory acts as the permanent location from which the data collector service is run. Ensure that it is on a local system disk that is available at system startup time and is not associated with a Windows user profile, home directory, or network share. The directory name and the names of any directories in the directory path must follow these naming conventions:
 - Directory names must not include special characters such as these:
% & ! () { } [] ; , ' ` ^ = \$ # ~ + @ \ / : * ? " < > |
 - If you plan to add any non-IBM storage systems, directory names must not start with any of the Windows reserved words such as these:

CON, PRN, AUX, NUL, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9

- The total characters for the names in the directory path should not exceed 50 characters.

Here are some examples of directory paths:

- C:\Program Files\IBM_SI_DC\
- D:\IBM_SI_DC\

2. Log in to IBM Storage Insights.

3. From the Configuration menu, click Data Collectors, and then click Deploy Data Collector.

4. Click Windows.

5. Accept the license agreement.

6. Download the compressed (.zip) file that contains the data collector.

Note: If the download fails or you want to download the data collector for another operating system, click Download again.

7. Move the compressed file to the target server and directory that you identified in step 1.

8. Extract the contents of the compressed file.

Can't extract the compressed file?: When you download a file from the internet, Windows might classify it as unsafe and prevent you from extracting its contents. If this situation occurs with the compressed file for the data collector, unblock it by completing these steps:

- In Windows Explorer, right-click the compressed file and select Properties.
- On the General tab in the Properties window, locate the Security section and click Unblock.
- Click OK.
- Try to extract the contents of the compressed file again.

9. To install the data collector, choose one of the following installation options. The batch file for each option is located in the directory where you extracted the compressed file. You must have Administrator authority to run these options.

Installation Options	Description
installDataCollectorService.bat	To install the data collector as a service and automatically start it, complete the following steps: <ol style="list-style-type: none">Press Windows key+R to open the Run window.In the Run window, type cmd.Press Ctrl+Shift+Enter to run the command prompt as an administrator.In the command prompt, change to the directory where you extracted the compressed file.Type installDataCollectorService.bat and press Enter.
installDataCollectorService.bat nostart	To install the data collector as a service, but not start it, complete the following steps: <ol style="list-style-type: none">Press Windows key+R to open the Run window.In the Run window, type cmd.Press Ctrl+Shift+Enter to run the command prompt as an administrator.In the command prompt, change to the directory where you extracted the compressed file.Type installDataCollectorService.bat nostart and press Enter.
installDataCollectorService.bat noconfigureproxy	To install and start the data collector as a service without configuring a connection to a proxy server, complete the following steps: <ol style="list-style-type: none">Press Windows key+R to open the Run window.In the Run window, type cmd.Press Ctrl+Shift+Enter to run the command prompt as an administrator.In the command prompt, change to the directory where you extracted the compressed file.Type installDataCollectorService.bat noconfigureproxy and press Enter.

10. Optional: If you type yes to configure the connection to a proxy server, complete these steps:

- Type the host name of the proxy server.
- Type the port number of the proxy server.

11. Optional: If you type yes to authenticate the connection to the proxy server, complete these steps:

- Type the user name.
- Type the password.

Results

The data collector is installed as a service and is started unless you chose the **installDataCollectorService.bat nostart** command. After the data collector is started, it runs continuously unless you stop or uninstall the service. It is restarted automatically when the system boots up.

When the data collector is up and running, it attempts to establish a connection to IBM Storage Insights. When the connection is complete, you're ready to start adding your storage systems for monitoring!

Troubleshooting: If you encounter any problems during the installation process, you can open a support case for IBM Storage Insights to get help. For more information, see [Getting support](#).

Related tasks

- [Installing data collectors on AIX or Linux](#)
- [Adding, changing, or removing connections to proxy servers](#)
- [Enabling the collection of metadata for devices that use TLS 1.0 or 1.1](#)

Related reference

- [Learn more about installing data collectors](#)
- [Metadata collection with multiple data collectors](#)
- [Getting started](#)

Installing data collectors on AIX or Linux

To gain insights in the capacity and performance of the storage systems in your data center, install data collectors. You also gain insights about your fabrics and switches, such as switch performance.

Before you begin

You can install the data collector on the following operating systems:

- The Linux® data collector runs on 64-bit Linux operating systems on x86-64 and PPC64LE systems only.
 - The supported Linux operating systems for x86-64 are Red Hat® Enterprise Linux 7 and later versions and CentOS 7 and later versions.
 - The supported Linux operating system for PPC64LE (POWER8® only) is Red Hat Enterprise Linux 7.x. The data collector on Linux PPC64LE has the additional limitation that you cannot monitor FlashSystem A9000, XIV®, IBM Spectrum Accelerate, and non-IBM devices.
- Restriction: The data collector is not supported for Linux operating systems on IBM® Power® systems (PPC64, Big Endian).
- The AIX® data collector runs on POWER6® or higher systems that use AIX versions 7.x and later. The AIX data collector can run on a physical AIX installation or a logical partition (LPAR).
Important: IBM support for AIX version 7.1 on POWER6 systems ends in April 2023. At that point, IBM Storage Insights will no longer support deploying data collectors to those platforms. It's strongly recommended that you deploy your data collectors to supported versions of AIX and POWER® systems. For more information about end of support for AIX versions, see [AIX support lifecycle information](#).

Keep in mind the following considerations before you install the data collector:

- On the server or virtual machine where you install the data collector, you must provide at least 1 GB of RAM and 3 GB of disk space.
- You must have root authority on the server or virtual machine where you install the data collector.
- Ensure that the operating system on the server or virtual machine where you install the data collector has general or extended support for maintenance and security fixes.
- To connect to your instance of IBM Storage Insights from the server or virtual machine where you install the data collector, your firewall must be configured to allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). The User Datagram Protocol (UDP) is not supported.
- The server or virtual machine on which you install the data collector must be able to access the storage systems that you want to monitor.

Important:

- Don't install a data collector on a laptop or personal workstation. Shutting down a laptop or personal workstation or putting it into sleep mode will interrupt data collection. The server or virtual machine where you install a data collector must be available 24X7.
- Don't install the data collector to a file system that was mounted or mapped under a user login session. These file systems can be temporary and might not persist after the user logs out of the network. Note that you *can* install a data collector to a system-mounted or mapped file system because those file systems are typically more permanent.

Antivirus software considerations: Installing a data collector involves making use of your operating system in manners typical for installing new application software. If your antivirus software is set on the maximum mode, it might prevent some of your changes from being accepted.

To verify that your deployment completes correctly, enable your antivirus software product on the target server or virtual machine to allow new executable files to be created in the installation directory of the data collector. If your antivirus software prevents the monitoring of some of your devices, such as XIV, Hitachi VSP, Dell EMC, NetApp, or Pure storage, add the related executable files for those devices to your allowlist.

About this task

When you install a data collector, you must complete the following tasks:

- Identify or create a directory on the server or virtual machine where the data collector will run.
- Download the compressed file that contains the data collector.
- Extract the contents of the compressed file.
- Run the command or script that installs the data collector.

Procedure

For each data collector that you want to install, complete these steps:

1. On the target server or virtual machine where the data collector will run, identify or create an empty directory. This directory acts as the permanent location from which the data collector service is run. Ensure that the directory name and the names of any directories in the directory path follow these naming conventions:

- Directory names must not include special characters such as these:

% & ! () { } [] ; , ' ` ^ = \$ # ~ + @ \ / : * ? " < > |

- The total characters for the names in the directory path must not exceed 256 characters.

Here's an example of a directory path: /opt/IBM/Storage_Insights

2. Log in to IBM Storage Insights.
3. From the Configuration menu, click Data Collectors, and then click Deploy Data Collector.
4. Click a Linux OS or AIX.
5. Accept the license agreement.
6. Download the compressed (.tar) file that contains the data collector.
Note: If the download fails or you want to download the data collector for another operating system, click Download again.
7. Move the compressed file to the target server and directory that you identified in step 1.
8. Extract the contents of the compressed file.
9. To install the data collector, choose one of the following installation options. The script file for each option is located in the directory where you extracted the compressed file. You must have root authority to run these options.

Installation Options	Description
<code>installDataCollectorService.sh</code>	Run this script to install the data collector as a service. The data collector is automatically started and you are prompted whether to configure a connection to a proxy server.
<code>installDataCollectorService.sh nostart</code>	Run this command to install the data collector as a service, but not start it. Choose whether you want to configure a connection to a proxy server.
<code>installDataCollectorService.sh noconfigureproxy</code>	Run this command to install and start the data collector as a service without configuring a connection to a proxy server.

10. Optional: If you type yes to configure the connection to a proxy server, complete these steps:

- a. Type the host name of the proxy server.
- b. Type the port number of the proxy server.

11. Optional: If you type yes to authenticate the connection to the proxy server, complete these steps:

- a. Type the user name.
- b. Type the password.

Results

The data collector is installed as a service and is started unless you chose the `installDataCollectorService.sh nostart` command. After the data collector is started, it runs continuously unless you stop or uninstall the service. It is restarted automatically when the system boots up.

When the data collector is up and running, it attempts to establish a connection to IBM Storage Insights. When the connection is complete, you're ready to start adding your storage systems for monitoring!

Troubleshooting: If you encounter any problems during the installation process, you can open a support case for IBM Storage Insights to get help. For more information, see [Getting support](#).

Related tasks

- [Installing data collectors on Windows](#)
- [Adding, changing, or removing connections to proxy servers](#)
- [Enabling the collection of metadata for devices that use TLS 1.0 or 1.1](#)

Related reference

- [Learn more about installing data collectors](#)
 - [Metadata collection with multiple data collectors](#)
 - [Getting started](#)
-

Adding, changing, or removing connections to proxy servers

You can add a connection to a proxy server after you install a data collector. You can also change the host name or port number or the credentials that you use to authenticate with the proxy server, or remove the connection to the proxy server.

Before you begin

To configure or change the configuration settings for the connection to the proxy server, you must complete these tasks:

- Stop the data collector
 - Make your changes and save them
 - Restart the data collector
- [Adding or changing the connection to the proxy server](#)
After you install the data collector, you can add a connection to a proxy server or change the existing connection to the proxy server.
- [Removing the connection to the proxy server](#)
If you want the data collector to connect directly to the server, you can remove the connection to the proxy server.

Related tasks

- [Installing data collectors on Windows](#)
- [Installing data collectors on AIX or Linux](#)
- [Enabling the collection of metadata for devices that use TLS 1.0 or 1.1](#)
- [Stopping and starting the data collector service](#)

Related reference

- [Learn more about installing data collectors](#)
 - [Metadata collection with multiple data collectors](#)
-

Adding or changing the connection to the proxy server

After you install the data collector, you can add a connection to a proxy server or change the existing connection to the proxy server.

About this task

The data collector supports proxy servers that don't use authentication and ones that use basic authentication.

Procedure

1. Go the directory where you downloaded and extracted the data collector files.
2. Choose one of the following options:
 - On Windows, run `configureProxy.bat`
 - On AIX® and Linux®, run `configureProxy.sh`
3. Type `Yes` to add or change the connection to the proxy server, and then type the host name and port number for the proxy server.
4. Type `Yes` to authenticate the connection with the proxy server, and then type the user name and password.
5. Optional: Add the certificate file for your proxy server to the keystore that is provided with the data collector. To add the certificate file, run a command similar to the following example:

```
data_collector_dir/jre/bin/keytool -importcert -noprompt -trustcacerts  
-alias your_certificate -file path_to_certificate  
-keystore "data_collector_dir/jre/lib/security/cacerts" -storepass keystore_password
```

The default password for the keystore is `changeit`.

6. When the connection to the proxy server is verified, type `Yes` to save your changes.

If the connection isn't verified, repeat steps 1-4 and ensure that you enter the correct information and that the proxy server is available.

Results

Your configuration changes are saved in the `setup.properties` file in the `data_collector_dir/conf` directory.

What to do next

Restart the data collector.

Removing the connection to the proxy server

If you want the data collector to connect directly to the server, you can remove the connection to the proxy server.

About this task

CAUTION:

Don't remove the connection to the proxy server unless the server where you installed the data collector can directly access IBM® Storage Insights Pro on IBM Service Engage. Otherwise, the data collector can't collect data from your data center.

Procedure

1. Go the directory where you downloaded and extracted the data collector files.
2. Choose one of the following options:
 - On Windows, run `configureProxy.bat`
 - On AIX® and Linux®, run `configureProxy.sh`
3. Type `No` when you are asked Does your data collector require a proxy server.
4. Type `Yes` when you are asked Do you want to continue to save the configuration data to the `setup.properties` file.

What to do next

Restart the data collector.

Learn more about installing data collectors

To help you install data collectors, information is provided about extracting the files, connecting securely to IBM® Storage Insights Pro, and installing the data collector service. Guidelines are provided for setting the properties of your data collectors so that they continue to collect performance metadata during service outages.

Extract the data collector

The files that are required to install and run the data collector are provided in a compressed file. Download the compressed file on the operating system where you want to run the data collector. When the download is complete, use an extraction utility that is provided with the operating system to extract the file contents to a directory of your choice. Ensure that the directory that you select is empty and that the directory name and the names of any directories in the directory path follow these naming conventions:

- Directory names must not include special characters such as these:
`% & ! () { } [] ; , ' ` ^ = $ # ~ + @ \ / : * ? " < > |`
- If you plan to add any non-IBM storage systems, directory names must not start with any of the Windows reserved words such as these:

CON, PRN, AUX, NUL, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9

- The total characters for the names in the directory path must not exceed 256 characters.

Important:

- Where the data collector is installed on a Windows system, the total characters for the names in the directory path should not exceed 50 characters.
- On the server or virtual machine where you install the data collector, you must provide at least 1 GB of RAM and 3 GB of disk space.

Ensure that data collectors can access IBM Storage Insights

Data collectors send metadata about your devices to the endpoint for IBM Storage Insights at <https://insights.ibm.com>. To view that metadata and monitor your devices in IBM Storage Insights, you must ensure that your data collectors can access that endpoint URL.

To verify that a data collector can connect to <https://insights.ibm.com>, run the following command on the server or virtual machine where it's installed:

```
curl https://insights.ibm.com -I
```

If the connection is successful, output similar to the following is displayed:

```
HTTP/2 200
date: Fri, 23 Jul 2021 01:30:30 GMT
content-type: text/html
cf-ray: 6733ed73ff281d39-BLR
last-modified: Thu, 17 Sep 2020 12:13:01 GMT
vary: Accept-Encoding
cf-cache-status: DYNAMIC
expect-ct: max-age=604800, report-uri="https://report-uri.cloudflare.com/cdn-cgi/beacon/expect-ct"
x-amz-request-id: 2a462ec5-c60d-4abb-bff9-8017d7b216fc
x-clv-request-id: 2a462ec5-c60d-4abb-bff9-8017d7b216fc
x-clv-s3-version: 2.5
server: cloudflare
```

A Secure Sockets Layer (SSL) certificate is used to secure communication between the data collector and IBM Storage Insights.

Firewall requirements: To connect to your instance of IBM Storage Insights, your firewall must be configured to allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). The User Datagram Protocol (UDP) is not supported.

Manage disk space during service outages

The data collectors continue to collect performance metadata if there is a disruption in communication between IBM Storage Insights and the data collectors. To avoid gaps in your performance charts and reports, the performance metadata that was collected during the outage is loaded into IBM Storage Insights when the connection is reestablished.

The data collectors require a certain amount of disk space to store the performance history metadata if there is a communication disruption.

The following properties are available to manage the disk space requirements on the server or virtual machine where the data collector is installed.

Table 1. Disk space requirements for data collectors

Property	Description	Default value (MiB)
cacheMinFreeSpaceMiB	The minimum amount of space that must be available on the server when performance metadata is collected. For example, if the property value is set to 2048 MiB, the data collector stops collecting metadata when there is only 2048 MiB remaining on the server.	2048
cacheMaxTotalSpaceMiB	The maximum amount of disk space that the data collector can use to store performance data during a service outage. Rule of thumb: 2 MiB of space is recommended for every 1000 volumes that you're monitoring. If extended periods of network outages are being experienced you need to increase this setting to retain all the data collected during network outages.	240

Important: Ensure that the server or virtual machine where the data collector is installed has the following available disk space, as a minimum:

$cacheMinFreeSpaceMiB + cacheMaxTotalSpaceMiB$

You can set the properties in the custom.properties file in the <data_collector_install_directory>/conf directory.

Run the data collector service installer script

A service is used to run the data collector. To install this service, run the installDataCollectorService.bat script for Windows operating systems or the installDataCollectorService.sh script for AIX® and Linux® operating systems.

To run the script, you must have Administrator authority on Windows operating systems or root authority on AIX or Linux operating systems.

After the data collector service starts, the data collector runs continuously unless you stop or uninstall the service.

Antivirus software considerations

Installing a data collector involves making use of your operating system in manners typical for installing new application software. If your antivirus software is set on the maximum mode, it might prevent some of your changes from being accepted.

To verify that your deployment completes correctly, enable your antivirus software product on the target server or virtual machine to allow new executable files to be created in the installation directory of the data collector. If your antivirus software prevents the monitoring of some of your devices, such as XIV, Hitachi VSP, Dell EMC, NetApp, or Pure storage, add the related executable files for those devices to your allowlist.

Frequently asked questions about data collectors

View answers to common questions about installing and using data collectors.

Do I need to prepare my environment before getting started with IBM Storage Insights?

Because IBM Storage Insights is an IBM Cloud® service, getting started is a snap. However, every environment is different, so to ensure that your getting started experience goes smoothly, see this handy checklist for some hints and tips: [Before you begin checklist for IBM Storage Insights](#).

What operating systems are supported for the data collector?

You can install the data collector on the following operating systems:

- Windows Server 2012 and later.
- The Linux data collector runs on 64-bit Linux operating systems on x86-64 and PPC64LE systems only. The supported Linux operating systems for x86-64 are Red Hat® Enterprise Linux 7 and later versions and CentOS 7 and later versions. The supported Linux operating system for PPC64LE (POWER8® only) is Red Hat Enterprise Linux 7.x. The data collector on Linux PPC64LE has the additional limitation that you cannot monitor FlashSystem A9000, XIV®, IBM Spectrum Accelerate, and non-IBM devices.
Restriction: The data collector is not supported for Linux operating systems on IBM Power® systems (PPC64, Big Endian).
- POWER6® or later systems that use AIX versions 7.x and later. The AIX data collector can run on a physical AIX installation or a logical partition (LPAR).

Tip: To avoid potential problems, ensure that the operating system on the server or virtual machine where you install the data collector has general or extended support for maintenance and security.

Important: IBM support for AIX version 7.1 on POWER6 systems ends in April 2023. At that point, IBM Storage Insights will no longer support deploying data collectors to those platforms. It's strongly recommended that you deploy your data collectors to supported versions of AIX and POWER® systems. For more information about end of support for AIX versions, [AIX support lifecycle information](#).

What data does IBM Storage Insights collect? How is it used?

IBM Storage Insights collects two types of data: metadata for storage systems and diagnostic data for support logs.

Metadata for storage systems

The following metadata about your storage systems is collected regularly and streamed to IBM Storage Insights:

- Information about the status of a storage system and its internal resources.
- Information about the configuration of a storage system, such as name, firmware, and capacity.
- Information about the internal resources of a storage system, such as volumes, pools, nodes, ports, and disks. This information includes the names and the configuration and capacity metrics for each internal resource.
- Information about the performance of storage system resources and internal resources such as pools and volumes.

This metadata is never stored locally, and is encrypted with 128-bit encryption while streaming and 256-bit encryption while at rest. For more information about the metadata that is collected and how it's used, check out the [IBM Storage Insights Security Guide](#).

Diagnostic data for support logs

Support logs for your IBM block storage systems are only collected when a support ticket is open and you request it. The logs include diagnostic information so that IBM Support can more efficiently and quickly investigate and close tickets. In Blue Diamond environments, support logs are sent to a secure ECuRep data store, just as if you were to do it manually.

Important: IBM Storage Insights can't access the actual application data that is stored on your storage systems.

What is involved in downloading data collectors?

Data collectors are downloaded as compressed files that can be extracted and installed on any server that runs Windows, Linux, or AIX operating systems or virtual machines that have access to both the internal SAN attached infrastructure as well as access to the internet to communicate with the cloud portal.

See [Downloading and installing data collectors](#).

What compute, network, and memory resources do data collectors use?

The data collector is a light-weight application. On the server or virtual machine where you install the data collector, you must provide at least 1 GB of RAM and 3 GB of disk space.

[Learn more about how disk space is used during service outages](#).

How can I configure the data collector to use a proxy server?

You can specify whether you want to connect to a proxy server when you install the data collector. You can also add the user's credentials to authenticate with the proxy server.

See [Adding or changing the connection to the proxy server](#).

What do I need to configure on my firewall to enable the data collector to access the IBM cloud?

If you do not have a proxy server, then ensure that the default HTTPS port 443 is open on the firewall. You should not need to configure it for the FQDN.

Tip: If a firewall exists between the data collector and the storage systems that it monitors, configure the firewall to allow SNMP traffic.

Can I get a new data collector if something happens to my current data collector?

If the data collector is deleted or otherwise stops operating, IBM Storage Insights Pro will be unable to gather any new information. Information that has already been collected by IBM Storage Insights Pro will be kept. To restart the data collection, download a data collector and reinstall it.

How will I know if a data collector stops working?

You will get an email and a message is shown at the bottom of the page of the GUI. To check the status of the data collector, you can click Configuration > Data Collectors.

Learn more [Resolving connection issues](#).

How do I uninstall the data collector from a server and install it on a different server?

To uninstall the data collector, log in as Administrator on Windows operating systems or as a user with root privileges on AIX or Linux operating systems. After you uninstall, remove the data collector entry in the GUI. You must log in to the GUI as Administrator.

To install the data collector, choose an operating system, copy or download the data collector to the server where you want to install it, extract the data collector, and then add the storage systems that you want to monitor.

See [Removing and uninstalling data collectors](#) and [Downloading and installing data collectors](#).

When I add a storage system, I provide user credentials and an IP address for that storage system so IBM Storage Insights can collect metadata about it. Is that information stored onsite at my location or is it storage in the IBM Cloud?

The user credentials and IP addresses that you provide for connecting to a storage system are encrypted and stored securely in the IBM Cloud instance for IBM Storage Insights. To collect metadata for the storage system, that information is transmitted over a secure channel to the locally installed data collector. The information is never stored on the host where the data collector is installed; it exists temporarily in the application memory for the data collector only.

Do the user credentials (user name and password) that I provide for connecting to a storage system have any special requirements?

Yes. The role or user group that is assigned to the user name must have the appropriate privileges to collect configuration, capacity, and performance metadata about the storage system. The type of storage system and the metadata that you want to collect determine the privileges that are required.

Learn more [User roles for collecting metadata from storage systems](#).

How often can I collect performance metadata for the storage resources that I monitor with IBM Storage Insights Pro?

The performance metadata for IBM storage systems that manage block storage is automatically collected every five minutes and the performance metadata for Dell EMC storage systems that manage block storage is automatically collected every fifteen minutes.

For IBM Spectrum Scale storage systems that are enabled to collect performance metadata for file storage, the collection schedule can be configured when or after the storage system is added. The intervals that can be selected for collecting performance metadata are every 5, 10, 15, 20, 30 or 60 minutes.

Do I need to back up my metadata on-premises in case a restore is required?

No, and it's not necessary. A backup of all IBM Storage Insights metadata is automatically stored in the ISO-certified IBM cloud in the unlikely event that a restore is required.

Can I create different views of the dashboard?

Yes. If you have the Administrator role in IBM Storage Insights, you can create dashboards to selectively monitor specific storage systems in your environment. For example, you might want a dashboard for each of your data centers that monitors all of the storage systems in the data center and another dashboard for your production systems.

If you don't have an Administrator role, contact a person within your organization who has that role to help create a custom dashboard for you.

See [Creating customized dashboards to monitor your storage](#) and [Adding and removing users](#).

How can I add a DS8000® storage system that uses SSL Version 3 or earlier versions or that use MD5 signed certificates?
See [Adding DS8000 storage systems that use SSLv3 and MD5 signed certificates](#).

Related tasks

- [Installing data collectors on Windows](#)
- [Installing data collectors on AIX or Linux](#)
- [Adding, changing, or removing connections to proxy servers](#)
- [Enabling the collection of metadata for devices that use TLS 1.0 or 1.1](#)

Related reference

- [Metadata collection with multiple data collectors](#)
- [Ports for collecting metadata from storage systems](#)

Metadata collection with multiple data collectors

You can deploy multiple data collectors to fail over to another data collector when a metadata collection fails or to optimize the metadata collection from data centers in different locations.

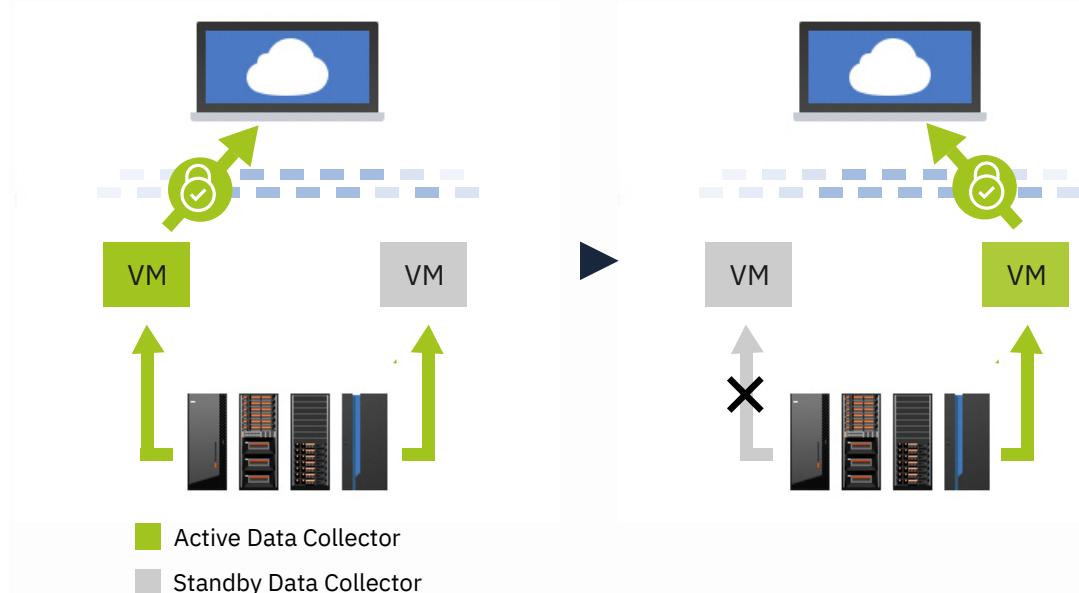
You add storage systems, switches, and fabrics to get valuable insights. To get those insights, you rely on the data collector, which collects the asset, configuration, capacity, and performance metadata from your data center for analysis and presentation in IBM® Storage Insights Pro.

You deploy multiple data collectors:

- To fail over to an assigned standby data collector when the active data collector can't collect the metadata.
- To avoid bandwidth, connectivity, network, or other potential performance issues when you collect metadata from data centers in different geographical regions.

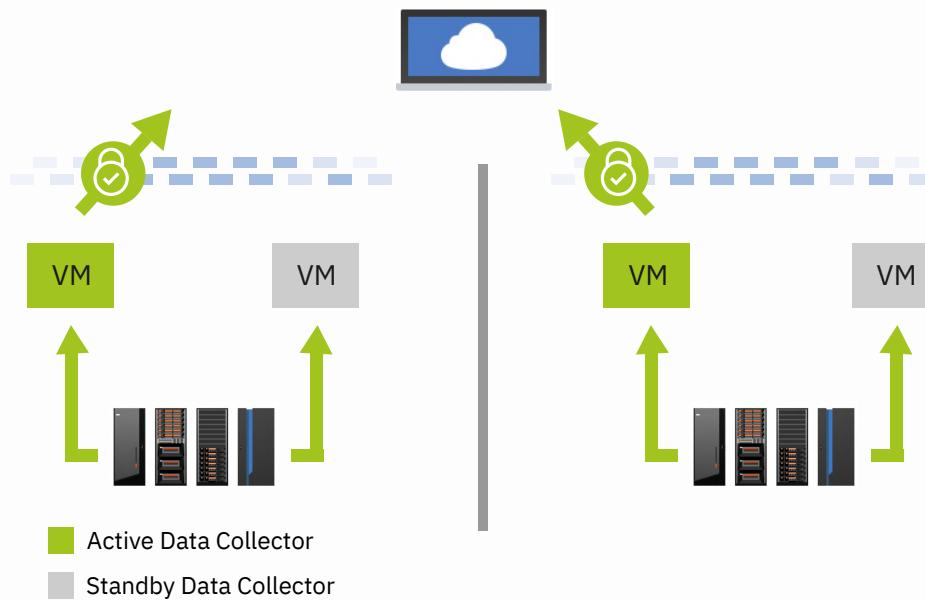
Pro tip: To ensure the availability of metadata collection and to help balance workload, deploy and assign two or more data collectors on *separate servers* in each of your data centers.

Active data collector fails over to standby data collector



In this scenario, the data collector is deployed on two different servers in the same data center. If one of the data collectors fails, the assigned data collectors on standby are tested and the data collector with the fastest response time collects the metadata.

Two data collectors deployed in two different data centers



In this scenario, two data collectors are deployed in two data centers that aren't connected over IP.

Tip: To help manage and troubleshoot the collection of metadata, specify the location of the resources that you add for monitoring. If you don't specify the location when you add storage resources, you can specify it later. From the Resources menu, select the type of resource, such as Block Storage Systems. Then, right-click the resources that you selected, and click Edit Properties.

Related tasks

- [Installing data collectors on Windows](#)
- [Installing data collectors on AIX or Linux](#)
- [Adding, changing, or removing connections to proxy servers](#)
- [Enabling the collection of metadata for devices that use TLS 1.0 or 1.1](#)

Related reference

- [Learn more about installing data collectors](#)

Enabling the collection of metadata for devices that use TLS 1.0 or 1.1

Because of known security vulnerabilities with TLS 1.0 and 1.1, TLS 1.2 is used to initiate communication between the data collector and your devices. For devices that don't support TLS 1.2, you can enable the data collector to initiate communication for the collection of metadata by using TLS 1.0 or 1.1.

About this task

If you disable TLS 1.2 and use TLS 1.0 or 1.1, you might expose your organization to security risks. Instead of enabling TLS 1.0 or 1.1 with devices that don't support TLS 1.2, IBM® strongly recommends that you contact your vendor to upgrade your devices to a version that supports TLS 1.2.

Note: IBM is not responsible or liable for any security issues that occur when you disable TLS 1.2 and enable TLS 1.0 or 1.1. You do so at your own risk. Learn about why TLS 1.0 and TLS 1.1 are being deprecated: [Memo from Internet Engineering Task Force](#).

If you change the version of TLS to a lower version, the change affects only the internal communication between your devices that support lower-level protocols and the data collector. The outbound transmission of metadata to IBM Storage Insights is not affected by this change.

Procedure

1. Log on to the server where the data collector service is installed.
2. Open a command window or shell and go to the directory where you installed the data collector package.
3. To stop the data collector service, choose one of the following options:

Operating system	Options
Windows	<p>a. From the desktop, click the Start menu, type <code>services.msc</code>, and then press Enter.</p> <p>b. On the Services page, right-click the service name that begins with IBM Spectrum Control Storage Insights data collector and select Stop.</p> <p>Alternatively, from the command prompt, complete these steps:</p> <ol style="list-style-type: none"> Click the Start menu and type <code>cmd</code>. In the data collector directory, type <code>dataCollector.bat stop</code>, and then press Enter.
AIX® or Linux®	In the data collector directory, type <code>dataCollector.sh stop</code> , and then press Enter.

4. Complete one of these actions:
 - On Windows, go to Data Collector Installation\jre\lib\security.
 - On AIX or Linux, go to Data Collector Installation/jre/lib/security.
5. Depending on the URL of your IBM Storage Insight® service, complete one of these actions:

Option	Description
The URL of your IBM Storage Insight service includes "serviceengage".	<p>Open the <code>java.security</code> file in an editor and remove the text <code>TLSv1</code>, <code>TLSv1.1</code> from this line:</p> <pre><code>jdk.tls.disabledAlgorithms=MD5withRSA, DH keySize < 1024, TLSv1, TLSv1.1, EC keySize < 224, anon, NULL</code></pre>
The URL of your IBM Storage Insight service includes "insights.ibm.com"	<p>a. Copy the <code>java.security</code> file and paste it outside the Data Collector Installation directory.</p> <p>b. Open the copied <code>java.security</code> file in an editor and remove the text <code>TLSv1</code>, <code>TLSv1.1</code> from this line.</p> <pre><code>jdk.tls.disabledAlgorithms=MD5withRSA, DH keySize < 1024, TLSv1, TLSv1.1, EC keySize < 224, anon, NULL</code></pre> <p>c. Go to Data Collector installation, open <code>conf</code> folder and then update the <code>setup.properties</code> file with full path of the modified <code>java.security</code> file. For example, For AIX or Linux,</p> <pre><code>dcJvmArgs= Djava.security.properties=/copiedlocationfolderpath/java.security file epJvmArgs= Djava.security.properties=/copiedlocationfolderpath/java.security file</code></pre> <p>For Windows,</p> <pre><code>dcJvmArgs= Djava.security.properties=C:\\copiedlocationfolderpath\\java.security file epJvmArgs= Djava.security.properties=C:\\copiedlocationfolderpath\\java.security file</code></pre>

6. Save your changes.
7. Choose one of the following options to restart the data collector service:

Operating system	Options
Windows	<p>a. From the desktop, click the Start menu, type <code>services.msc</code>, and then press Enter.</p> <p>b. On the Services page, right-click the service name that begins with IBM Spectrum Control Storage Insights data collector and select Start.</p> <p>Alternatively, from the command prompt, complete these steps:</p> <ol style="list-style-type: none"> Click the Start menu and type <code>cmd</code>. In the data collector directory, type <code>dataCollector.bat start</code>, and then press Enter.
AIX or Linux	In the data collector directory, type <code>dataCollector.sh start</code> , and then press Enter.

Results

The data collector can initiate communication with and collect metadata from devices that use TLS 1.0 or TLS 1.1.

Related tasks

- [Installing data collectors on Windows](#)
- [Installing data collectors on AIX or Linux](#)
- [Adding, changing, or removing connections to proxy servers](#)

Related reference

- [Learn more about installing data collectors](#)
- [Metadata collection with multiple data collectors](#)

Adding and removing users

Administrators can add and remove IBM® Storage Insights Pro users and assign roles.

Prerequisite: You must have Administrator privileges to grant access, remove, and assign roles to users.

Adding a user

To add a single user, complete the following steps:

1. In the menu bar, hover over your user name  and click Manage Users.
2. On the My IBM website, click Manage for IBM Storage Insights.
3. Click Manage users.
4. Click Add new user.
5. Provide a first name, last name, and email address or IBM ID. Typically, the email address and IBM ID are identical.
6. Assign the Subscription administrator or License user role to determine their level of access in IBM Storage Insights. For more information about roles, see [Roles and access rights](#).
7. Click Submit.

Adding multiple users

To add multiple users at the same time, complete the following steps:

1. In the menu bar, hover over your user name  and click Manage Users.
2. On the My IBM website, click Manage for IBM Storage Insights.
3. Click Manage users.
4. Click Add multiple users.
5. Download the CSV (comma-separated values) sample file.
6. In the CSV file, include information about the users that you want to add. For each user, you must provide a first name, last name, and email address or IBM ID. Typically, the email address and IBM ID are identical. You must also assign the Subscription administrator or License user role to determine their level of access in IBM Storage Insights.
 - If you're viewing the CSV file as a spreadsheet, enter information about each user in the appropriate columns. To assign the Subscription administrator role, type `x` in the Admin column for the user; to assign the License user role, type `x` in the User column.
 - If you're viewing the CSV as a text file, include information about each user on separate lines. Use the following format:

```
"First_name","Last_name","Email or IBMid",User,Admin,Status
```

Where:

- `User` represents a License user.
- `Admin` represents a Subscription administrator.
- `Status` is set to Active or Inactive.

For example, to add Jane Doe with the Subscription administrator role and John Doe with the License user role, include the following information:

```
"Jane","Doe","username@example.com",,x,Active  
"John","Doe","username2@example.com",x,,Active
```

For more information about roles, see [Roles and access rights](#).

7. To upload the updated CSV file, click Select file and follow the prompts.
8. Click Submit.

To see how it's done, watch the following short video.



Removing users and assigning roles

- To remove a user, expand the user information and select the remove action. When users are removed, they will no longer have access to IBM Storage Insights.
- To change the role of a user, you must first remove the user. Then, re-add the user and assign the new role. You can also open a support case at <https://www.ibm.com/mysupport/> to request a role change.
- **Roles and access rights**
Users in IBM Storage Insights are assigned roles. Roles determine the level of access that users have to product features. There are two roles in IBM Storage Insights: Administrator (Subscription administrator) and Monitor (License user)

Related tasks

- [Changing the owner of IBM Storage Insights](#)

Roles and access rights

Users in IBM® Storage Insights are assigned roles. Roles determine the level of access that users have to product features. There are two roles in IBM Storage Insights: Administrator (Subscription administrator) and Monitor (License user)

Owners of an IBM Storage Insights service are assigned the role of Administrator. When they log in to the service for the first time, they can create user accounts and assign the Administrator role to a member of their organization.

Tip: To determine the role of the user who is logged in, hover over the user icon in the upper-right corner of any page in the GUI. The access rights that are associated with the Administrator role and Monitor role for IBM Storage Insights Pro and IBM Storage Insights are as follows:

Table 1. Roles and access rights

Role	Access rights
Administrator (Subscription administrator)	<p>Access all monitoring and administrative features, including adding devices for monitoring, and removing and upgrading data collectors.</p> <p>Tips:</p> <ul style="list-style-type: none">• Assign the Administrator role to two users. If one administrator is unavailable, the other administrator can add or remove users and access all of the features of the offerings.• Assign the Administrator role to users who will be responsible for upgrading data collectors, when needed. Only users with the Administrator role can perform an upgrade.

Role	Access rights
Monitor (License User)	<p>IBM Storage Insights</p> <p>Users with the Monitor role can:</p> <ul style="list-style-type: none"> • View Call Home events for IBM block storage • View key capacity and performance information • Open tickets for IBM block storage systems • Upload and attach diagnostic packages to tickets • Start a trial of the full version of IBM Storage Insights Pro <p>IBM Storage Insights Pro</p> <p>Users with the Monitor role can access all the features of IBM Storage Insights plus the following features:</p> <ul style="list-style-type: none"> • View and export information about all monitored resources • View all of the capacity and performance information that is collected for block, file, and object storage systems • View, acknowledge, and remove alerts • Open management GUIs • View and run the reports that are created by users with an Administrator role and shown on the Reports page

User roles for collecting metadata: Roles in IBM Storage Insights are different from the user roles for collecting metadata. Roles for collecting metadata are associated with the users that you specify when you add devices for monitoring. These roles determine the type of metadata that you can collect about the devices. For information about the required roles for collecting metadata from devices, see [User roles for collecting metadata from storage systems](#).

Adding storage systems

Add the storage systems that you want to monitor in IBM® Storage Insights.

Before you begin

Ensure that you have the Administrator role in IBM Storage Insights. For more information about roles, see [Adding and removing users](#).
Restriction:

- You must enter a user name and password that is used to connect to that storage system. In rare cases, special characters in the user name or password might not be allowed by IBM Storage Insights. If you can't add a storage system for monitoring because of restricted characters, it's recommended that you change the credentials for the storage system and try adding it again. Then, open a ticket for the character limitation so that we can address it in a future update.
- If you add non-IBM storage systems, and the data collector is installed on a Windows system, any directory names must not start with any of the Windows reserved words such as these:

CON, PRN, AUX, NUL, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9,
LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, LPT9

As your email address or IBMid is used internally by the data collector when you add storage systems, you must ensure that they do not start with any of the Windows reserved words.

About this task

You can add multiple storage systems at the same time, or add them one by one. To add multiple storage systems, the storage systems must be of the same type and share authentication credentials.

When block storage systems are added, asset, capacity, configuration, and performance metadata is automatically collected and analyzed. When storage systems that manage block and file storage are added, the asset, capacity, and configuration metadata for file storage is also automatically collected and analyzed.

Metadata Collection Schedule and Required Roles:

- By default, asset, capacity, and configuration metadata is aggregated and collected daily. Performance metadata is collected at the following intervals:
 - Every 5 minutes for IBM block storage systems
 - Every 5 minutes for Dell EMC Unity storage systems
 - Every 5 minutes for Hitachi VSP storage systems

- Every 5 minutes for NetApp storage systems that are running ONTAP 9
- Every 5 minutes for Pure storage systems
- Every 15 minutes for other Dell EMC block storage systems.
- The user name that IBM Storage Insights Pro uses to connect to a storage system must have the required privileges (or role) on that storage system to collect different types of metadata. For more information about the requirements for each type of storage system, see [User roles for collecting metadata from storage systems](#).

When storage systems are added that manage only file storage or object storage, you schedule the collection of asset, capacity, and configuration metadata.

Time zone determination: The time zone of the browser that you use to access IBM Storage Insights determines when the data is collected and the date and time that is shown in the chart and table views.

Table 1. Types of IBM storage systems that can be monitored

Type	IBM Storage Insights Pro	IBM Storage Insights	Block	File	Object
Click a storage system to view its supported versions.					
DS8000®	✓	✓	✓		
IBM FlashSystem® family (includes FlashSystem 5000, FlashSystem 5100, FlashSystem 7200, FlashSystem 9100, FlashSystem 9200)	✓	✓	✓		
IBM Cloud Object Storage	✓				✓
IBM Spectrum Accelerate	✓	✓	✓		
IBM Spectrum Scale (ESS and GSS)	✓			✓	✓
SAN Volume Controller	✓	✓	✓		
IBM Spectrum Virtualize	✓	✓	✓		
IBM Spectrum Virtualize for Public Cloud	✓	✓	✓		
Storwize® block storage systems	✓	✓	✓		
Storwize V7000 Unified	✓	✓	✓	✓	
XIV®	✓	✓	✓		

Subscribers to IBM Storage Insights Pro can also monitor the following types of non-IBM storage systems:

Table 2. Types of non-IBM storage systems that can be monitored

Type	IBM Storage Insights Pro	IBM Storage Insights	Block	File
Dell EMC Unity	✓		✓	✓
Dell EMC VMAX family	✓		✓	
Dell EMC VNX	✓		✓	✓
Dell EMC VNXe	✓		✓	✓
Hitachi Virtual Storage Platform (VSP)	✓		✓	
NetApp storage systems running ONTAP 9	✓		✓	✓
Pure FlashArray//M and FlashArray//X	✓		✓	

Restriction: IBM Storage Insights doesn't support monitoring non-IBM software-defined storage devices. However, it can monitor IBM software-defined storage devices, such as IBM SAN Volume Controller. For a list of storage devices that can be monitored, check out <https://www.ibm.com/support/pages/node/6249369>.

For the following types of storage system, you can add multiple storage systems at the same time:

- DS8000
- IBM FlashSystem (includes FlashSystem 5000, FlashSystem 5100, FlashSystem 7200, FlashSystem 9100, FlashSystem 9200)
- IBM Spectrum Accelerate
- SAN Volume Controller or IBM Spectrum Virtualize
- Storwize block storage systems
- XIV
- Dell EMC Unity (IBM Storage Insights Pro only)
- NetApp storage systems that are running ONTAP 9 (IBM Storage Insights Pro only)
- Pure (IBM Storage Insights Pro only)

Procedure

1. Choose one of the following options:

Offering	Actions
IBM Storage Insights Pro	Click Resources, and then click Block Storage Systems, or File Storage Systems, or Object Storage Systems. Click Add Storage Systems or Add Storage System.

Offering	Actions
IBM Storage Insights	On the NOC dashboard, click the Add Storage Systems tile.

2. Add the information to connect to and monitor the storage system.

Results

After you specify the information for adding storage systems, a task is added to the list of running tasks on the page banner. If a task fails for adding a storage system, it's added to the list of failed tasks on the page banner. You can retry the tasks that failed or clear them from the list. When you retry a task, the task is added to the list of running tasks.

After a storage system is successfully connected to IBM Storage Insights, a probe is automatically run to collect status and asset information. Additionally, the storage system is added to the default alert policy for the storage system type. For example, if you add a DS8000 storage system, it's automatically to the alert policy called Default DS8000 policy. At any time, you can change which alert policy manages a storage system, or set a storage system to not be managed by any policy.

- **[Preparing to add storage systems](#)**

Before you add storage systems, learn the port numbers that are used to connect to those storage systems and the privileges that are required for collecting metadata.

- **[DS8000](#)**

Add DS8000 storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

- **[IBM FlashSystem family](#)**

Add IBM FlashSystem storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

- **[IBM Spectrum Accelerate](#)**

Add IBM Spectrum Accelerate storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

- **[SAN Volume Controller or IBM Spectrum Virtualize](#)**

Add IBM Spectrum Virtualize storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

- **[Storwize family](#)**

Add Storwize V3500, Storwize V3700, Storwize V5000, Storwize V5000E, Storwize V7000, or IBMStorwize Flex System V7000 Storage Node storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

- **[Storwize V7000 Unified](#)**

Add Storwize V7000 Unified storage systems to get performance and asset, capacity, and configuration metadata analyzed for block storage and asset, capacity, and configuration metadata analyzed for file storage. Use that information to help detect performance issues, see changes in storage usage, and plan for future storage needs.

- **[XIV](#)**

Add XIV storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

- **[IBM Spectrum Scale](#)**

Add IBM Spectrum Scale storage systems to get asset, capacity, and configuration metadata analyzed so that you can detect changes in file and cloud storage usage and plan for future storage needs.

- **[IBM Cloud Object Storage](#)**

Add IBM Cloud Object Storage to get asset, capacity, and configuration metadata analyzed so that you can detect changes in storage usage and plan for future storage needs.

- **[Dell EMC](#)**

- **[Hitachi](#)**

Add Hitachi Virtual Storage Platform (VSP) F and G Series storage systems to get performance, asset, capacity, and configuration metadata analyzed for block storage so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

- **[NetApp](#)**

Add NetApp storage systems to get performance, asset, capacity, and configuration metadata analyzed for block and file storage so that you can detect performance issues, changes in storage usage, and plan for future storage needs. The information that you can view depends on the model of storage system.

- **[Pure Storage](#)**

Add Pure FlashArray//M and FlashArray//X storage systems to get performance, asset, capacity, and configuration metadata analyzed for block storage so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

Related reference

- [Tracking tasks](#)
- [Supported devices in IBM Storage Insights](#)

Preparing to add storage systems

Before you add storage systems, learn the port numbers that are used to connect to those storage systems and the privileges that are required for collecting metadata.

- [**Ports for collecting metadata from storage systems**](#)

View the list of port numbers that are used to connect to and collect metadata from storage systems.

- [**User roles for collecting metadata from storage systems**](#)

When you add storage systems, you add the credentials of users with the appropriate privileges for collecting asset, configuration, capacity, and performance metadata.

Ports for collecting metadata from storage systems

View the list of port numbers that are used to connect to and collect metadata from storage systems.

In [Table 1](#), the terms inbound and outbound are used from the perspective of the data collector. For example, port 1751 is used by the data collector to listen for event communications from DS8000® storage systems.

Table 1. List of port numbers for storage systems

Storage systems	Default port numbers
DS8000	<p>The following port numbers are used:</p> <ul style="list-style-type: none">• Inbound: 1751 is used for events. If port 1751 is not available, the outbound port 1750 on the HMC is used.• Inbound and Outbound: 1755 is used for offloading logs
IBM Spectrum Scale	<p>The following port numbers are used:</p> <ul style="list-style-type: none">• Outbound: 9084 is used for performance data collection on the IBM Spectrum® Scale cluster node where the collector component is running.• Outbound: 22 for SSH <p>To collect performance metadata, complete the following actions:</p> <p>IBM Spectrum Scale 5.1.0 and earlier: Ensure that the queryinterface property is set to "0.0.0.0" in the ZIMonCollector.cfg file on the cluster node.</p> <pre>queryinterface="0.0.0.0"</pre> <p>IBM Spectrum Scale 5.1.1 and later: Ensure that the zimon/ZIMonCollector.cfg file on the cluster node includes the following properties:</p> <pre>fallbackqueryinterface = "0.0.0.0" # "0.0.0.0" to allow remote connections (or "::0" for IPv6) fallbackqueryport = "9084"</pre> <p>For more information, see Configuring the collection of performance data for IBM Spectrum Scale</p>
SAN Volume Controller IBM Spectrum Virtualize for Public Cloud Storwize® V7000 Storwize V7000 Unified IBM FlashSystem® devices that run IBM Spectrum Virtualize FlashSystem 900	<p>The following port numbers are used:</p> <ul style="list-style-type: none">• Outbound: 22 for SSH• Outbound: 5989 Optionally, the SSH key can be uploaded once at setup time using the 5989 port. <p>For FlashSystem 900:</p> <ul style="list-style-type: none">• The SNMP port that is used for performance monitoring is 161 (UDP).• The SNMP agent must be enabled for a storage system before IBM® Storage Insights can collect its performance metadata. <p>For IBM Spectrum Virtualize for Public Cloud, the data collector host must have outbound access to the IBM Storage Insights instance.</p>

Storage systems	Default port numbers
IBM XIV® Storage System IBM Spectrum Accelerate FlashSystem A9000 FlashSystem A9000R	The following outbound port number is used: 7778.
IBM Cloud Object Storage	The following outbound port number is used: 443.
Dell EMC Unity	The following outbound port number is used: 443.
Other Dell EMC storage systems	5991 listens for events that are coming from Dell EMC CIMOMs. The protocol is set to http by default.
Hitachi VSP storage systems: • Hitachi Command Suite: Port: 2443 • Hitachi Device Manager: Port: 2443	The following outbound port number is used: 2443.
NetApp ONTAP 9 storage systems	The following outbound port number is used: 22.
Pure storage systems	The following outbound port number is used: 443.

Firewall requirements for the data collector: If a data collector is installed, outbound metadata for monitored storage systems is sent to a single, unique address, which is the IBM host name and port of your IBM Storage Insights instance. This means that you must configure your firewall to allow outbound communication on HTTPS port 443 using TCP to the IP address of your instance. In some cases, you might also need to allow specific hostnames.

User roles for collecting metadata from storage systems

When you add storage systems, you add the credentials of users with the appropriate privileges for collecting asset, configuration, capacity, and performance metadata.

To monitor storage systems, you must provide a user name and password to log in to the storage systems. The role or user group that is assigned to the user name must have the appropriate privileges to monitor the data that is collected.

Roles: The roles and user groups are configured on the storage system that you add for monitoring.

Security: The user credentials and IP address that you provide for connecting to a storage system are encrypted and stored securely in the IBM Cloud® instance for IBM® Storage Insights. To collect metadata about the storage system, that information is transmitted over a secure channel to the locally installed data collector. The information is never stored on the host where the data collector is installed; it exists temporarily in the application memory for the data collector only.

For block storage systems, configuration, capacity, and performance metadata can be collected. For file and object storage systems, configuration and capacity metadata can be collected.

Table 1. User role by storage system

Type of storage system	Required user role for collecting capacity and configuration metadata (probes)	Required user role for collecting performance metadata (performance monitor)
DS8000®	Monitor role or role that includes monitoring privileges.	Same role as probes
Dell EMC Unity	Administrator role. The user must have administrative account credentials for the storage system.	Same role as probes
Dell EMC VMAX	Administrator role. The user must have administrative account credentials for Solutions Enabler or SMI-S Provider.	Same role as probes
Dell EMC VNX	Administrator role. The user must have administrative account credentials for Solutions Enabler or SMI-S Provider.	Same role as probes
Dell EMC VNxe	Administrator role. The user must have administrative account credentials for Solutions Enabler or SMI-S Provider.	Same role as probes
Hitachi VSP	The user must have the View Group role or higher in the Hitachi Command Suite that connects to the storage system.	The user for the Export Tool must have the Storage Administrator (Performance Management) role in the Hitachi Device Manager that connects to the storage system.

Type of storage system	Required user role for collecting capacity and configuration metadata (probes)	Required user role for collecting performance metadata (performance monitor)
FlashSystem 900	Monitor role or role that includes monitoring privileges.	Same role as probes
FlashSystem A9000	Any role	Monitor role or role that includes monitoring privileges.
FlashSystem A9000R	Any role	Monitor role or role that includes monitoring privileges.
FlashSystem 5000 FlashSystem 5100 FlashSystem 7200 FlashSystem 9100 FlashSystem 9200 FlashSystem V9000	Monitor role or higher	For versions earlier than 8.3.1.2, Administrator, or SecurityAdmin. For version 8.3.1.2 or later, any role but some limitations might apply. Learn more
IBM Cloud Object Storage	Operator, System Administrator, or Super User role	Performance monitoring is not available
IBM Spectrum Accelerate	Any role	Monitor role or role that includes monitoring privileges.
IBM Spectrum Scale		Any role for file storage. Performance monitoring is not available for object storage.
NetApp	Operator role or higher	Same role as probes
Pure FlashArray//M	Role with read-only permission or higher	Same role as probes
Pure FlashArray//X	Role with read-only permission or higher	Same role as probes
SAN Volume Controller	Monitor role or higher	For versions earlier than 8.3.1.2, Administrator, or SecurityAdmin. For version 8.3.1.2 or later, any role but some limitations might apply. Learn more
Storwize® V3500 Storwize V3700 Storwize V5000 Storwize V7000	Monitor role or higher	For versions earlier than 8.3.1.2, Administrator, or SecurityAdmin. For version 8.3.1.2 or later, any role but some limitations might apply. Learn more
Storwize V7000 Unified	Monitor role or higher	Administrator
XIV®	Any role	Monitor role or higher

DS8000

Add DS8000® storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

Use the following information to add storage systems so that they can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host names or IP addresses

The hostnames or IP addresses of the Hardware Management Console (HMC). Use hostnames if your IP addresses change regularly. For high availability, connect to both HMCs for each DS8000. Depending on what is supported in your environment, you can enter an

Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

User name and Password

The user name, which is the same as the user name for the enterprise storage server network interface (ESSNI), and password for logging in to the storage system. The user must have Monitor privileges for the storage system so that the metadata that is analyzed and presented in the GUI can be collected.

Tip: Why not create a dedicated user account to manage the monitoring of your storage systems more efficiently? So, instead of using an existing user account, create a new user account to connect to and collect metadata from your storage resources.

Restriction: Capacity and configuration metadata can't be collected for DS8000 storage systems that are in maintenance mode. Probes that run when a DS8000 is in maintenance mode will fail. To ensure that metadata can be collected, schedule and run probes during non-maintenance times. For information about how to schedule and run probes, see <https://www.ibm.com/docs/en/storage-insights?topic=systems-starting-probes-collect-asset-capacity-configuration-metadata>.

- **[Adding DS8000 storage systems that use SSLv3 and MD5 signed certificates](#)**

Because of security vulnerabilities, you can't add DS8000 storage systems that use SSLv3 or MD5 certificates to IBM Storage Insights unless you choose to disable the security settings that prevent such storage systems from being added.

Related tasks

- [Monitoring resources](#)

Adding DS8000 storage systems that use SSLv3 and MD5 signed certificates

Because of security vulnerabilities, you can't add DS8000® storage systems that use SSLv3 or MD5 certificates to IBM® Storage Insights unless you choose to disable the security settings that prevent such storage systems from being added.

About this task

To ensure the security of the HMC, the best practice is to ensure that all DS8000 storage systems are patched or updated to a firmware level that is documented in the security bulletin at <http://www.ibm.com/support/docview.wss?uid=ssg1S1005137>.

Procedure

To add DS8000 storage systems that are at a firmware level that use the SSLv3 protocol or that use MD5 to sign certificates, complete these steps:

1. Log on to the server where the data collector service is installed.
2. Open the setup.properties file in the data collector conf directory.
The default path for this file is DataCollector_windows\conf on Windows operating systems, DataCollector_aix/conf on AIX® operating systems, and DataCollector_linux_ix86/conf on Linux® operating systems.
3. To disable the security settings, add one or both of the following lines to the setup.properties file:
 - a. To disable the security setting for SSLv3, type `EnableSSLv3=true` on a separate line.
 - b. To disable the security setting for MD5, type `EnableMD5=true` on a separate line.
4. Stop and start the data collector service.

On Windows operating systems, you must have Administrator rights to stop or start the data collector service. On AIX or Linux operating systems, you must have root privileges to stop or start the data collector service.

Operating system	Options
Windows	<ol style="list-style-type: none">a. Click the Start menu, type <code>services.msc</code>, and then press Enter.b. On the Services page, select the service name that begins with <code>IBM Spectrum Control Storage Insights</code> data collector and stop and start it. <p>Alternatively, run the <code>dataCollector.bat</code> script with the <code>stop</code> parameter, and then with the <code>start</code> parameter.</p>
AIX or Linux	Run the <code>dataCollector.sh</code> script with the <code>stop</code> parameter, and then with the <code>start</code> parameter.

IBM FlashSystem family

Add IBM FlashSystem® storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

Use the following information to add storage systems so that they can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host names or IP addresses

The host names or IP addresses that are used to connect to the storage systems. Use host names if your IP addresses change regularly. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

Authentication Type

The user name and password or the private Secure Shell (SSH) key that is used to connect to the storage system.

You can use an SSH key to authenticate with IBM FlashSystem devices that run IBM Spectrum Virtualize, and FlashSystem 900 devices.

User Name and Password

The user name and password for logging in to the storage system.

The user role that is required to collect metadata for the storage system depends on the device type and the firmware version.

FlashSystem 900, FlashSystem A9000, and FlashSystem A9000R

The user must have a Monitor role or a role that includes monitoring privileges.

IBM FlashSystem devices that run IBM Spectrum Virtualize

- For IBM Spectrum Virtualize 8.3.1.2 or later, the user must have the Monitor role or a role that includes monitoring privileges.

If the collection of performance metadata is stopped on the storage system, the role of the storage system user determines whether the collection can be automatically restarted. For example, if the storage system user has the Monitor role and your administrator has stopped the collection on the storage system, the collection must be manually restarted by your administrator before IBM® Storage Insights can collect performance metadata. [Learn more](#).

- For versions earlier than 8.3.1.2, the user must have the Administrator, or SecurityAdmin role.

Authenticate with SSH key

When you drag or upload the SSH key, you must add the SSH user that was associated with the SSH key when the SSH key was created. You can also provide a passphrase for the SSH private key if the file that is uploaded is in OpenSSH format.

SSH key

Drag or upload the new SSH key that was generated to authenticate with the storage system. The valid file formats for SSH keys are OpenSSH and PuTTY.

Passphrase

The passphrase that is associated with the SSH key pair. If a passphrase was not created for the SSH key pair, leave the field blank. For SSH keys that use the PuTTY file format, you cannot use a passphrase to protect the private key.

SSH User

For IBM FlashSystem devices that run IBM Spectrum Virtualize, the user that was associated with the SSH key when it was created must have an Administrator role so that the metadata for the storage systems can be collected.

For FlashSystem 900, the user must have a Monitor role or higher so that the metadata for the storage system can be collected.

Performance monitoring: To monitor the performance of IBM FlashSystem 900 storage systems, you must enable the SNMP agent on each of those storage systems. IBM Storage Insights communicates with the SNMP agent on port 161 (UDP) to collect performance metadata. To enable the SNMP agent, open the management GUI of a storage system, go to **Settings > Notifications > SNMP**, click **Agent**, and enter a community name.

You can also enable the SNMP agent by using CLI commands. For more information, see the [IBM FlashSystem 900 IBM Docs](#).

Related tasks

- [Monitoring resources](#)

IBM Spectrum Accelerate

Add IBM Spectrum Accelerate storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

IBM Spectrum Accelerate, a member of the IBM Spectrum Storage™ family, is a software defined storage solution that is based on the XIV® storage system.

Use the following information to add storage systems so that they can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host names or IP addresses

The host names or IP addresses that are used to connect to the storage systems. Use host names if your IP addresses change regularly. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

User Name and Password

The user that you add must have a Monitor role or a role that includes monitoring privileges.

Tip: Why not create a dedicated user account to manage the monitoring of your storage systems more efficiently? So, instead of using an existing user account, create a new user account to connect to and collect metadata from your storage resources.

Related tasks

- [Monitoring resources](#)
-

SAN Volume Controller or IBM Spectrum Virtualize

Add IBM Spectrum Virtualize storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

In this documentation, IBM Spectrum Virtualize is used to refer collectively to IBM® SAN Volume Controller, IBM Spectrum Virtualize for Public Cloud, IBM Spectrum Virtualize as Software Only, and IBM Storwize® storage systems, and to IBM FlashSystem® devices that run IBM Spectrum Virtualize.

IBM Spectrum Virtualize for Public Cloud: Before you add an IBM Spectrum Virtualize for Public Cloud storage system for monitoring, you must configure it for communication with IBM Storage Insights. For more information, see [Configuring IBM Spectrum Virtualize for Public Cloud](#).

Use the following information to add storage systems so that they can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host names or IP addresses

The host names or IP addresses that are used to connect to the storage systems. Use host names if your IP addresses change regularly. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

Authentication Type

The user name and password or the private Secure Shell (SSH) key that is used to connect to the storage system.

User name and Password

The user name and password for logging in to the storage system.

- For IBM Spectrum Virtualize 8.3.1.2 or later, the user must have the Monitor role or a role that includes monitoring privileges.
If the collection of performance metadata is stopped on the storage system, the role of the storage system user determines whether the collection can be automatically restarted. For example, if the storage system user has the Monitor role and your administrator has stopped the collection on the storage system, the collection must be manually restarted by your administrator before IBM Storage Insights can collect performance metadata. [Learn more](#).
- For versions earlier than 8.3.1.2, the user must have the Administrator, or SecurityAdmin role so that the metadata for the storage system can be collected.

Tip: Why not create a dedicated user account to manage the monitoring of your storage systems more efficiently? So, instead of using an existing user account, create a new user account to connect to and collect metadata from your storage resources.

Authenticate with SSH key

When you drag or upload the SSH key, you must add the SSH user that was associated with the SSH key when the SSH key was created. You can also provide a passphrase for the SSH private key if the file that is uploaded is in OpenSSH format.

SSH key

Drag or upload the new SSH key that was generated to authenticate with the storage system. The valid file formats for SSH keys are OpenSSH and PuTTY.

Passphrase

The passphrase that is associated with the SSH key pair. If a passphrase was not created for the SSH key pair, leave the field blank. For SSH keys that use the PuTTY file format, you cannot use a passphrase to protect the private key.

SSH User

The user that was associated with the SSH key when it was created must have an Administrator role so that the metadata that is analyzed and presented in the GUI can be collected.

- [**Planning for IBM Spectrum Virtualize for Public Cloud**](#)

IBM Spectrum Virtualize is a software-defined storage solution that has been proven for years in SAN Volume Controller and the IBM Storwize family. IBM Spectrum Virtualize for Public Cloud extends that solution to a hybrid-cloud or cloud-based model, where servers, storage, and network infrastructure are delivered in a public cloud environment. It can be deployed on either IBM® Cloud or Amazon Web Services (AWS) cloud infrastructures.

- [**Probing a SAN Volume Controller cluster fails when the cluster ID changes**](#)

When a SAN Volume Controller cluster ID changes, the first probe after the ID change fails. Subsequent probes complete successfully.

- [**User roles for collecting performance metadata from IBM Spectrum Virtualize**](#)

When you add IBM Spectrum Virtualize storage systems, you must add the credentials of a user who can log on to the storage system and collect performance metadata.

Related tasks

- [Monitoring resources](#)
-

Planning for IBM Spectrum Virtualize for Public Cloud

IBM Spectrum Virtualize is a software-defined storage solution that has been proven for years in SAN Volume Controller and the IBM® Storwize® family. IBM Spectrum Virtualize for Public Cloud extends that solution to a hybrid-cloud or cloud-based model, where servers, storage, and network infrastructure are delivered in a public cloud environment. It can be deployed on either IBM® Cloud or Amazon Web Services (AWS) cloud infrastructures.

With IBM Storage Insights, you can view the capacity, space usage, and performance of your IBM Spectrum Virtualize for Public Cloud storage systems. Other monitoring features, such as alerting, health checking, advanced analytics, and reporting are also supported.

Benefits

IBM Storage Insights can help you predict and prevent storage problems before they impact your business. Here are some key benefits of using IBM Storage Insights to monitor your IBM Spectrum Virtualize for Public Cloud storage systems:

- View detailed information about capacity, storage usage, and performance.
- Monitor health, status, and availability.
- Use alerts and alert policies to be notified of conditions and potential problems.
- Use advanced analytics to provision, optimize, and reclaim storage.
- Create and share reports about inventory, capacity, performance, and storage consumption.

How to monitor

Before you can add an IBM Spectrum Virtualize for Public Cloud storage system for monitoring, you must ensure that IBM Storage Insights can connect to it. To enable a connection, you can use the site-to-site VPN IPSec tunnel that exists between the on-premises environment and the IBM Spectrum Virtualize for Public Cloud instances in AWS or IBM Cloud®.

For IBM Spectrum Virtualize for Public Cloud storage systems that are implemented in AWS, you can also deploy the data collector on the Bastion host.

Tips:

- For more information about the methods for configuring the connection between IBM Storage Insights and IBM Spectrum Virtualize for Public Cloud, see the following topics:

- [Monitoring IBM Spectrum Virtualize for Public Cloud with on-premises data collection \(Site to Site VPN IPsec\)](#)
- [Monitoring IBM Spectrum Virtualize for Public Cloud with off-premises data collection \(in AWS and installed on the bastion host\)](#)
- IBM Storage Insights uses the following ports for communicating with IBM Spectrum Virtualize for Public Cloud:
 - Outbound: 22 for SSH
 - Outbound: 5989. Optionally, the SSH key can be uploaded once at setup time using the 5989 port.

Supported features

View a detailed list of the features in IBM Storage Insights that you can use to monitor IBM Spectrum Virtualize for Public Cloud storage systems:

Table 1. Supported features for monitoring IBM Spectrum Virtualize for Public Cloud

Resource Monitoring	Features	Supported
Understanding the environment	Monitor storage inventory and configuration. Includes information about type, model, serial number, and firmware.	✓
	Understand storage relationships, from volume and share down to server and application.	✓
	Explore virtualization relationships.	✓
	Explore replication relationships.	✓
	View dashboards to get insights into key aspects of your storage at a glance and one-click access to web-based element managers.	✓
Monitoring capacity	Collect storage consumption and capacity metrics.	✓
	View data reduction information.	✓
	View copy data information.	✓
	View internal storage tiers such as EasyTier.	✓
	Monitor the storage consumed by applications.	✓
Monitoring performance	Collect performance metrics about the workload on resources.	✓*
	View calculated metrics to gain insights into performance conditions.	✓
	Export performance data to a compressed file.	✓
	Drill down performance workflows to troubleshoot bottlenecks.	✓
	Compare the performance of resources.	✓
Monitoring health	Understand the health of resources.	✓
	Receive notifications when the status of a resource changes.	✓
	View the status of elements that are not represented as resources.	✓
Alerting	Alert on conditions within your storage environment.	✓
	Define alerts to identify issues based on multiple conditions.	✓
	Define alert policies to be notified of changes across related resources.	✓
Reporting	View predefined reports.	✓
	View chargeback and consumer reports.	✓
	Create custom reports by using the REST API.	
	Create rollup reports to view information across multiple servers.	✓
Analytics	Analyze business impact (applications, departments, and groups).	✓
	Optimize data placement with tiering.	✓
	Optimize capacity with reclamation.	✓

* Performance metadata for managed disks in IBM Spectrum Virtualize for Public Cloud is not available.

For your reference: Want to learn more about IBM Spectrum Virtualize for Public Cloud? No problem. IBM provides the following documentation for your reference:

- [IBM Spectrum Virtualize for Public Cloud Knowledge documentation](#)
- [Redbook \[PDF\]: Implementation guide for IBM Spectrum® Virtualize for Public Cloud 8.3](#)
- [Redbook \[PDF\]: IBM Spectrum Virtualize for Public Cloud on AWS Implementation Guide](#)

What's next

After you establish the method for connecting IBM Storage Insights to a IBM Spectrum Virtualize for Public Cloud storage system, you can add that storage system for monitoring, alerting, and reporting.

For instructions on how to add storage systems for monitoring, see [Adding storage systems](#).

- [Monitoring IBM Spectrum Virtualize for Public Cloud with on-premises data collection \(Site to Site VPN IPsec\)](#)

You can connect and monitor IBM Spectrum Virtualize for Public Cloud storage with IBM Storage Insights by using the site-to-site

virtual private network (VPN) IPSec tunnel that exists between the on-premises environment and the IBM Spectrum Virtualize for Public Cloud instances.

- [Monitoring IBM Spectrum Virtualize for Public Cloud with off-premises data collection \(in AWS and installed on the bastion host\)](#)

You can use IBM Storage Insights to monitor IBM Spectrum Virtualize for Public Cloud storage systems in AWS by installing the data collector on AWS.

Monitoring IBM Spectrum Virtualize for Public Cloud with on-premises data collection (Site to Site VPN IPsec)

You can connect and monitor IBM Spectrum Virtualize for Public Cloud storage with IBM® Storage Insights by using the site-to-site virtual private network (VPN) IPSec tunnel that exists between the on-premises environment and the IBM Spectrum Virtualize for Public Cloud instances.

About this task

The VPN IPSec site-to-site tunnel is a secure communication network between the cloud infrastructure and the on-premises environment. Network communication between the private subnets is controlled by the access control list (ACL) that is populated when you create the VPN IPSec site-to-site tunnel.

Typically, a bi-directional, IPsec site-to-site tunnel is limited to the subnets that contain the following IP addresses:

- On-premises IBM Spectrum® Virtualize cluster and replication target
- Cloud-based IBM Spectrum Virtualize for Public Cloud cluster and replication target

To use the IPsec site-to-site tunnel for communication between IBM Storage Insights and IBM Spectrum Virtualize for Public Cloud, you must include the IP address of the server or virtual machine where the data collector is installed in the tunnel definition as one of the on-premises endpoints.

For example, in the AWS Management Console, you can define the following:

- The external (internet-routable) IP address of the on-premises IPsec tunnel endpoint.
- The subnet / IP addresses for the on-premises server or virtual machine where the data collector is installed, IBM Spectrum Virtualize cluster, and replication target that will communicate through the tunnel.
- The IP addresses of the IBM Spectrum Virtualize for Public Cloud cluster and replication target in AWS that will communicate through the tunnel.

When defined, you can export a configuration file that can be used in different IPsec VPN devices, such as Vyatta and Juniper (Junos VPN Site Secure).

Contact your network and firewall administrators to help set up this communication between IBM Storage Insights and IBM Spectrum Virtualize for Public Cloud.

Procedure

After configuring the connection between IBM Spectrum Virtualize for Public Cloud and IBM Storage Insights, add the storage system for monitoring by completing the following steps:

1. In IBM Storage Insights, go to Resources > Block Storage Systems.
2. Click Add Storage Systems.
3. Click the SVC or Spectrum Virtualize icon.
4. Specify the IP address and authentication credentials for the IBM Spectrum Virtualize for Public Cloud instance that you want to monitor.
5. Click Connect.

Results

The storage system is added for monitoring and is automatically added to the default alert policy for the storage system type. Data collection is automatically run to collect status, configuration, capacity, and performance metadata about the storage system.

What to do next

By default, asset, capacity, and configuration metadata is aggregated and collected daily. Performance metadata is collected every 5 minutes. You can schedule daily capacity and inventory reports to gain insights about your IBM Spectrum Virtualize for Public Cloud storage systems.

Monitoring IBM Spectrum Virtualize for Public Cloud with off-premises data collection (in AWS and installed on the bastion host)

You can use IBM® Storage Insights to monitor IBM Spectrum Virtualize for Public Cloud storage systems in AWS by installing the data collector on AWS.

Before you begin

The IBM Spectrum Virtualize for Public Cloud storage systems are deployed in AWS.

About this task

Install the data collector on AWS if your IBM Spectrum Virtualize for Public Cloud storage systems only support applications that are hosted on AWS.

Tip: If an IBM Spectrum Virtualize for Public Cloud storage system is being used as a replication target from an on-premises environment, there should already be an existing VPN or dedicated link in place. In this case, install a data collector on-premises or use an existing data collector if one is currently monitoring the storage system.

To enable a secure connection between IBM Storage Insights and IBM Spectrum Virtualize for Public Cloud storage systems, install the IBM Storage Insights data collector on the Linux® bastion host in AWS. The bastion host is provisioned by default in the AWS CloudFormation template. Therefore, the bastion host already has outbound internet access and has access to the IBM Spectrum Virtualize for Public Cloud storage systems.

For information about the Bastion host in AWS, see [IBM Spectrum® Virtualize for Public Cloud on AWS Implementation Guide](#).

Procedure

1. Identify the external IP address of the bastion host.
2. Connect to the bastion host by using the private key. Enter a command like this:

```
ssh -i path_to_key/privateKey.pem centos@external_ip_of_bastion
```
3. Run the `enable-sv-cloud-management-gui` command on the bastion host to activate the GUI proxy.
4. Complete the postinstallation configuration of the IBM Spectrum Virtualize for Public Cloud storage system. On the Storage Insights page, register for IBM Storage Insights.
5. Create a new public and private key pair for use with IBM Storage Insights. Use the PEM file format for the key pair.
6. Create an IBM Storage Insights user with security administrator (`secadmin`) role authority in the IBM Spectrum Virtualize for Public Cloud storage system in AWS.
7. Associate the public key that you created in step 5 with the IBM Storage Insights user with security administrator role authority.
8. After the IBM Storage Insights instance is created, download the Linux data collector.
9. Use the Linux `scp` command to copy the data collector securely to the bastion host. Use the key pair whose private key you used in step 2.
10. Install the data collector on the bastion host.
11. Log in to your IBM Storage Insights instance with the IBM ID you used during the registration process. Click Configuration > Data Collectors, then confirm that the data collector is communicating.
12. In the IBM Storage Insights GUI, go to Resources > Block Storage Systems.
13. Click Add Storage Systems.
14. Click the SVC or Spectrum Virtualize icon.
15. Enter the IP address for the cluster for the IBM Spectrum Virtualize for Public Cloud storage system. You can get this IP address from any of the following locations:
 - In the IBM Spectrum Virtualize GUI, click Settings > Network > Management IP Addresses.
 - On the bastion host, from the `/etc/ssh/ssh_config` configuration files.
 - The AWS CloudFormation postinstallation output.
16. Select SSH as the authentication type, select the private key from step 5 as the SSH key. Enter the IBM Storage Insights user ID from step 6 as the SSH user.
17. Click Connect.

Results

The storage system is added for monitoring and is automatically added to the default alert policy for the storage system type. Data collection is automatically run to collect status, configuration, capacity, and performance metadata about the storage system.

What to do next

By default, asset, capacity, and configuration metadata is aggregated and collected daily. Performance metadata is collected every 5 minutes. You can schedule daily capacity and inventory reports to gain insights about your IBM Spectrum Virtualize for Public Cloud storage systems.

Probing a SAN Volume Controller cluster fails when the cluster ID changes

When a SAN Volume Controller cluster ID changes, the first probe after the ID change fails. Subsequent probes complete successfully.

Tip: When a SAN Volume Controller cluster is rebuilt or recovered, a new cluster ID is generated. To ensure that the first probe after a cluster ID change is successful, complete the following steps.

1. Remove the cluster from IBM® Storage Insights before you rebuild or recover the cluster.
2. Rebuild or recover the cluster.
3. Add the cluster to IBM Storage Insights.

User roles for collecting performance metadata from IBM Spectrum Virtualize

When you add IBM Spectrum Virtualize storage systems, you must add the credentials of a user who can log on to the storage system and collect performance metadata.

The required role of the user on your storage system for collecting performance metadata depends on the version of IBM Spectrum Virtualize.

Versions earlier than 8.3.1.2

The user must have the role of Administrator or SecurityAdmin.

Version 8.3.1.2 or later

The user can have any role, such as the Monitor role.

Important information about user roles for IBM Spectrum Virtualize version 8.3.1.2 or later

If the collection of performance metadata is stopped on the storage system, the role of the storage system user determines whether the collection can be automatically restarted. For example, if the storage system user has the Monitor role and your administrator has stopped the collection on the storage system, the collection must be manually restarted by your administrator before IBM® Storage Insights can collect performance metadata.

User has privileges to start collections

If the user has the Administrator or SecurityAdmin role on the storage system, the collection is automatically restarted and the performance metadata is collected.

User does not have privileges to start collections

If the user has the Monitor role on the storage system, IBM Storage Insights can't automatically restart the collection. To manually start the collection of performance metadata on the storage system, complete the following steps:

1. Log on to the storage system as a user with the Administrator, or SecurityAdmin role.
2. Run the following command:

```
svctask startstats -interval 5
```

Storwize family

Add Storwize® V3500, Storwize V3700, Storwize V5000, Storwize V5000E, Storwize V7000, or IBM® Storwize Flex System V7000 Storage Node storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

Restriction: You can't use IBM Storage Insights to monitor the SAS ports on a Storwize storage system. To monitor those ports, use the management GUI for the storage system.

Use the following information to add the storage system so that it can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host names or IP addresses

The host names or IP addresses that are used to connect to the storage systems. Use host names if your IP addresses change regularly. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address.

If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example:
2001:DB95:0000:1234:0000:0000:5678:ABCD.

Authentication Type

The user name and password or the private Secure Shell (SSH) key that is used to connect to the storage system.

User name and Password

The user name and password for logging in to the storage system.

- For storage systems that run IBM Spectrum Virtualize 8.3.1.2 or later, the user must have the Monitor role or a role that includes monitoring privileges.

If the collection of performance metadata is stopped on the storage system, the role of the storage system user determines whether the collection can be automatically restarted. For example, if the storage system user has the Monitor role and your administrator has stopped the collection on the storage system, the collection must be manually restarted by your administrator before IBM Storage Insights can collect performance metadata. [Learn more](#).

- For storage systems that run versions earlier than 8.3.1.2, the user must have the Administrator, or SecurityAdmin role so that the metadata for the storage system can be collected.

Tip: Why not create a dedicated user account to manage the monitoring of your storage systems more efficiently? So, instead of using an existing user account, create a new user account to connect to and collect metadata from your storage resources.

Authenticate with SSH key

When you drag or upload the SSH key, you must add the SSH user that was associated with the SSH key when the SSH key was created. You can also provide a passphrase for the SSH private key if the file that is uploaded is in OpenSSH format.

SSH key

Drag or upload the new SSH key that was generated to authenticate with the storage system. The valid file formats for SSH keys are OpenSSH and PuTTY.

Passphrase

The passphrase that is associated with the SSH key pair. If a passphrase was not created for the SSH key pair, leave the field blank. For SSH keys that use the PuTTY file format, you cannot use a passphrase to protect the private key.

SSH User

The user that was associated with the SSH key when it was created must have an Administrator role so that the metadata that is analyzed and presented in the GUI can be collected.

Monitoring restriction for SAS ports: After you add a Storwize device, you can use IBM Storage Insights to monitor its health, status, capacity, and performance. However, you can't monitor the SAS ports on a Storwize device. To monitor those ports, use the management GUI for the device.

Related tasks

- [Monitoring resources](#)

Storwize V7000 Unified

Add Storwize® V7000 Unified storage systems to get performance and asset, capacity, and configuration metadata analyzed for block storage and asset, capacity, and configuration metadata analyzed for file storage. Use that information to help detect performance issues, see changes in storage usage, and plan for future storage needs.

Tip: To monitor the performance of a Storwize V7000 Unified storage system, you must add it as a block storage system.

Discover page

Use the following information to add the storage system so that it can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host names or IP addresses

The host names or IP addresses that are used to connect to the storage systems. Use host names if your IP addresses change regularly. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example:

2001:DB95:0000:1234:0000:5678:ABCD.

Authentication

The user name and password or the private Secure Shell (SSH) key that is used to connect to the storage system.

User name and Password

The user must have Administrator privileges for the storage system so that the metadata that is analyzed and presented in the GUI can be collected.

Authenticate with SSH key

When you drag or upload the SSH key, you must add the SSH user that was associated with the SSH key when the SSH key was created. You can also provide a passphrase for the SSH private key if the file that is uploaded is in OpenSSH format.

SSH key

Drag or upload the new SSH key that was generated to authenticate with the storage system. The valid file formats for SSH keys are OpenSSH and PuTTY.

Passphrase

The passphrase that is associated with the SSH key pair. If a passphrase was not created for the SSH key pair, leave the field blank.

For SSH keys that use the PuTTY file format, you cannot use a passphrase to protect the private key.

SSH User

The user that was associated with the SSH key when it was created must have an Administrator role so that the metadata that is analyzed and presented in the GUI can be collected.

Tip: If you use different credentials to connect to and collect metadata for file storage, the user must have Administrator role privileges for block metadata and Monitor role privileges for file metadata.

When the storage system is added, asset, capacity, and configuration metadata for block storage and file storage, and performance metadata for block storage is collected, analyzed and presented in the GUI.

- [How to fix IBM Storwize V7000 Unified authentication errors](#)

If the IP address for IBM Storwize V7000 Unified is not configured correctly on SAN Volume Controller, you get an authentication error when you add the storage system in IBM Storage Insights.

Related tasks

- [Monitoring resources](#)

How to fix IBM Storwize V7000 Unified authentication errors

If the IP address for IBM® Storwize® V7000 Unified is not configured correctly on SAN Volume Controller, you get an authentication error when you add the storage system in IBM Storage Insights.

Problem

You can add IBM Storwize V7000 Unified on a SAN Volume Controller to IBM Storage Insights as either a file storage system, or block storage system, or both. However, if you add a block storage system IP address for a file storage system, or vice versa, an authentication error occurs.

Action

To solve the issue, complete these steps:

1. Get the IP address of IBM Storwize V7000 Unified storage system from the Storwize V7000 Unified Management GUI.
 2. Get the IP address for the Storwize V7000 Unified storage system registered on SAN Volume Controller by using the following command on a command line of SAN Volume Controller. **svcinfo lscluster -devicename**
 3. Update the IP address on SAN Volume Controller with the IP address from step 1 by using the following command: **chsystemip -clusterip <IP address>**
 4. Retry the connection on IBM Storage Insights.
-

XIV

Add XIV® storage systems to get performance and asset, capacity, and configuration metadata analyzed so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

Use the following information to add storage systems so that they can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host names or IP addresses

The host names or IP addresses that are used to connect to the storage systems. Use host names if your IP addresses change regularly. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example:
2001:DB95:0000:1234:0000:0000:5678:ABCD.

User Name and Password

The user that you add must have a Monitor role or a role that includes monitoring privileges.

Tip: Why not create a dedicated user account to manage the monitoring of your storage systems more efficiently? So, instead of using an existing user account, create a new user account to connect to and collect metadata from your storage resources.

Related tasks

- [Monitoring resources](#)
-

IBM Spectrum Scale

Add IBM Spectrum Scale storage systems to get asset, capacity, and configuration metadata analyzed so that you can detect changes in file and cloud storage usage and plan for future storage needs.

IBM Spectrum Scale is a software defined storage solution for processing large amounts of data in a distributed environment on a single IBM Spectrum Scale cluster. The cluster can contain one or more servers, or a combination of servers and GPFS Storage Server systems. GPFS Storage Server (GSS) is a storage solution that comprises storage enclosures, hard disks, and servers that are installed with IBM Spectrum Scale software.

You can monitor an IBM Spectrum Scale storage system that is configured for file storage, or a combination of file storage and object storage. The object storage uses an OpenStack Swift object storage system. Swift objects are stored in the GPFS file system.

Discover page

Use the following information to add the storage system so that it can be monitored and that metadata can be collected, analyzed, and presented in the GUI.

Host name or IP address

The host name or IP address of the cluster node that IBM® Storage Insights Pro uses for authentication. For authentication, you can use any server or GSS server that is configured as a node of the cluster and that runs an operating system version that is supported. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example:
2001:DB95:0000:1234:0000:0000:5678:ABCD.

User name

The user name that is used to log on to the cluster node. To run administration commands for monitoring the storage system, the user must have the following privileges:

- The user must have root privileges or privileges to run a set of specified administration commands using the `sudo` command on the cluster node.
- The user must have permission to log on from the specified node without entering a password to the other nodes in the cluster.

Tip: Why not create a dedicated user account to manage the monitoring of your storage systems more efficiently? So, instead of using an existing user account, create a new user account to connect to and collect metadata from your storage resources.

Password

The password that is used to log on to the cluster node.

Specify authentication credentials for object storage

To monitor object storage, you must enter object storage credentials. If you do not specify credentials when you add an object storage system for monitoring, you can specify them later. However, until credentials are entered, no data is collected about the object storage system.

User name

The user name that is used to log on to the OpenStack Swift object storage system. The user must be assigned the admin role in Keystone, the OpenStack identity service. To monitor all accounts and containers, the user must also be assigned the ResellerAdmin role. [Learn more](#).

Domain

The Keystone domain of the user that is used to monitor the OpenStack Swift object storage system. The default setting is Default. The combination of user name and domain uniquely identify a user on the object storage system.

Configure page

Use the following information to schedule the collection of data for the storage system:

Probe

The probe collects status, asset, and storage information about the IBM Spectrum Scale cluster.

The time zone that is shown is determined by the location of the browser that is used to access the GUI.

To probe object storage, the server that hosts the data collector must be able to connect to the OpenStack Swift and Keystone endpoints that are used to access object services. [Learn more](#).

Performance Monitor

Enable or disable the performance monitor for the storage system. If you enable the performance monitor, select the schedule for how often you want performance data to be collected.

Before you can enable the performance monitor, you must configure the IBM Spectrum Scale performance monitoring tool on the IBM Spectrum Scale cluster. [Learn more](#).

- [Monitoring IBM Spectrum Scale without requiring root privileges](#)

Enable users that do not have root privileges on a IBM Spectrum Scale cluster node to monitor IBM Spectrum Scale storage systems.

- [Verifying that asset, capacity, and configuration metadata can be collected for object storage](#)

To collect asset, capacity, and configuration metadata for object storage, the server that hosts the data collector must be able to connect to the OpenStack Swift and Keystone endpoints that are used to access object services.

- [Configuring the collection of performance data for IBM Spectrum Scale](#)

Configure the collection of information about the performance of IBM Spectrum Scale file storage systems.

- [Configuring OpenStack access to monitor the object storage system](#)

Configure OpenStack access for the user name that is used to monitor the IBM Spectrum Scale object storage system.

Related tasks

- [Monitoring IBM Spectrum Scale without requiring root privileges](#)

- [Monitoring resources](#)

Monitoring IBM Spectrum® Scale without requiring root privileges

Enable users that do not have root privileges on a IBM Spectrum Scale cluster node to monitor IBM Spectrum Scale storage systems.

About this task

Before you add the IBM Spectrum Scale storage system for monitoring, complete this task.

To grant access to the user, make the following changes to the sudoers file on the cluster node that is used for authentication:

- Add the set of administration commands that are required to monitor the storage system.
- Associate the user with the set of administration commands.

Procedure

1. Log on to the cluster node that is used for authentication with a user name that has root privileges.
2. To edit the sudoers file, enter the following command:

```
visudo -f /etc/sudoers
```

3. Add the following command aliases to the `sudoers` file.

The command aliases contain the commands that the user must be able to issue to monitor the storage system.

Important: Each command alias must be on a single line without line breaks.

```
Cmnd_Alias TPC_GPFS_MMCMD = /usr/lpp/mmfs/bin/mmsdrquery, /usr/lpp/mmfs/bin/mmlsconfig,
    /usr/lpp/mmfs/bin/mmgstate, /usr/lpp/mmfs/bin/mmlsnodect, /usr/lpp/mmfs/bin/mmlsfs,
    /usr/lpp/mmfs/bin/mmdf, /usr/lpp/mmfs/bin/mmlsnsd, /usr/lpp/mmfs/bin/mmlsfileset,
    /usr/lpp/mmfs/bin/mmccloudgateway, /usr/lpp/mmfs/bin/mmlsmount, /usr/lpp/mmfs/bin/mmlssnapshot,
    /usr/lpp/mmfs/bin/mmrepquota, /usr/lpp/mmfs/bin/mmlspolicy, /usr/lpp/mmfs/bin/mmaplypolicy

Cmnd_Alias TPC_GPFS_MMDSH = /usr/lpp/mmfs/bin/mmdsh -N * /usr/lpp/mmfs/bin/mmdiag --version,
    /usr/lpp/mmfs/bin/mmdsh -N * /lib/udev/scsi_id --whitelisted *,
    /usr/lpp/mmfs/bin/mmdsh -N * /sbin/blockdev --getsize64 *,
    /usr/lpp/mmfs/bin/mmdsh -N * /usr/bin/getconf DISK_SIZE *,
    /usr/lpp/mmfs/bin/mmdsh -f 20000 -N linuxNodes 'cat /sys/class/fc_host/*',
    /usr/lpp/mmfs/bin/mmdsh -N * /usr/lpp/mmfs/bin/mmces node list,
    /usr/lpp/mmfs/bin/mmdsh -N * /usr/lpp/mmfs/bin/mmces service list -a,
    /usr/lpp/mmfs/bin/mmdsh -N * /usr/lpp/mmfs/bin/mmces address list|grep object_database_node,
    /usr/lpp/mmfs/bin/mmdsh -N * /usr/lpp/mmfs/bin/mmces address list
    --by-node|grep object_database_node,
    /usr/lpp/mmfs/bin/mmdsh -v -N cesNodes /usr/lpp/mmfs/bin/mmobj config list
    --ccrfile object-server.conf --section DEFAULT --property devices,
    /usr/lpp/mmfs/bin/mmdsh -f 20000 -v -N * "test -e /opt/IBM/zimon/ZIMonSensors.cfg &&
    (grep -w collectors -A 4 /opt/IBM/zimon/ZIMonSensors.cfg | grep -w host) || true",
    /usr/lpp/mmfs/bin/mmdsh -f 20000 -v -N nonWindowsNodes hostname

Cmnd_Alias TPC_GPFS_OTHER = /bin/cat *release, /usr/bin/lsb_release -a

Cmnd_Alias TPC_GPFS_CMDS = TPC_GPFS_MMCMD, TPC_GPFS_MMDSH, TPC_GPFS_OTHER
```

4. To enable the user to issue the commands, add the following lines after the command aliases:

```
Defaults:user_name !requiretty
user_name ALL=(ALL) TPC_GPFS_CMDS
```

where `user_name` is the user name that you enter when you add the storage system for monitoring.

Results

The user that you added to the sudoers file can now monitor the IBM Spectrum Scale storage system.

Verifying that asset, capacity, and configuration metadata can be collected for object storage

To collect asset, capacity, and configuration metadata for object storage, the server that hosts the data collector must be able to connect to the OpenStack Swift and Keystone endpoints that are used to access object services.

Procedure

To verify that the server can access the object services, complete these steps:

1. List the URLs for the Keystone and Swift services by running commands on a IBM Spectrum Scale cluster node that is configured for object storage. Run the following commands with a user name that has root privileges:

```
. ~/openrc
openstack endpoint list
```

2. Ensure that the server that hosts the data collector can connect to the IP addresses and host names that are included in the Keystone and Swift services URLs.

For example, the URL for the Keystone service might be `http://gpfs420proto1:5000/v3`. The server that hosts the data collector must be able to connect to the `gpfs420proto1` host name.

Configuring the collection of performance data for IBM Spectrum Scale

Configure the collection of information about the performance of IBM Spectrum Scale file storage systems.

About this task

To collect performance data, you must first configure the IBM Spectrum Scale performance monitoring tool on the IBM Spectrum Scale cluster. Then, use the IBM® Storage Insights Pro GUI to schedule the collection of performance data.

Procedure

1. Configure the IBM Spectrum Scale performance monitoring tool by using the **mmperfmon config** command. For more information on the configuration code list, see the documentation for the

https://www.ibm.com/docs/en/STXKQY_5.1.1/com.ibm.spectrum.scale.v5r10.doc/bl1adm_mmperfmon.htm

Set the --collector property of **mmperfmon config** to the IBM Spectrum Scale cluster node where the collector component will run. The --collectors property must be set to one of the following options:

- An IP address that can be reached by the server that hosts the IBM Storage Insights Pro data collector
- A host name that resolves to an IP address that is reachable by the server that hosts the data collector

Ensuring that the collector node can be reached by IBM Storage Insights:

If the --collectors property is set to the internal host name of the collector node, the collector node might not be reachable by the server that hosts the IBM Storage Insights data collector.

Update the hosts file on the server that hosts the data collector to resolve the internal host name of the collector node to the public IP address that the server can access.

2. Configure the collector component of the performance monitoring tool so that the server that hosts the IBM Storage Insights Pro data collector can connect to port 9084 on the cluster node where the collector component will run.

Configure the collector component by editing the /opt/IBM/zimon/ZIMonCollector.cfg file on the IBM Spectrum Scale cluster node where the collector component will run.

IBM Spectrum® Scale 5.1.0 and earlier

To collect performance metadata, ensure that the queryinterface property is set to "0.0.0.0" in ZIMonCollector.cfg file on the cluster node:

```
queryinterface = "0.0.0.0"
```

IBM Spectrum Scale 5.1.1 and later

To collect performance metadata, ensure that zimon/ZIMonCollector.cfg file on the cluster node includes the following properties:

```
fallbackqueryinterface = "0.0.0.0" # "0.0.0.0" to allow remote connections (or "::0" for IPv6)
fallbackqueryport = "9084"
```

3. Restart the collector component.

4. Use the **mmperfmon** command to assign the perfmon designation to each node for which you want to collect performance data. For more information, see the documentation for the <https://www.ibm.com/docs/en/spectrum-scale/5.1.1?topic=reference-mmchnode-command>

Note: By default in IBM Spectrum Scale 5.0.0 version or higher, the sensors are started on all nodes.

5. Schedule the collection of performance data by creating a performance monitor in the IBM Storage Insights Pro GUI.

You can create performance monitors in the GUI when you add resources for monitoring or you can create them later.

Results

A performance monitor is created for the IBM Spectrum Scale storage system. If a successful probe run is completed for the resource, the performance monitor runs according to the defined interval.

What to do next

To check the progress of a performance monitor, you can complete the following actions:

- View the Performance Monitor Status column on the File Storage Systems page.
- From the File Storage Systems page, right-click a row, and select Data Collection > Open Performance Monitor Logs.

Related reference

- [Performance metrics for IBM Spectrum Scale](#)

Related information

- [IBM Spectrum Scale Performance monitoring tool](#)

Configuring OpenStack access to monitor the object storage system

Configure OpenStack access for the user name that is used to monitor the IBM Spectrum Scale object storage system.

About this task

Before you add the IBM Spectrum Scale object storage system for monitoring, ensure that the user name that you use to monitor the storage system has access to object storage accounts.

Tip: The terms "account" and "project" mean the same thing. Swift, the OpenStack object storage service, uses the term "account" and Keystone, the OpenStack identity service, uses the term "project."

Procedure

1. Set the object storage account and the domain for the user. By default, the domain is set to Default and cannot be modified after you create the user account. Choose one of the following actions:

- a. To set the account and domain when you create a user account, use the following command:

```
openstack user create --domain domainname --project projectname  
--password Password username
```

- b. To set the account and the domain for an existing user name, use the following command:

```
openstack user set --project projectname username
```

2. Assign the admin role for an object storage account to the user name.

Use the following command:

```
openstack role add --user username --project projectname admin
```

3. To monitor all accounts on the object storage system, assign to the user name the role that is defined in the reseller_admin_role configuration option in the Swift proxy server. The default value for the reseller_admin_role option is ResellerAdmin.

For example, use the following command:

```
openstack role add --user username --project projectname ResellerAdmin
```

Restriction: If you do not assign the ResellerAdmin role, information is collected only for the object storage accounts that the user has admin access to.

What to do next

To learn more about configuring and assigning user roles in OpenStack, see <https://docs.openstack.org/>.

IBM Cloud Object Storage

Add IBM® Cloud Object Storage to get asset, capacity, and configuration metadata analyzed so that you can detect changes in storage usage and plan for future storage needs.

IBM Cloud Object Storage is an IBM object storage solution that can be deployed on-premises, in the public cloud, or as a hybrid solution that combines on-premises and cloud storage.

Tips:

- Ensure that outbound communication on port 443 is enabled in your data center so that the data collector can stream metadata to IBM Storage Insights.
- Performance monitoring is not available for IBM Cloud Object Storage.

Discover page

Use the following information to add the storage system so that it can be monitored and that metadata can be collected, analyzed, and presented in the GUI:

Host name or IP address

The host name or IP address of the manager device for IBM Cloud Object Storage. The manager device is typically referred to as Cloud Object Storage Manager or dsnet manager. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

User Name and Password

The user that you add must have Operator, System Administrator, or Super User privileges so that the metadata for the storage system can be collected.

Tip: Why not create a dedicated user account to manage the monitoring of your storage systems more efficiently? So, instead of using an existing user account, create a new user account to connect to and collect metadata from your storage resources.

Configure page

Use the following information to schedule the collection of data for the storage system:

Probe

The probe collects asset, capacity, and configuration metadata about IBM Cloud Object Storage.

The time zone that is shown is determined by the location of the browser that is used to access the GUI.

Related tasks

- [Monitoring resources](#)

Related information

-  [IBM Cloud Object Storage](#)
-

Dell EMC

By default, the asset, capacity, and configuration metadata that is collected from storage systems is refreshed every 24 hours. For Dell EMC Unity storage systems, performance metadata is collected at a default collection interval of 5 minutes, while for other Dell EMC storage systems, the collection interval for performance metadata is 15 minutes.

Supported versions: To view the versions of Dell EMC storage systems, SMI-S Provider, and Solutions Enabler that are supported in IBM® Storage Insights, go to the  [Dell EMC support page](#).

Antivirus software restriction: If your antivirus software is set on the maximum mode, it might prevent your Unity storage systems from being added to IBM Storage Insights. For more information about how to configure your antivirus software, see [Before you begin checklist for IBM Storage Insights](#).

Use the following information to add storage systems so that they can be monitored and that metadata can be collected, analyzed, and presented in the GUI. You can add Unity storage systems by connecting directly to them. You can add other models of Dell EMC storage systems by connecting to the SMI-S Provider or Solutions Enabler that manages those storage systems.

Add Dell EMC Unity storage systems

When you select Unity as the storage system model, you can add one or more storage systems by entering their connection information.

Connection details

The IP addresses or host names that you use to connect to the Dell EMC storage systems. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

Tip: You can use a comma or a space to separate IP addresses or host names.

User Name and Password

The account credentials that are required to connect to the Dell EMC storage system. The role or user group that is assigned to the user name must have the appropriate privileges to monitor the data that is collected and, if required, to change the frequency of the data collection schedules. [Learn more about the role requirements for the user name.](#)

Tip: If you also want to add a Unity storage system for monitoring in IBM Spectrum Control or IBM Storage Insights for IBM Spectrum Control, ensure that you use different account credentials for each connection.

Add other Dell EMC storage systems

Step 1

SMI-S providers are required to connect to other types of Dell EMC storage systems. To add Dell EMC VMAX, VNX, or VNXe models, first download and configure Dell EMC SMI-S Provider or Dell EMC Solutions Enabler. Learn more about [Solutions Enabler and SMI-S Provider](#).

For a list of the versions of SMI-S Provider and Solutions Enabler that are required for supported Dell EMC storage systems, see [Dell EMC support page](#).

Step 2

Enter the connection information for SMI-S Provider or Solutions Enabler. If SMI-S Provider or Solutions Enabler manages multiple storage systems, all of those storage systems are added to IBM Storage Insights Pro.

Tip: You can add multiple instances of SMI-S Provider or Solutions Enabler to monitor your Dell EMC storage systems. Multiple instances can provide redundancy in collecting data from storage. See [Adding multiple instances of SMI-S Provider or Solutions Enabler](#).

SMI-S Provider host name or IP address

The IP address or host name of the server where the SMI-S Provider or Solutions Enabler that communicates with the storage systems is installed. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

User Name and Password

The account credentials that are required to connect to SMI-S Provider or Solutions Enabler. The role or user group that is assigned to the user name must have the appropriate privileges to monitor the data that is collected and, if required, to change the frequency of the data collection schedules. [Learn more about the role requirements for the user name.](#)

Advanced

Expand Advanced to set the optional protocol, port, and namespace for SMI-S Provider or Solutions Enabler.

Protocol

The version of the cim-xml protocol, http or https.

Port

The port on which SMI-S Provider or Solutions Enabler is listening. By default this port is 5989 for a secure connection and 5988 for an unsecured connection. For more information about the ports that are available, see the documentation for SMI-S Provider or Solutions Enabler.

Namespace

This namespace within SMI-S Provider or Solutions Enabler allows for accessing the CIM Interop Schema (including the class instances of the Server Profile) and determines how IBM Storage Insights Pro interacts with SMI-S Provider or Solutions Enabler when retrieving information.

Check the documentation for SMI-S Provider or Solutions Enabler or contact the storage system vendor to ensure that you use the most current namespaces.

When the storage system is added, asset, capacity, and configuration metadata for block storage and file storage, and performance metadata for block storage is collected, analyzed and presented in the GUI.

- [Planning for Dell EMC storage systems](#)

Dell EMC resources provide block and unified storage for organizations with network-attached storage or storage area network environments that have file and block-level services. IBM Storage Insights provides enhanced monitoring for Unity, VMAX, VNX, and VNXe storage systems.

- [Planning for Dell EMC Solutions Enabler and Dell EMC SMI-S Provider](#)

IBM Storage Insights Pro communicates with Solutions Enabler and SMI-S Provider to collect configuration and performance

information about the Dell EMC storage systems that they manage.

- [Adding multiple instances of SMI-S Provider or Solutions Enabler](#)

You can connect to multiple instances of SMI-S Provider or Solutions Enabler to monitor your Dell EMC storage systems. Multiple instances can provide redundancy in collecting data from storage.

Related tasks

- [Monitoring resources](#)
-

Planning for Dell EMC storage systems

Dell EMC resources provide block and unified storage for organizations with network-attached storage or storage area network environments that have file and block-level services. IBM® Storage Insights provides enhanced monitoring for Unity, VMAX, VNX, and VNXe storage systems.

IBM Storage Insights supports the Unity storage system by connecting directly to the device.

IBM Storage Insights supports versions of Dell EMC SMI-S Provider or Dell EMC Solutions Enabler that are compliant with SMI-S 1.6. Through SMI-S 1.6, the following storage systems are monitored:

- VMAX family
- VNX family
- VNXe family

Supported versions: To view the versions of Dell EMC storage systems that are supported in IBM Storage Insights, go to the [Dell EMC support page](#).

Dell EMC Unity Device configuration

A Unity device can be added to IBM Storage Insights as a block storage system, a file storage system, or both. When you add a Unity storage system, IBM Storage Insights collects data by connecting directly to the storage system.

Antivirus software restriction: If your antivirus software is set on the maximum mode, it might prevent your Unity storage systems from being added to IBM Storage Insights. For more information about how to configure your antivirus software, see [Before you begin checklist for IBM Storage Insights](#).

Benefits

IBM Storage Insights can help you predict and prevent storage problems before they impact your business. Here are some key benefits of using IBM Storage Insights to monitor your Dell EMC storage systems:

- View detailed information about capacity, storage usage, and performance.
- Monitor health, status, and availability.
- Use alerts and alert policies to be notified of conditions and potential problems.
- Use advanced analytics to reclaim storage.
- Create and share reports about inventory, capacity, performance, and storage consumption.

Supported features

View a detailed list of the features in IBM Storage Insights that you can use to monitor Dell EMC Unity storage systems:

Table 1. Supported features for Dell EMC Unity

Resource Monitoring	Features	Supported
Understanding the environment	Monitor storage inventory and configuration. Includes information about type, model, serial number, and firmware.	✓
	Understand storage relationships, from volume and share down to server and application.	✓
	Explore virtualization relationships.	
	Explore replication relationships.	✓
	View dashboards to get insights into key aspects of your storage at a glance and one-click access to web-based element managers.	✓
	Support for multiple protocols and storage types, such as FC, iSCSI, NVMe, CIFS, and NFS.	✓

Resource Monitoring	Features	Supported
Monitoring capacity	Collect storage consumption and capacity metrics.	✓
	View data reduction information.	✓
	View copy data information.	✓
	View internal storage tiers such as Easy Tier® and EMC FAST.	✓
	Monitor the storage consumed by applications.	✓
Monitoring performance	Collect performance metrics about the workload on resources.	✓
	View calculated metrics to gain insights into performance conditions.	✓
	Export performance data to a compressed file.	✓
	Drill down performance workflows to troubleshoot bottlenecks.	✓
	Compare the performance of resources.	✓
Monitoring health	Understand the health of resources.	✓
	Receive notifications when the status of a resource changes.	
	View the status of elements that are not represented as resources.	✓
Alerting	Alert on conditions within your storage environment.	✓
	Define alerts to identify issues based on multiple conditions.	✓
	Define alert policies to be notified of changes across related resources.	✓
Reporting	View predefined reports.	✓
	View chargeback and consumer reports.	✓
	Create custom reports by using the REST API.	✓
	Create rollup reports to view information across multiple servers.	✓
Analytics	Performance planning	✓
	Capacity planning	✓
	Business impact analysis (applications, departments, and groups)	✓
	Optimize data placement with tiering	
	Optimize capacity with reclamation.	✓

Restriction: In replication relationships, any snapshot volumes in either source or target storage systems that are not assigned to a host, are not stored in IBM Storage Insights. The volumes are listed in the Copy Data page but do not have hyperlinks.

Metadata collection schedule

By default, asset, capacity, and configuration metadata is aggregated and collected daily. You can schedule daily capacity and inventory reports to gain insights about your Dell EMC storage systems.

For Dell EMC Unity storage systems, the collection intervals for performance metadata are 5 minutes and 60 minutes. The default interval is 5 minutes.

Performance metadata is collected every 15 minutes for VMAX, VNX, and VNXe block storage systems.

What's next

Before you can monitor, alert, and report on your Dell EMC storage systems, you must add them to IBM Storage Insights.

For instructions on how to add storage systems for monitoring, see [Adding storage systems](#).

Related reference

- [Performance metrics for Dell EMC storage systems](#)

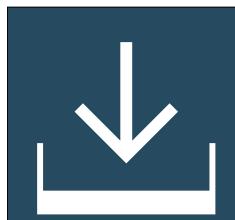
Planning for Dell EMC Solutions Enabler and Dell EMC SMI-S Provider

IBM® Storage Insights Pro communicates with Solutions Enabler and SMI-S Provider to collect configuration and performance information about the Dell EMC storage systems that they manage.

About this task

Dell EMC provides Solutions Enabler and SMI-S Provider to connect to Dell EMC storage systems.

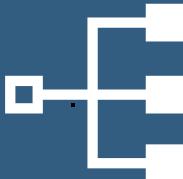
You can configure IBM Storage Insights Pro to communicate with Solutions Enabler and SMI-S Provider after you install them.



1

Download and install Dell EMC Solutions Enabler or Dell EMC SMI-S Provider

Download and install Solutions Enabler or SMI-S Provider to manage your storage systems.



2

Connect the storage systems to Solutions Enabler or SMI-S Provider

Refer to the Dell EMC documentation for Solutions Enabler or SMI-S Provider to find out how to connect your storage systems.



3

Authenticate to Solutions Enabler or SMI-S Provider

In IBM Storage Insights Pro enter the administrative account credentials for Solutions Enabler or SMI-S Provider.



4

Discover the storage systems

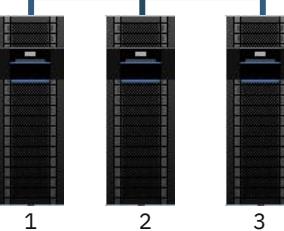
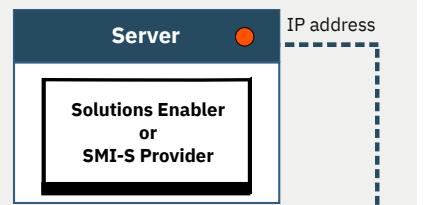
Discover the storage systems that are managed by Solutions Enabler or SMI-S Provider.



5

Data collection

When the storage system is added, asset, configuration, and capacity metadata and performance metadata is collected for block storage and asset, configuration, and capacity metadata is collected for file storage.



User's credentials

Note: You can connect to multiple instances of Solutions Enabler or SMI-S Provider to monitor your Dell EMC storage systems. Multiple instances can provide redundancy in collecting data from storage. See [Adding multiple instances of SMI-S Provider or Solutions Enabler](#). For information about the supported versions of Solutions Enabler or SMI-S Provider, see the [Dell EMC support page](#).

Adding multiple instances of SMI-S Provider or Solutions Enabler

You can connect to multiple instances of SMI-S Provider or Solutions Enabler to monitor your Dell EMC storage systems. Multiple instances can provide redundancy in collecting data from storage.

Before you begin

Download SMI-S Provider or Solutions Enabler and install on multiple servers. For a list of the versions of SMI-S Provider and Solutions Enabler that are required for supported Dell EMC storage systems, see [Dell EMC support page](#). Connect the instances to your Dell EMC storage systems. Add your storage systems to IBM® Storage Insights Pro.

About this task

SMI-S providers are required to connect to types of Dell EMC storage systems other than Unity.

Procedure

1. To add another instance of SMI-S Provider or Solutions Enabler to connect to your block or file storage systems, go to Resources > Block Storage Systems, or Resources > File Storage Systems.
2. Click Add Storage Systems.
3. Click the Dell EMC icon to add a storage system.
4. Select any model other than Unity and click Next.
5. Enter the connection information for the SMI-S Provider or Solutions Enabler instance and click Next.
The new instance of SMI-S Provider or Solutions Enable is enabled for data collection.
6. Repeat steps 1-4 to add additional instances of SMI-S Provider or Solutions Enabler.

Hitachi

Add Hitachi Virtual Storage Platform (VSP) F and G Series storage systems to get performance, asset, capacity, and configuration metadata analyzed for block storage so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

You can add a VSP system by connecting to the Hitachi Command Suite that is managing the device. By default, the asset, capacity, and configuration metadata that is collected from storage systems is refreshed every 24 hours. Performance metadata is collected at a default collection interval of 5 minutes.

Use the following information to add VSP storage systems so that they can be monitored and their metadata can be collected, analyzed, and presented in the GUI. Add a VSP storage system by connecting to the Hitachi Command Suite that manages the device. Connect to the Hitachi Device Manager to enable the Export Tool to collect performance information from the storage system.

Supported versions: To view the versions of Hitachi VSP storage systems that are supported in IBM® Storage Insights, go to the [Hitachi support page](#).

Restriction: You cannot monitor Hitachi VSP storage systems if the only IBM Storage Insights data collector is installed on AIX®. Complete the following steps to add your Hitachi VSP storage systems for monitoring.

- Add Hitachi VSP F and G Series by connecting to Hitachi Command Suite. See [Credentials for Hitachi Command Suite](#).
- Install the Hitachi Export Tool to collect performance information and export it from your storage system. See [Installing the Hitachi Export Tool](#).
- To enable or disable performance monitoring, see [Enabling and disabling the collection of performance metadata for Hitachi VSP storage systems](#).

Add Hitachi VSP F and G Series

When you select Hitachi VSP, you can add one or more storage systems by entering the connection information for the Hitachi Command Suite that is managing those devices.

Credentials for Hitachi Command Suite

IBM Storage Insights monitors capacity and configuration information about Hitachi devices by using the Hitachi Command Suite. Provide the connection information for the Hitachi Command Suite installation that is monitoring the devices.

Host name or IP address

The host name or IP address that you use to connect to Hitachi Command Suite. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

User Name and Password

The account credentials that are required to connect to Hitachi Command Suite. The role or user group that is assigned to the user name must have the appropriate privileges to monitor the data that is collected and, if required, to change the frequency of the data collection schedules. [Learn more about the role requirements for the user name](#).

Performance

Enable performance monitoring

When you enable performance monitoring in IBM Storage Insights, the user name and password that you provided to connect to the Hitachi Command Suite are also used to connect to Hitachi Device Manager. Hitachi Device Manager provides the connection information for the storage system to the Export Tool, which then sends the performance information to IBM Storage Insights.

Requirement: You might already have created credentials for Hitachi Device Manager, but you must create new credentials to match the credentials used for Command Suite. Device Manager uses these credentials exclusively for the Export Tool.

Important: To collect performance metadata, Hitachi requires that the password for connecting to the storage system be temporarily stored as clear text in a file on the server where the data collector is installed. For security reasons, ensure access to that server is restricted to key personnel. The file is automatically deleted after metadata is collected.

User Name and Password

The account credentials that are required to connect to Hitachi Device Manager. The role or user group that is assigned to the user name must have the appropriate privileges to monitor the data that is collected and, if required, to change the frequency of the data collection schedules. [Learn more about the role requirements for the user name.](#)

Capacity

Asset, capacity, and configuration metadata is collected by probes. By default, a probe collects metadata from Hitachi VSP systems once every 24 hours.

- [Planning for Hitachi storage systems](#)

Hitachi resources provide block storage for organizations with network-attached storage or storage area network environments that have block-level services. IBM Storage Insights provides enhanced monitoring for Hitachi VSP F and G Series storage systems.

- [Installing the Hitachi Export Tool](#)

To collect performance data from a Hitachi storage system, you must install the Hitachi Export Tool on the server or virtual machine where the data collector is installed. If you have many Hitachi storage systems in your environment, you must install the appropriate version of the Export Tool for each model of storage system.

Planning for Hitachi storage systems

Hitachi resources provide block storage for organizations with network-attached storage or storage area network environments that have block-level services. IBM® Storage Insights provides enhanced monitoring for Hitachi VSP F and G Series storage systems.

Hitachi VSP F and G Series Device configuration

A Hitachi VSP device can be added to IBM Storage Insights as a block storage system. When you add a Hitachi VSP storage system, IBM Storage Insights collects data by connecting to the Hitachi Command Suite that is managing the device. Connect to the Hitachi Device Manager to enable the Hitachi Export Tool to collect performance information from the storage system.

To view the versions of Hitachi VSP storage systems that are supported in IBM Storage Insights, go to the [Hitachi support page](#).
Restrictions:

- You cannot monitor Hitachi VSP storage systems if the only available IBM Storage Insights data collector is installed on AIX®.
- You must set the Hitachi Performance Monitor Monitoring Switch to Enabled in the Hitachi Device Manager and then set the Sample Interval to 1 minute or 5 minutes only. Any other interval options are not supported. If performance monitoring is already enabled at an unsupported interval and you want to keep the previous monitoring data, first export the data by using the Export Tool and then restart monitoring.

Antivirus software restriction: If your antivirus software is set on the maximum mode, it might prevent your Hitachi VSP storage systems from being added to IBM Storage Insights. For more information about how to configure your antivirus software, see [Before you begin checklist for IBM Storage Insights](#).

Benefits

IBM Storage Insights can help you predict and prevent storage problems before they impact your business. Here are some key benefits of using IBM Storage Insights to monitor your Hitachi VSP storage systems:

- View detailed information about capacity, storage usage, and performance.
- Monitor health, status, and availability.

- Use alerts and alert policies to be notified of conditions and potential problems.
- Use advanced analytics to reclaim storage.
- Create and share reports about inventory, capacity, performance, and storage consumption.

Supported features

View a detailed list of the features in IBM Storage Insights that you can use to monitor Hitachi VSP F and G Series storage systems:

Table 1. Supported features for Hitachi VSP F and G Series

Resource Monitoring	Features	Supported
Understanding the environment	Monitor storage inventory and configuration. Includes information about type, model, serial number, and firmware.	✓
	Understand storage relationships, from volume and share down to server and application.	✓
	Explore virtualization relationships.	
	Explore replication relationships.	✓
	View dashboards to get insights into key aspects of your storage at a glance and one-click access to web-based element managers.	✓
	Support for multiple protocols and storage types, such as FC, iSCSI, and PVMe.	✓
Monitoring capacity	Collect storage consumption and capacity metrics.	✓
	View data reduction information.	✓
	View copy data information.	✓
	View internal storage tiers such as Easy Tier®.	
	Monitor the storage consumed by applications.	✓
Monitoring performance	Collect performance metrics about the workload on resources.	✓
	View calculated metrics to gain insights into performance conditions.	✓
	Export performance data to a compressed file.	✓
	Drill down performance workflows to troubleshoot bottlenecks.	✓
	Compare the performance of resources.	✓
Monitoring health	Understand the health of resources.	✓
	Receive notifications when the status of a resource changes.	
	View the status of elements that are not represented as resources.	✓
Alerting	Alert on conditions within your storage environment.	✓
	Define alerts to identify issues based on multiple conditions.	✓
	Define alert policies to be notified of changes across related resources.	✓
Reporting	View predefined reports.	✓
	View chargeback and consumer reports.	✓
	Create custom reports by using the REST API.	
	Create rollup reports to view information across multiple servers.	✓
Analytics	Performance planning	✓
	Capacity planning	✓
	Business impact analysis (applications, departments, and groups)	✓
	Optimize data placement with tiering	
	Optimize capacity with reclamation.	✓

Restriction: In replication relationships, any snapshot volumes in either source or target storage systems that are not assigned to a host, are not stored in IBM Storage Insights. The volumes are listed in the Copy Data page but do not have hyperlinks.

Metadata collection schedule

By default, asset, capacity, and configuration metadata is aggregated and collected daily. Schedule daily reports to gain insights about your Hitachi VSP storage systems.

IBM Storage Insights collects performance metadata from Hitachi VSP storage systems at intervals of 5 minutes and 60 minutes. The default interval is 5 minutes.

Important: When you set the Sample Interval in Hitachi Device Manager to 1 minute or 5 minutes, there will be a gap in the performance data after performance monitoring starts because no data has accumulated. Depending on the value of the Performance Monitor interval in IBM Storage Insights, the resulting gap in performance data will be 35 minutes or 90 minutes.

What's next

Before you can monitor, alert, and report on your Hitachi VSP storage systems, you must add them to IBM Storage Insights.

Important: If you want to monitor performance information, you must install the Hitachi Export Tool. The Export Tool requires that the password for connecting to the storage system is temporarily stored as clear text in a file on the server or virtual machine where the data collector is installed. For security reasons, ensure access to that server or virtual machine is restricted to key personnel. The file is automatically deleted after metadata is collected.

For your reference: Want to learn more about support for Hitachi VSP storage systems in IBM Storage Insights? No problem. Take a look at the following documentation:

- For instructions on how to add storage systems for monitoring, see [Adding storage systems](#)
- For instructions on how to install the Hitachi Export Tool, see [Installing the Hitachi Export Tool](#).
- For instructions on using Hitachi Performance Monitoring and the Hitachi Export Tool, see the Hitachi documentation at <https://knowledge.hitachivantara.com/Documents/Storage>

Related reference

- [Performance metrics for Hitachi VSP storage systems](#)
-

Installing the Hitachi Export Tool

To collect performance data from a Hitachi storage system, you must install the Hitachi Export Tool on the server or virtual machine where the data collector is installed. If you have many Hitachi storage systems in your environment, you must install the appropriate version of the Export Tool for each model of storage system.

About this task

To collect performance metadata, the Hitachi Export Tool requires that the password for connecting to the storage system is temporarily stored as clear text in a file on the server or virtual machine where the data collector is installed. For security reasons, ensure access to that server or virtual machine is restricted to key personnel. The file is automatically deleted after metadata is collected.

Procedure

1. Use your Hitachi account to download the Export Tool from the following location:

https://knowledge.hitachivantara.com/Knowledge/Storage/How_to_Download_the_Appropriate_Export_Tool_Version_Specific_to_Array_Microcode

Tip: If you have more than one model of Hitachi storage system, you must download the version of the Export Tool for each model.

2. To install the tool into the default directory, first create the following directory structure where *hitachi_model* is the directory name that corresponds to the Export Tool for the model of your storage system.

Windows

Program Files\monitor\export\hitachi_model

Linux®

/opt/monitor/export/hitachi_model

Where *hitachi_model* is the directory name. See the following table for the directory details.

Table 1. Hitachi storage system models and export tool directories

Model	Property Name	Directory Name
Hitachi Virtual Storage Platform 5100/5100H/5500/5500H	hitachi_5000_ExportToolPath	5000
Hitachi Virtual Storage Platform E990	hitachi_E_ExportToolPath	eseries
Hitachi VSP G200/400/600/800 and F400/600/800	hitachi_FGX00_ExportToolPath	fgx00
Hitachi VSP G130/350/370/700/900 and F350/370/700/900	hitachi_FGXX0_ExportToolPath	fgxx0
Hitachi VSP G1000/1500 and F1500	hitachi_FG1X00_ExportToolPath	fg1x00
Hitachi VSP N400/600/800	hitachi_N_ExportToolPath	nseries
Hitachi Virtual Storage Platform (VSP)	hitachi_LegacyVSP_ExportToolPath	legacyvsp

3. Ensure that the Export Tool directory has write permission for users.
4. For each Export Tool that you downloaded, open the disk image and extract the tool for your chosen operating system.
5. Install the tool into the default directory.
6. Optional: If it is not possible to run the Export Tool from the default directory, another directory can be used. However, you must modify the setup.properties file in the DataCollector/conf directory to specify the new location.

Modify the `hitachi_model_ExportToolPath` property for your specific Hitachi storage system as in the following examples for Hitachi VSP G200/400®/600/800 and F400/600/800.

Windows

```
hitachi_FGX00_ExportToolPath=C:\\User1\\HitachiExportTool\\export\\fgx00  
Where folders are separated by \\
```

Linux

```
hitachi_FGX00_ExportToolPath=/usr/abc/HitachiExportTool/export/fgx00
```

7. Optional: If you changed the `setup.properties` file, save it and then restart the data collector.

NetApp

Add NetApp storage systems to get performance, asset, capacity, and configuration metadata analyzed for block and file storage so that you can detect performance issues, changes in storage usage, and plan for future storage needs. The information that you can view depends on the model of storage system.

By default, the asset, capacity, and configuration metadata that is collected from storage systems is refreshed every 24 hours. For NetApp storage systems that are running ONTAP 9, performance metadata is collected at a default collection interval of 5 minutes, or at 60 minutes.

Supported versions: To view the versions of NetApp storage systems that are supported in IBM® Storage Insights, go to the [NetApp support page](#).

Prerequisites for adding NetApp storage systems that are running ONTAP 9: If you are using AIX® data collectors, you must install the `libgcc<version that is required>.ppc` system library using root privileges before you add NetApp storage systems. To download the library, go to the [AIX Toolbox for Linux Applications](#). Find the appropriate version of the library for your AIX installation. The minimum version that is required is `libgcc6-6.3.0-1`.

Use the following information to add storage systems so that they can be monitored and that metadata can be collected, analyzed, and presented in the GUI. You can add NetApp storage systems that are running ONTAP 9 by connecting directly to them.

Add NetApp storage systems that are running ONTAP 9

To add a storage system that is running ONTAP 9, provide the connection information for the ONTAP System Manager. When you select the ONTAP 9 model, you can add one or more storage systems by entering their connection information.

Connection details

The IP addresses or host names that you use to connect to the System Managers for your storage systems that are running ONTAP 9. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example: 2001:DB95:0000:1234:0000:0000:5678:ABCD.

Tips:

- Use a comma or a space to separate IP addresses or host names.
- Use host names if your IP addresses change regularly.

User Name and Password

The user name and password for logging in to the storage system. The role or user group that is assigned to the user name must have the appropriate privileges to monitor the data that is collected and, if required, to change the frequency of the data collection schedules. [Learn more about the role requirements for the user name](#).

Antivirus software restriction: If your antivirus software is set on the maximum mode, it might prevent your ONTAP 9 storage systems from being added to IBM Storage Insights. For more information about how to configure your antivirus software, see [Before you begin checklist for IBM Storage Insights](#).

- [Planning for NetApp device support](#)

NetApp devices provide unified storage for organizations with network-attached storage or storage area network environments that have file and block-level services. Plan for how to use IBM Storage Insights to monitor your NetApp storage systems.

- [Adding multiple instances of SMI-S providers](#)

You can connect to multiple instances of SMI-S providers to monitor any of your storage systems that connect to IBM Storage Insights Pro by SMI-S provider. Multiple instances can provide redundancy in collecting data from storage.

Planning for NetApp device support

NetApp devices provide unified storage for organizations with network-attached storage or storage area network environments that have file and block-level services. Plan for how to use IBM® Storage Insights to monitor your NetApp storage systems.

To view the versions of NetApp storage systems that are supported in IBM Storage Insights, go to the [NetApp support page](#).

Benefits

IBM Storage Insights can help you predict and prevent storage problems before they impact your business. Here are some key benefits of using IBM Storage Insights to monitor your NetApp storage systems:

- View detailed information about capacity, storage usage, and performance.
- Monitor health, status, and availability.
- Use alerts and alert policies to be notified of conditions and potential problems.
- Use advanced analytics to reclaim storage.
- Create and share reports about inventory, capacity, performance, and storage consumption.

Device configuration for NetApp storage systems running ONTAP 9

You can add a NetApp storage system running ONTAP 9 to IBM Storage Insights as either a block or file storage system to view all of the block and file data on the system. When you add a NetApp ONTAP 9 device, IBM Storage Insights collects data by connecting directly to the storage system.

Antivirus software restriction: If your antivirus software is set on the maximum mode, it might prevent your ONTAP 9 storage systems from being added to IBM Storage Insights. For more information about how to configure your antivirus software, see [Before you begin checklist for IBM Storage Insights](#).

Supported features

View a detailed list of the features in IBM Storage Insights that you can use to monitor NetApp ONTAP 9 storage systems:

Table 1. Supported features for NetApp storage systems running ONTAP 9

Resource Monitoring	Features	Supported
Understanding the environment	Monitor storage inventory and configuration. Includes information about type, model, serial number, and firmware.	✓
	Understand storage relationships, from volume and share down to server and application.	✓
	Explore virtualization relationships.	
	Explore replication relationships.	✓
	View dashboards to get insights into key aspects of your storage at a glance and one-click access to web-based element managers.	✓
	Support for multiple protocols and storage types, such as FC, NVMe, CIFS, and NFS.	✓
Monitoring capacity	Collect storage consumption and capacity metrics.	✓
	View data reduction information.	✓
	View copy data information.	✓
	View internal storage tiers such as Easy Tier®.	✓
	Monitor the storage consumed by applications.	✓
Monitoring performance	Collect performance metrics about the workload on resources.	✓
	View calculated metrics to gain insights into performance conditions.	✓
	Export performance data to a compressed file.	✓
	Drill down performance workflows to troubleshoot bottlenecks.	✓
	Compare the performance of resources.	✓
Monitoring health	Understand the health of resources.	✓
	Receive notifications when the status of a resource changes.	✓
	View the status of elements that are not represented as resources.	✓
Alerting	Alert on conditions within your storage environment.	✓
	Define alerts to identify issues based on multiple conditions.	✓
	Define alert policies to be notified of changes across related resources.	✓
Reporting	View predefined reports.	✓
	View chargeback and consumer reports.	✓
	Create custom reports by using the REST API.	✓
	Create rollup reports to view information across multiple servers.	✓

Resource Monitoring	Features	Supported
Analytics	Performance planning	✓
	Capacity planning	✓
	Business impact analysis (applications, departments, and groups)	✓
	Optimize data placement with tiering	
	Optimize capacity with reclamation.	✓

Restrictions:

- In replication relationships, any snapshot volumes in either source or target storage systems that are not assigned to a host, are not stored in IBM Storage Insights. The volumes are listed in the Copy Data page but do not have hyperlinks.
- Although you can view the remote and FlashCopy® relationships for NetApp storage systems, the data is not correlated.
- NetApp doesn't provide performance data for any volumes that don't have host connections. Because of this, the number of volumes on the Volumes Performance page might not match the number of volumes on the Volumes page.
- NetApp doesn't provide performance data for any drives that don't have RAID arrays. Because of this, the number of drives on the Drives Performance page might not match the number of drives on the Drives page.

Metadata collection schedule

By default, asset, capacity, and configuration metadata is aggregated and collected daily. You can schedule daily capacity and inventory reports to gain insights about your NetApp storage systems.

For NetApp storage systems, the collection intervals for performance metadata are 5 minutes and 60 minutes. The default interval is 5 minutes.

What's next

Before you can monitor, alert, and report on your NetApp storage systems, you must add them to IBM Storage Insights.

For instructions on how to add storage systems for monitoring, see [Adding storage systems](#).

Related reference

- [Performance metrics for NetApp storage systems](#)

Adding multiple instances of SMI-S providers

You can connect to multiple instances of SMI-S providers to monitor any of your storage systems that connect to IBM® Storage Insights Pro by SMI-S provider. Multiple instances can provide redundancy in collecting data from storage.

Before you begin

Download the SMI-S providers that are required for your storage systems and install on multiple servers. For a list of the versions of SMI-S providers that are required for supported storage systems, see [IBM Spectrum Control interoperability matrix for storage systems](#). Connect the instances to your storage systems. Add your storage systems to IBM Storage Insights Pro.

Procedure

1. To add another instance of an SMI-S provider to connect to your block or file storage systems, go to Resources > Block Storage Systems, or Resources > File Storage Systems.
2. Click Add Storage Systems.
3. Click the icon for the storage system that you want to add.
4. Enter the connection information for the SMI-S provider instance and click Next.
The new instance of the SMI-S provider is enabled for data collection.
5. Repeat steps 1-4 to add additional instances of the SMI-S provider.

Pure Storage

Add Pure FlashArray//M and FlashArray//X storage systems to get performance, asset, capacity, and configuration metadata analyzed for block storage so that you can detect performance issues, changes in storage usage, and plan for future storage needs.

You can add Pure storage systems by connecting directly to them.

By default, the asset, capacity, and configuration metadata that is collected from storage systems is refreshed every 24 hours. Performance metadata is collected at a default collection interval of 5 minutes.

Use the following information to add Pure storage systems so that they can be monitored and their metadata can be collected, analyzed, and presented in the GUI. Add a Pure storage system by providing the connection information for the storage system.

Supported versions: To view the versions of Pure storage systems that are supported in IBM® Storage Insights, go to the [Pure Storage support page](#).

Antivirus software restriction: If your antivirus software is set on the maximum mode, it might prevent your Pure FlashArray//M and FlashArray//X storage systems from being added to IBM Storage Insights. For more information about how to configure your antivirus software, see [Before you begin checklist for IBM Storage Insights](#).

Add Pure FlashArray//M and FlashArray//X

When you select Pure FlashArray//M or FlashArray//X, you can add one or more storage systems by entering their connection information.

Connection details

The IP address or host name that you use to connect to the FlashArray//M or FlashArray//X storage system. Depending on what is supported in your environment, you can enter an Internet Protocol version 4 (IPv4) or IPv6 address. If you enter an IPv6 address, the preferred representation is written as eight groups of four hexadecimal digits. Example:

2001:DB95:0000:1234:0000:5678:ABCD.

Tip: You can use a comma or a space to separate IP addresses or host names.

User Name and Password

The user name and password for logging in to the storage system. The role or user group that is assigned to the user name must have the appropriate privileges to monitor the data that is collected and, if required, to change the frequency of the data collection schedules. [Learn more about the role requirements for the user name](#).

- [Planning for Pure Storage systems](#)

Pure storage resources provide block storage for organizations with network-attached storage or storage area network environments that have block-level services. IBM Storage Insights provides enhanced monitoring for Pure FlashArray//M and FlashArray//X storage systems.

Planning for Pure Storage systems

Pure storage resources provide block storage for organizations with network-attached storage or storage area network environments that have block-level services. IBM® Storage Insights provides enhanced monitoring for Pure FlashArray//M and FlashArray//X storage systems.

Pure FlashArray//M and FlashArray//X Device configuration

A Pure FlashArray//M or FlashArray//X can be added to IBM Storage Insights as a block storage system. When you add a Pure storage system, IBM Storage Insights collects data by connecting directly to the storage system.

To view the versions of Pure storage systems that are supported in IBM Storage Insights, go to the [Pure Storage support page](#).

Antivirus software restriction: If your antivirus software is set on the maximum mode, it might prevent your Pure Storage systems from being added to IBM Storage Insights. For more information about how to configure your antivirus software, see [Before you begin checklist for IBM Storage Insights](#).

Benefits

IBM Storage Insights can help you predict and prevent storage problems before they impact your business. Here are some key benefits of using IBM Storage Insights to monitor your Pure storage systems:

- View detailed information about capacity, storage usage, and performance.
- Monitor health, status, and availability.
- Use alerts and alert policies to be notified of conditions and potential problems.
- Use advanced analytics to reclaim storage.
- Create and share reports about inventory, capacity, performance, and storage consumption.

Supported features

View a detailed list of the features in IBM Storage Insights that you can use to monitor PureFlashArray//M and FlashArray//X storage systems:

Table 1. Supported features for PureFlashArray//M and FlashArray//X

Resource Monitoring	Features	Supported
Understanding the environment	Monitor storage inventory and configuration. Includes information about type, model, serial number, and firmware.	✓
	Understand storage relationships, from volume and share down to server and application.	✓
	Explore virtualization relationships.	
	Explore replication relationships.	✓
	View dashboards to get insights into key aspects of your storage at a glance and one-click access to web-based element managers.	✓
	Support for multiple protocols and storage types, such as FC, iSCSI, and NVMe.	✓
Monitoring capacity	Collect storage consumption and capacity metrics.	✓
	View data reduction information.	✓
	View copy data information.	✓
	View internal storage tiers such as Easy Tier®.	
	Monitor the storage consumed by applications.	✓
Monitoring performance	Collect performance metrics about the workload on resources.	✓
	View calculated metrics to gain insights into performance conditions.	✓
	Export performance data to a compressed file.	✓
	Drill down performance workflows to troubleshoot bottlenecks.	✓
	Compare the performance of resources.	✓
Monitoring health	Understand the health of resources.	✓
	Receive notifications when the status of a resource changes.	
	View the status of elements that are not represented as resources.	✓
Alerting	Alert on conditions within your storage environment.	✓
	Define alerts to identify issues based on multiple conditions.	✓
	Define alert policies to be notified of changes across related resources.	✓
Reporting	View predefined reports.	✓
	View chargeback and consumer reports.	✓
	Create custom reports by using the REST API.	✓
	Create rollup reports to view information across multiple servers.	✓
Analytics	Performance planning.	✓
	Capacity planning.	✓
	Business impact analysis (applications, departments, and groups).	✓
	Optimize data placement with tiering.	
	Optimize capacity with reclamation.	✓

Restrictions:

- In replication relationships, any snapshot volumes in either source or target storage systems that are not assigned to a host, are not stored in IBM Storage Insights. The volumes are listed in the Copy Data page but do not have hyperlinks.
- For asynchronous remote relationships, note the following limitations.
 - From the target storage system perspective, no details are available for the source storage system.
 - From the source storage system perspective, the remote storage systems and volumes are listed in the Copy Data page. However, the remote volumes cannot be correlated with the volumes on the source system and so do not have hyperlinks.

Metadata collection schedule

By default, asset, capacity, and configuration metadata is aggregated and collected daily. Schedule daily reports to gain insights about your Pure storage systems.

For Pure storage systems, the collection intervals for performance metadata are 5 minutes and 60 minutes. The default interval is 5 minutes.

What's next

Before you can monitor, alert, and report on your Pure storage systems, you must add them to IBM Storage Insights.

For instructions on how to add storage systems for monitoring, see [Adding storage systems](#).

Related reference

- [Performance metrics for Pure storage systems](#)
-

Adding switches and fabrics

Add Brocade and Cisco switches and fabrics so that you can detect and investigate performance issues throughout your storage environment. You can follow the trail of storage requests through the components in the SAN fabric to the target storage systems.

Before you begin

Keep in the mind the following requirements before you add switches and fabrics for monitoring:

- You must have the administrator role in IBM® Storage Insights. For more information about roles, see [Adding and removing users](#).
- You must add the IP address or switch name and credentials for all the chassis that host the switches in the fabric. If other chassis in the same fabric has the same username, password, protocol, and port they can be added automatically. Switches that are added automatically that do not have the supported firmware or that have different credentials are set to condition 'Not Monitored'.
Note: NPV mode switch chassis are not part of a fabric and must be added individually.

For more information about the requirements for adding Brocade and Cisco switches and fabrics, see the corresponding planning topics.

- [**Planning for Brocade switches and fabrics**](#)

Make it easy for IBM Storage Insights to monitor your Brocade switches and fabrics.

- [**Adding Brocade switches and fabrics**](#)

To detect, investigate, and resolve bandwidth and latency issues, monitor switches and fabrics. Key metadata is collected, analyzed, and presented in IBM Storage Insights so that you can investigate and track performance from the hosts, such as application servers, through the components of the SAN fabric to the storage systems.

- [**Planning for Cisco switches and fabrics**](#)

IBM Storage Insights uses NX-API to manage Cisco switches and fabrics.

- [**Adding Cisco switches and fabrics**](#)

To detect, investigate, and resolve bandwidth and latency issues, monitor the switches and fabrics in your storage environment. Key metadata is collected, analyzed, and presented in IBM Storage Insights so that you can investigate and track performance from the hosts, such as application servers, through the components of the SAN fabric to the storage systems.

- [**Removing chassis, switches, and fabrics**](#)

Remove switches, fabrics, or chassis that you no longer want to monitor with IBM Storage Insights.

Planning for Brocade switches and fabrics

Make it easy for IBM® Storage Insights to monitor your Brocade switches and fabrics.

Supported switches and fabrics

IBM Storage Insights can monitor Brocade fabrics and switches with the following Fabric operation system (FOS):

- 8.2.1 or later, up to 8.2.3
- 9.0.0 or later

For a complete list of the switches that are supported, see <https://www.ibm.com/support/pages/node/6465529>.

Connection credentials for monitoring Brocade switches and fabrics

To add Brocade switches and fabrics, you must provide the username and password of a user or admin account with chassis-role permission so that IBM Storage Insights can collect and analyze the following metadata:

- Performance metadata
- Asset, configuration, and status metadata

Tip: To help IBM Support troubleshoot data collection, performance, and other issues, create a dedicated user account for collecting metadata from switches. When the switches are added, you can also provide location information for the switches.

Requirements for collecting switch and fabric events

To show the events in IBM Storage Insights that are reported for the switches and fabrics, MAPS must be activated with a Fabrics Vision license. The active policy for the switch must be set to a policy other than the default active policy, which is `dflt_base_policy`.

Learn more: Go to <https://www.broadcom.com/>. Search for "Brocade Monitoring and Alerting Policy Suite Configuration Guide", and read the "Setting the active MAPS policy to a default policy" topic.

- [Configuring Brocade switches for monitoring](#)

Configure Brocade switches for monitoring through a direct connection. IBM Storage Insights establishes this connection by using the Brocade REST API and requires Fabric OS 8.2.1 or later.

Configuring Brocade switches for monitoring

Configure Brocade switches for monitoring through a direct connection. IBM® Storage Insights establishes this connection by using the Brocade REST API and requires Fabric OS 8.2.1 or later.

About this task

Before you add a Brocade switch for monitoring in IBM Storage Insights, you must configure it for HTTPS and set up the proper user role.

Procedure

1. To enhance security, configure a switch for HTTPS. This action disables HTTP access.

Option 1

Create a self-signed HTTPS certificate by using the `seccertmgmt generate` command.

```
seccertmgmt generate -cert [https | extn -keypair_tag keypair_tag] [-type [rsa | dsa | ecdsa]] [-keysize value] [-hash type] [-years value] [-f]
```

For example:

```
switch:admin> seccertmgmt generate -cert https
```

Option 2

Upload a CA-signed certificate by using the `seccertmgmt import` command.

```
seccertmgmt import -cert [fcap | commoncert | https | radius | ldap | syslog | extn -keypair_tag keypair_tag | mgmtip] -protocol [scp | ftp]-ipaddr IP_address -remotedir remote_directory-certname certificate_name-cacert preimported_local_ca_cert-login login_name -password password
```

For more information, see [Brocade® Fabric OS® Command Reference Manual, 8.2.x](#).

2. Configure a user with required roles for the switches.

a. To collect metadata about a switch, IBM Storage Insights requires a user account with "user" or "admin" role. If the switch is virtualized, the user must also have a "user" or "admin" role for the chassis and have access to all the Logical Fabric IDs 1 - 128.

b. To create a user with the required roles, run one of the following commands.

- For virtualized switches, run the `userconfig --add` command with the `-r role`, `-l LF_ID_LIST`, and `-c chassis_role` options.

```
virtualizedswitch:admin> userconfig --add user_name -r user -l 1 1-128 -c user -p MyPassword
```

- For non-virtualized switches, run the `userconfig --add` command with the `-r role` option.

```
physicalswitch:admin> userconfig --add user_name -r user -p MyPassword
```

c. To change the role for an existing user, run one of the following commands.

- For virtualized switches, run the **userconfig --change** command with the **-r**, **-l**, or **-c** options along with the **userconfig --addlf** command to expand the list of Logical Fabric IDs.

For example, run the following command to change the chassis role and the list of Logical Fabric IDs that the user is allowed to access.

```
virtualizedswitch:admin> userconfig --change user_name -c admin -l 1 128  
virtualizedswitch:admin> userconfig --addlf user_name -c admin -l 1-128
```

- For non-virtualized switches, run the **userconfig --change** command with the **-r** option.

```
physicalswitch:admin> userconfig--change user_name -r admin
```

d. To verify the roles, run the **userconfig --show** command. Add the **-a** option to list all users on the switch.

Adding Brocade switches and fabrics

To detect, investigate, and resolve bandwidth and latency issues, monitor switches and fabrics. Key metadata is collected, analyzed, and presented in IBM® Storage Insights so that you can investigate and track performance from the hosts, such as application servers, through the components of the SAN fabric to the storage systems.

Before you begin

To collect metadata from fabrics, switches, and storage systems, you deploy data collectors. If you deployed data collectors to collect metadata from your storage systems, these data collectors can also collect fabric and switch metadata. You can also deploy more data collectors to distribute and optimize the collection workload.

Keep in the mind the following requirements before you add Brocade switches and fabrics for monitoring:

- You must have the administrator role in IBM Storage Insights. For more information about roles, see [Adding and removing users](#).
- You must add the IP address or switch name and credentials for all the chassis that host the switches in the fabric. If other chassis in the same fabric has the same username, password, protocol, and port they can be added automatically. Switches that are added automatically that do not have the supported firmware or that have different credentials are set to condition ‘Not Monitored’.

Note: NPV mode switch chassis are not part of a fabric and must be added individually.

About this task

When you add switches, asset, configuration, and performance metadata is collected, analyzed, and shown in the IBM Storage Insights. If the switch belongs to a fabric, inventory and configuration metadata about the fabrics is also collected, analyzed, and shown in IBM Storage Insights.

You can add one or more switches. To add multiple switches, the switches must share the same authentication credentials.

Figure 1. Workflow for adding switches and fabrics

Adding Brocade switches and fabrics



Add connection details

To add switches and fabrics, you must know:

- The host names or the IPv4 or IPv6 addresses of the switches
- The user name and password of a user with a user or admin account with chassis-role privileges to connect to and collect metadata from the switches and fabrics.
- To help IBM Support investigate issues, create a dedicated user account to connect to the switches that you want to monitor.



Connect to the switches

When you add the connection details for the switches, a task is created to connect to the switches.

- You can click this icon on the menu bar to check the progress of the task.
- When a switch can't be added, you can click this icon on the menu bar to modify the connection details and try again, or you can clear the task from the list.



Information collection and analysis

Information is automatically collected for the switches and the fabrics that the switches are assigned to.

- Configuration and status information is immediately collected, and refreshed every 24 hours.
- Performance information is immediately collected, and refreshed every 5 minutes.
- Switch and fabric events are reported when changes occur in the SAN fabric.

Procedure

1. From the Resources menu, click Switches and then click Add Switch or click Fabrics and then click Add Fabric.
2. Click Brocade and specify the connection information.
To connect and collect metadata for the switches and fabrics, you must have a user or admin account with chassis-role privileges.

Results

Inventory, configuration, and, performance metadata is collected and analyzed for the switches and inventory and configuration metadata is collected and analyzed for the fabrics that the switches belong to. If a switch is configured as a virtual or logical switch, metadata is also collected about these switches and their associated virtual fabrics.

What to do next

When Brocade switches are added, other switches in the same fabric are discovered. If the discovered switches have the same authentication credentials as the switches that were added, they are automatically added for monitoring. If the switches do not have the same authentication credentials, you must configure them for data collection.

To identify and configure the switches for data collection, complete these steps:

1. Click Resources and then click Switches.
2. Select the Chassis tab.
3. Select the Brocade switch or switches that have the same authentication credentials and perform the Configure Data Collection action.

Related tasks

- [Downloading and installing data collectors](#)

Related information

-  [Supported switches](#)
-

Planning for Cisco switches and fabrics

IBM® Storage Insights uses NX-API to manage Cisco switches and fabrics.

Supported switches and fabrics

You must have NX-OS Release 8.4(x) and must enable NX-API on your MDS Cisco switches before you can add them for monitoring in IBM Storage Insights.

Monitoring limitations:

- The following Cisco switches are not supported for monitoring at this time:
 - Switches that run NX-OS Release 8.5
 - Nexus family switches
 - Switches with the following SAN Extension module installed: DS-X9334-K9. To view the installed modules, use the `show mod` command on the switch CLI.
- You can't monitor the IP storage modules (ethernet ports) or the Fibre Channel over IP (FCIP) tunnels on Cisco switches.

For a complete list of the switches that are supported, see <https://www.ibm.com/support/pages/node/6465529>.

Connection credentials for monitoring Cisco switches and fabrics

To add Cisco switches and fabrics, you must provide the username and password of a user with the network-admin role or network-operator role so that IBM Storage Insights can collect and analyze the following metadata:

- Performance metadata
- Asset, configuration, and status metadata

Tip: To help IBM Support troubleshoot data collection, performance, and other issues, create a dedicated user account for collecting metadata from switches. When the switches are added, you can also provide location information for the switches.

Entering configuration mode

To run commands that change switch configuration settings, you must enter configuration mode on the switch. Use the terminal as the source of commands. To enter configuration mode, run the following command:

```
switch_name# configure terminal
```

After you run this command, the prompt will include "**(config)**" to indicate that you are in configuration mode:

```
switch_name(config)#
```

Important: Users with the Network-admin role can run the commands that are listed here excluding the text (config), without entering configuration mode.

Configuring message severity levels for event processing

For IBM Storage Insights to process events from Cisco switches, you must configure the log message severity levels of the syslog messages for the switches.

You can configure the message severity levels for a switch by using either of the following methods:

- Use the Device Manager, which is one of the Cisco Fabric Manager applications.
- Use the CLI for a switch.

Using the Device Manager

To configure the message severity levels of a switch by using the Device Manager, complete the following steps:

1. In Device Manager, click Logs > Syslog > Setup.
2. In the Switch Logging tab, select the following options:
 - TerminalEnable

- LineCardEnable
3. Select the following message severity levels:

Table 1.

Message Severity	Level
TerminalMsgSeverity	notice(6)
LinecardMsgSeverity	info(7)
LogFileMsgSeverity	info(7)

4. Click Apply.

Using the CLI

To configure the message severity levels of a switch by using the CLI, complete the following steps:

1. Access the CLI of the switch through SSH.
2. Run the following command:

```
switch_name# show logging
```

The output of the command includes the following information:

```
Logging logfile:           enabled
logfile-name: Severity - debugging Size - #####
```

Where *logfile-name* represents the name of the log file.

3. Run the following commands:

```
switch# configure terminal
switch(config)# logging monitor 6
switch(config)# logging module 7
switch(config)# logging logfile logfile-name 7
switch(config)# exit
switch# copy run start
```

Where *logfile-name* is the name of the log file from step 2.

Enabling NX-API and HTTPS

1. To verify that the switch uses NX-OS Release 8.4(1) or later, run the following command:

```
switch_name# show version
```

Important: If the NX-OS Release is less than 8.4(1), you must upgrade the NX-OS to Release 8.4(1) or later to add the switch.

2. To verify that NX-API is enabled, run the following command:

```
switch_name# show feature | grep nxapi
```

- If NX-API is enabled, the following text is displayed:

```
nxapi 1 enabled
```

- If NX-API is disabled, run the following command to enable it:

```
switch_name# configure terminal
switch_name(config)# feature nxapi
```

3. To view the details of the NX-API configuration, including NX-API status, ports, and the HTTPS certificate, run the following command:

```
switch_name# show nxapi
```

The output includes the following key information:

NX-API: Enabled

You can also confirm the same by running the command in step 2.

HTTP Port: Disabled

HTTP is disabled by default. If you must enable HTTP due to internal requirements, run the following command:

```
switch_name(config)# nxapi http port 8080
```

To disable the HTTP again, run the following command:

```
switch_name(config)# no nxapi http
```

HTTPS Port: 8443

When you enable NX-API, HTTPS is enabled automatically with a self-signed certificate that expires after one day. By default, HTTPS is configured to use port 8443.

If port 8443 is not configured on the switch, run the following command:

```
switch_name(config)# nxapi https port 8443
```

To use a port other than 8443, substitute a different port number in the command.

Remember: If the Cisco chassis is configured to run NX-API with HTTPS on port 443, it creates a conflict with the web server that runs on the same port. So, do not use the port 443. Use another unused port number.

SSH Certificate Information:

SSH certificate includes an expiration date and the certificate content.

Security

From Cisco NX-OS Release 8.4(x), when NX-API is enabled over HTTPS, a self signed certificate is created that expires after 24 hours. If you use expired certificate, the browser displays a warning about security vulnerabilities. It is recommended to use a valid certificate from a certificate authority to minimize the security threats. For more information on how to get the valid certificate and import on the switch, see the [Configuring Certificate Authorities and Digital Certificates](#) section in the Cisco MDS 9000 Series Security Configuration Guide, Release 8.x.

Saving NX-API configuration changes

After you make changes to the running NX-API configuration, you must save the configuration of the switch to the startup configuration so that the changes persist after the switch is rebooted. You can save the configuration from outside the configure terminal.

Run the following command to save the current configuration to be used when the switch is restarted:

```
switch_name# copy running-config startup-config
```

Other useful NX-API commands

Other NX-API commands that might be useful are listed in the following table.

Table 2. Other NX-API commands

Command Description	Commands
Show whether HTTPS is enabled.	<code>switch_name# show nxapi grep -i https</code>
Configure the switch to use a port other than 8443 with HTTPS. Restriction: Don't use port 443 because this port is already used by the web UI of the switch.	<code>switch_name(config)# nxapi https port port_number</code>
Create a user with network-operator role.	<code>switch_name (config)# username myoperator password user_password role network-operator</code>
Disable HTTP access.	<code>switch_name(config)# no nxapi http</code>

Adding Cisco switches and fabrics

To detect, investigate, and resolve bandwidth and latency issues, monitor the switches and fabrics in your storage environment. Key metadata is collected, analyzed, and presented in IBM® Storage Insights so that you can investigate and track performance from the hosts, such as application servers, through the components of the SAN fabric to the storage systems.

Before you begin

To collect metadata from fabrics, switches, and storage systems, you must deploy data collectors. If you deployed data collectors to collect metadata from storage systems, these data collectors can also be used to collect fabric and switch metadata. Alternatively, you can deploy more data collectors to optimize the data collection workload.

Keep in the mind the following requirements before you add Cisco switches and fabrics for monitoring:

- You must have the administrator role in IBM Storage Insights. For more information about roles, see [Adding and removing users](#).

- You must add the IP address or switch name and credentials for all the chassis that host the switches in the fabric. If other chassis in the same fabric has the same username, password, protocol, and port they can be added automatically. Switches that are added automatically that do not have the supported firmware or that have different credentials are set to condition ‘Not Monitored’. Note: NPV mode switch chassis are not part of a fabric and must be added individually.

About this task

When you add switches, asset, configuration, and performance metadata is collected, analyzed, and shown in IBM Storage Insights. If the switch belongs to a fabric, inventory and configuration metadata about the fabrics is also collected, analyzed, and shown in IBM Storage Insights.

You can add one or more switches at the same time. When you add multiple switches, the switches must have the same authentication credentials.

Adding Cisco switches and fabrics

Add connection details

To add switches and fabrics, you must know:

- The host names or the IPv4 or IPv6 addresses of the switches
- The user name and password of a user with network-admin privileges to connect to and collect metadata from the switches and fabrics.

 To help IBM Support investigate issues, create a dedicated user account to connect to the switches that you want to monitor.

Connect to the switches

When you add the connection details for the switches, a task is created to connect to the switches.

-  You can click this icon on the menu bar to check the progress of the task.
-  When a switch can't be added, you can click this icon on the menu bar to modify the connection details and try again, or you can clear the task from the list.

Information collection and analysis

Information is automatically collected for the switches and the fabrics that the switches are assigned to.

-  Configuration and status information is immediately collected, and refreshed every 24 hours.
-  Performance information is immediately collected, and refreshed every 5 minutes.
-  Switch and fabric events are reported when changes occur in the SAN fabric.

Procedure

1. From the Resources menu, click Switches and then click Add Switch or click Fabrics and then click Add Fabric.
2. Click Cisco and specify the connection information.
To connect and collect metadata for the switches and fabrics, you must have network-admin privileges.

Results

Inventory, configuration, and, performance metadata is collected and analyzed for the switches and inventory and configuration metadata is collected and analyzed for the fabrics that the switches belong to. If a switch is configured as a virtual or logical switch, metadata is also collected about these switches and their associated virtual fabrics.

What to do next

When Cisco switches are added, other switches in the same fabric are discovered. If the discovered switches have the same authentication credentials as the switches that were added, they are automatically added for monitoring. If the switches do not have the same authentication credentials, you must configure them for data collection.

To identify and configure the switches for data collection, complete these steps:

1. Click Resources and then click Switches.
2. Select the Chassis tab.
3. Select the Cisco switch or switches that have the same authentication credentials and perform the Configure Data Collection action.

Related tasks

- [Downloading and installing data collectors](#)

Related information

-  [Supported switches](#)

Removing chassis, switches, and fabrics

Remove switches, fabrics, or chassis that you no longer want to monitor with IBM® Storage Insights.

About this task

To prevent rediscovery of switches and fabrics to be removed, all of the related chassis must be removed. Because of the inter-dependencies between switches, chassis and fabrics, determining the set of resources that must be removed is an iterative process. Follow the procedure to remove the switches from IBM Storage Insights.

Procedure

1. On Resources  Switches, go to the Chassis tab and select all chassis that you want to stop monitoring. Right-click the selected chassis and select Remove.
2. Go to the Switches tab and select all the switches that were associated with the removed chassis. Right-click the selected switches and select Remove.
3. Go to the Resources  Fabrics and select all the fabrics that were associated with the removed switches. Right-click the selected fabrics and select Remove.

Adding servers

IBM® Storage Insights Pro creates and updates agentless servers automatically after it probes storage systems. It uses information about host connections on storage systems to create the agentless servers. It doesn't monitor direct-attached storage (DAS) or local disks on servers.

IBM Storage Insights Pro only: You subscribe to IBM Storage Insights Pro to monitor agentless servers. This functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

Depending on your storage environment, IBM Storage Insights Pro might not model all of the servers in your environment correctly. For example, IBM Storage Insights Pro might identify six host connections and create an agentless server for each host connection. However, in your environment, these six host connections represent one server computer. In this case, you need to merge the six agentless servers into one agentless server.

Similarly, IBM Storage Insights Pro might create a single agentless server from a group of host connections that appear to be related. However, in your environment, each of these host connections represents a separate server computer. In this case, you can separate the agentless server into multiple agentless servers, one for each of the servers in your environment.

Important: IBM Storage Insights Pro doesn't monitor the direct-attached storage (DAS) or local disks on servers. Instead, it displays information about the host connections on monitored storage systems, where each connection is automatically added as an agentless server.

Managing alert conditions and notification settings

When IBM Storage Insights Pro creates agentless servers, the servers are not added automatically to a default alert policy. You can create an alert policy to manage the alert definitions and notification settings for the agentless servers in one place.

You can also create an alert policy from the alert definitions and notification settings of a server. Click Resources > Servers. Right-click the server from which you want to create an alert policy, and then click View Alert Definitions. Click Create Policy from the Policy Actions menu.

Related tasks

- [Adding storage systems](#)
 - [Creating departments](#)
 - [Creating applications](#)
-

Monitoring resources with Call Home

Call Home is a communication link between IBM® storage systems, IBM Support, and IBM Storage Insights that monitors the health and status of your storage.

Monitor storage events as they occur

Receive and view heartbeats and events about the health and status of IBM storage systems and their components, as they are detected. Call Home constantly monitors the health and status of your storage so that you and IBM Support are notified of hardware failures and potentially serious events. Be proactive in the fight against performance slowdown and unexpected downtime.

Get a direct line to IBM Support for proactive, fast resolution of problems

Upon detection of any hardware or software error code, IBM Support is notified via e-mail, through a specified SMTP gateway. If IBM Support determines that the detected event requires service or further investigation, a new problem ticket (PMR or PMH) is created and sent to the appropriate IBM Support team. Proactive support minimizes the number of interaction cycles between you and IBM Support.

Spend less time on troubleshooting and increase operational efficiency

The availability and performance of storage systems is critical to ensuring that your applications remain online and their services are uninterrupted. Call Home can help you and IBM Support to identify where these problems are occurring, and in some cases, detect them before they occur. Use the enhanced capabilities of IBM Storage Insights Pro with Call Home to easily discover the root cause of problems by following the trail of evidence from storage system to port number.

- [**Enabling Call Home**](#)
When enabled for IBM block storage systems, the Call Home feature alerts you and IBM Support about hardware failures and potentially serious configuration or environmental events. Call Home constantly monitors the health and availability of your storage so that you can address issues before they impact your business.
 - [**Acknowledging Call Home events**](#)
Some Call Home events are caused by conditions that commonly occur and can be ignored. In such cases, you acknowledge those events to indicate that they were reviewed and don't require immediate resolution.
-

Enabling Call Home

When enabled for IBM® block storage systems, the Call Home feature alerts you and IBM Support about hardware failures and potentially serious configuration or environmental events. Call Home constantly monitors the health and availability of your storage so that you can address issues before they impact your business.

To stream Call Home events from your IBM block storage systems to IBM Storage Insights, complete the following steps:

1. Enable the Call Home feature on the storage systems that you want to monitor with IBM Storage Insights.
2. Add the storage systems for monitoring in IBM Storage Insights.

How to enable Call Home:

- For some storage systems, an IBM Service Representative enabled Call Home during the initial setup. If Call Home is not enabled for those storage systems, contact your representative for help.
- For other storage systems, you can manually enable Call Home at any time. To see how to enable Call Home for some storage systems, see [IBM Site assistance](#) and click Call Home Web. To view the IBM Documentation for more help about specific storage systems, check out the following instructions.

Getting more help for Call Home

There are different types of Call Home events that can occur on a device. The type of event, and the device where the event occurs, determines whether a notification is shown in IBM Storage Insights.

To learn about any special circumstances for displaying notifications and how to configure Call Home for different devices, check out the following information:

Storage system	Instructions for enabling Call Home
DS8000®	<p>Call Home is enabled during the initial setup of a DS8000 storage system by an IBM Service Representative. If Call Home is not enabled, contact your representative for help. After Call Home is enabled for a DS8000, you can receive and view its Call Home events in IBM Storage Insights.</p> <p>For more information, see the following topics:</p> <ul style="list-style-type: none"> Configuring call home settings Remote support settings DS8000 configuration worksheets <p>Important: Call Home messages for DS8000 storage systems are displayed in IBM Storage Insights when the following events occur:</p> <ul style="list-style-type: none"> A ticket is opened for a problem that is reported by a DS8000 storage system. A firmware update is recommended. Restriction: Notifications about best practices and the expiration of warranty or maintenance contracts are not available. <p>For information about the DS8000 storage systems that support Call Home, see https://www.ibm.com/support/pages/node/618573.</p>
FlashSystem V9000	<p>Call Home is typically enabled during the initial setup of a FlashSystem V9000 storage system by an IBM Service Representative. If Call Home is not enabled, contact your representative for help or manually enable Call Home.</p> <p>For help with manually enabling Call Home, see the following topics:</p> <ul style="list-style-type: none"> For general information about Call Home and event notifications, see Understanding event notifications. To configure Call Home by using the CLI, see Setting up email event notifications and inventory reports using the CLI. To view the worksheet that you must fill out in preparation to enable Call Home, see Call Home worksheet. <p>For information about the FlashSystem V9000 storage systems that are supported for monitoring, see https://www.ibm.com/support/pages/node/618523.</p>
IBM FlashSystem® 900	<p>For information on how to enable Call Home for IBM FlashSystem 900 storage systems, see Configuring Call Home, Email Alert, and Inventory IBM FlashSystem Products.</p> <p>For information about the IBM FlashSystem 900 storage systems that are supported for monitoring, see https://www.ibm.com/support/pages/node/598535.</p>
IBM FlashSystem A9000	<p>For information about how to enable Call Home for IBM FlashSystem A9000 storage systems, see the following topics:</p> <ul style="list-style-type: none"> Planning for Call Home Planning for Call Home Web Remote support and proactive support <p>For information about the IBM FlashSystem A9000 storage systems that are supported for monitoring, see https://www.ibm.com/support/pages/node/608561.</p>

Storage system	Instructions for enabling Call Home
IBM FlashSystem A9000R	<p>For information about how to enable Call Home for IBM FlashSystem A9000R storage systems, see the following topics:</p> <ul style="list-style-type: none"> • Planning for Call Home • Planning for Call Home Web • Remote support and proactive support <p>For information about the IBM FlashSystem A9000R storage systems that are supported for monitoring, see https://www.ibm.com/support/pages/node/608561.</p>
IBM Spectrum Accelerate	<p>For information about how to enable Call Home for IBM Spectrum Accelerate, see the following topics:</p> <ul style="list-style-type: none"> • Remote support and proactive support • Configuring connection to IBM Call Home Web <p>For information about the IBM Spectrum Accelerate storage systems that are supported for monitoring, see https://www.ibm.com/support/pages/node/618595.</p>
Storage systems that run IBM Spectrum Virtualize	<p>You must enable both Call Home and inventory reporting for storage systems that run IBM Spectrum Virtualize to view their Call Home events in IBM Storage Insights</p> <p>For an overview of Call Home and how to enable it for IBM Spectrum Virtualize, see IBM Spectrum Virtualize Products Call Home and Remote Support Overview.</p> <p>For information about Call Home and specific storage systems, see the following IBM Docs:</p> <ul style="list-style-type: none"> • SAN Volume Controller • Storwize® V3500 • Storwize V3700 • Storwize V5000 • Storwize V7000 • Storwize V7000 Unified (block storage) • IBM Spectrum Virtualize as Software Only • FlashSystem 5000 • FlashSystem 5100 • FlashSystem 5200 • FlashSystem 7200 • FlashSystem 9100 • FlashSystem 9200 • FlashSystem V9000 <p>Limitations:</p> <ul style="list-style-type: none"> • Call Home messages are not displayed for the Storwize family for Lenovo and other Lenovo storage devices. • Call Home messages are not yet available for IBM Spectrum Virtualize for Public Cloud.
XIV®	<p>For information on how to enable Call Home for XIV Gen3 storage systems, see the following topics:</p> <ul style="list-style-type: none"> • Call Home configuration • Remote support and proactive support <p>For information about the XIV storage systems that are supported for monitoring, see https://www.ibm.com/support/pages/node/608761.</p>

Acknowledging Call Home events

Some Call Home events are caused by conditions that commonly occur and can be ignored. In such cases, you acknowledge those events to indicate that they were reviewed and don't require immediate resolution.

About this task

Acknowledging an event marks it as acknowledged in the Notifications tab of the storage system details. If the Call Home event recurs, a new entry is displayed for it in the Notifications tab. You can also manually unacknowledge an event.

Tip: When certain Call Home issues are resolved on a storage system, the corresponding events in IBM® Storage Insights are automatically marked as acknowledged.

Procedure

To acknowledge an event, complete the following steps:

1. Choose one of the following options:
 - IBM Storage Insights Pro: Click Dashboards > Operations.
 - IBM Storage Insights: Click Dashboards.
 2. Click the storage system to view its details.
 3. Click the Notifications tab.
 4. Select the event that you want to acknowledge and click Acknowledge. The Type value is updated to Error - Acknowledged.
 5. Optional: To unacknowledge an event, select the event, and click Unacknowledge.
-

Creating applications

Monitor the capacity, space usage, and performance of storage resources in your organization by grouping storage by application and then monitoring the applications.

Before you begin

IBM Storage Insights Pro only: You must subscribe IBM® Storage Insights Pro to create applications. This advanced functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

- [**Application models**](#)
You create applications to monitor the capacity and performance of the storage resources that your critical applications use in one place.
 - [**Creating an application hierarchy**](#)
In these scenarios, you create an application hierarchy with three subcomponents so that you can monitor the application and each of the subcomponents.
 - [**Filters for associating storage resources with applications and subcomponents**](#)
To monitor the capacity, space usage, and performance of applications and subcomponents, you create filters that associate the storage resources with applications and subcomponents.
-

Application models

You create applications to monitor the capacity and performance of the storage resources that your critical applications use in one place.

To create applications, you associate storage resources with the applications that your organization uses.

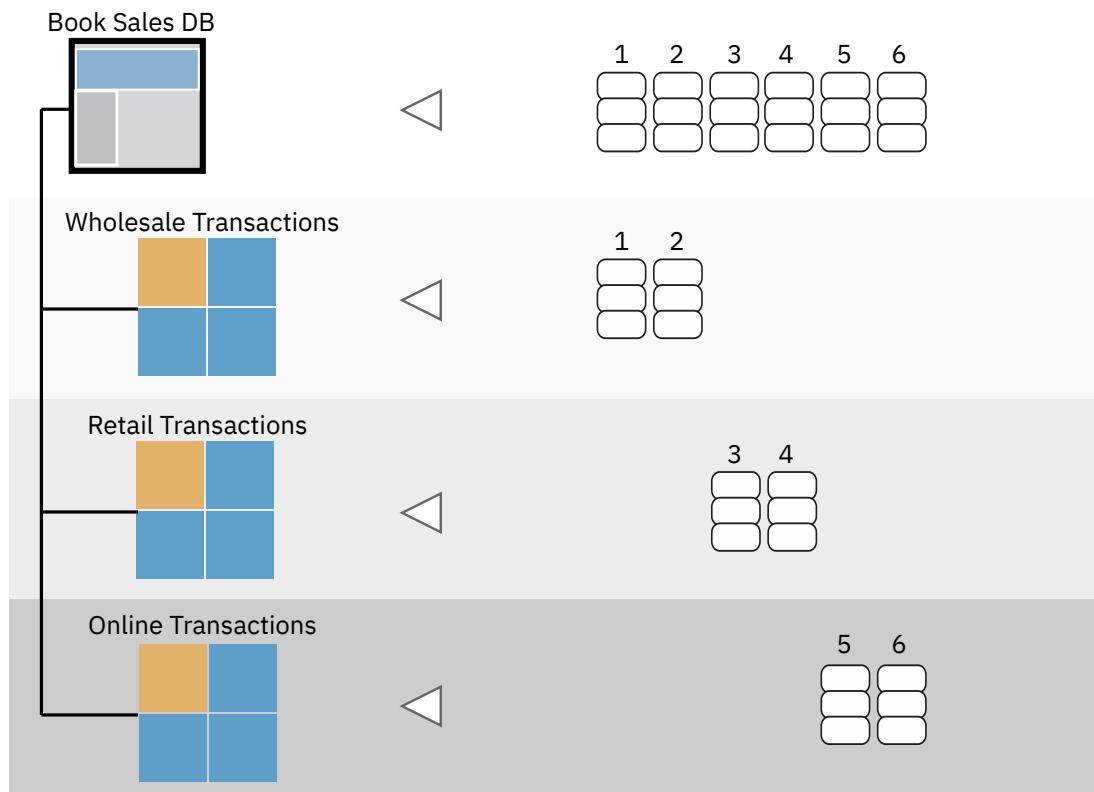
Applications comprise three elements:

- The application.
- The subcomponents of the application, which is optional.
- The filters that associate storage resources with the applications or subcomponents.

The application hierarchy determines the information that is shown about the capacity and performance of the storage resources.

For example, you can create an application with a filter that associates the application with all of the storage resources that it uses.

An application and its subcomponents

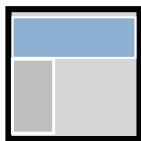


Alternatively, you can create an application hierarchy that comprises a container application and its application subcomponents. You can view the capacity, space usage, and performance of all of the storage resources that are associated with the application, which includes the application subcomponents, at the application level. You can also view the capacity, space usage, and performance of the resources that are associated with each of the subcomponents at the application subcomponent level.

When you create an application hierarchy, it is not necessary to associate storage resources with the application because the application inherits the storage resources that are associated with its subcomponents. However, if you want to monitor storage resources that are not associated with the subcomponents, you must associate the additional storage resources that you want to monitor with the application.

Categorizing applications

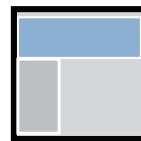
Book Sales



Type: DB Vendor

Subtype: DB Environment

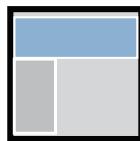
Book Marketing



Type: DB Vendor

Subtype: DB Environment

Book Stocks



Type: DB Vendor

Subtype: DB Environment

When you create applications, you can also organize and provide more information about your applications. For example, you can categorize your database applications:

- By the database vendor such as IBM®
- By the database environment such as production, preproduction, or test

You specify the categories that you want to use in the Type and Subtype fields when you create the applications.

Tip: To add categories after you create the application, go to Resources > Applications. Right-click the application, click View Properties, and then click Edit.

You can also create an application that maps the application to the departments in your organization. If you want to monitor the storage usage of a particular department, you associate the application with the department that you create. This allows you to monitor storage

usage and performance at the application level and at the department level.

Related tasks

- [How to map departments to applications](#)
-

Creating an application hierarchy

In these scenarios, you create an application hierarchy with three subcomponents so that you can monitor the application and each of the subcomponents.

1. [Creating an application](#)

When you create and associate storage resources with an application, you can monitor the capacity, space usage, and performance of the application and its subcomponents.

2. [Creating subcomponents for an application](#)

When you create and associate storage resources with subcomponents, you can monitor the capacity, space usage, and performance of each of the subcomponents.

Creating an application

When you create and associate storage resources with an application, you can monitor the capacity, space usage, and performance of the application and its subcomponents.

About this task

To create the filter for the application, you must identify the storage resources that the application uses.

In this scenario, you want to create an application that is called Book Sales DB. The Books Sales DB application uses volumes with names that begin with `bksales` that are on a Storwize® V7000 storage system.

To ensure that the filter does not retrieve storage resources that are on other servers or storage systems:

- You add the names of the volumes or a pattern that matches the names of the volumes.
- You add the name of the storage system or a pattern that matches the name of the storage system.

Procedure

1. From the Groups menu, click Applications.
2. Click Create Application.
3. Enter the information about the application that you want to create, and click Create.
4. On the Select a Method page, click Assign storage resources to the application.
5. On the Select a Resource Type page, click A selection of volumes that match a pattern.
6. Type the pattern that matches the names of the volumes that the application uses for storage.
For example, to associate the volumes that the application for the Books Sales DB uses, you type `bksales_ws*`.
7. Click Belonging to and then click Storage System.
8. Type the name of the storage system or the pattern that matches the name of the storage system.
9. To check that the filter retrieves the correct storage resources, click Preview.
If you want to change the filter, click Close and make your changes.
10. Click Save.

Results

You can now view information about the capacity, space usage, and performance of the storage resources on the Overview page for the application.

Next topic: [Creating subcomponents for an application](#)

Creating subcomponents for an application

When you create and associate storage resources with subcomponents, you can monitor the capacity, space usage, and performance of each of the subcomponents.

About this task

To create the filters for the subcomponents, you must identify the storage resources that the subcomponents use.

In this scenario, you want to add the following subcomponents to the application for the Book Sales DB:

- Wholesale Transactions. Volumes with names that begin with `bksales_ws` are used to store data for wholesale transactions.
- Retail Transactions. Volumes with names that begin with `bksales_rt` are used to store data for retail transactions.
- Online Transactions. Volumes with names that begin with `bksales_ol` are used to store data for online transactions.

Procedure

For each subcomponent that you want to create, complete these steps:

1. From the Groups menu, click Applications.
2. Right-click the application, and click View Details.
3. In the navigation pane, click Subcomponents and then click Create Subcomponent.
4. Enter the information about the subcomponent that you want to create, and click Create.
5. Right-click the subcomponent that you created, and click View Details.
6. In the navigation pane, click Filters and then click A selection of volumes that match a pattern.
7. Type the pattern that matches the names of the volumes that the subcomponent uses for storage.
For example, for the Wholesale Transactions subcomponent, you type `bksales_ws*`.
8. Click Belonging to and then click Storage System.
9. Type the name of the storage system or the pattern that matches the name of the storage system.
10. To check that the filter retrieves the correct storage resources, click Preview.
If you want to change the filter, click Close and make your changes.
11. Click Save.

Results

You can now view information about the capacity, space usage, and performance of the storage resources for each of the subcomponents on the Overview page for the subcomponent.

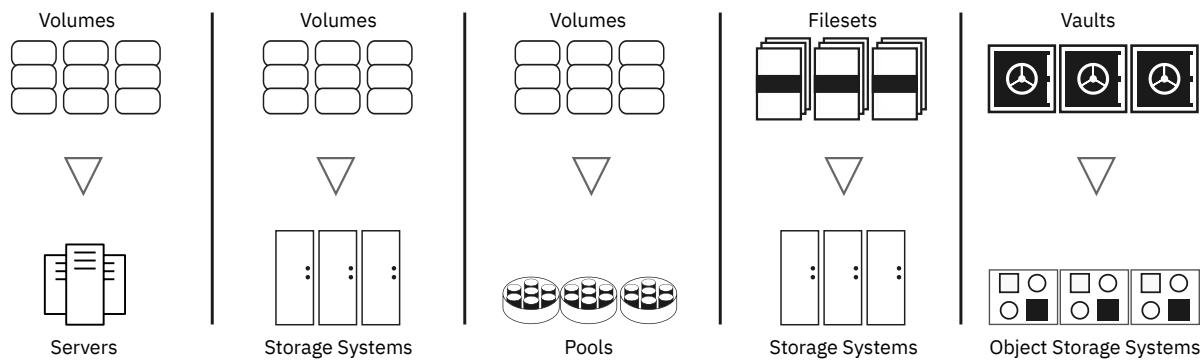
[Previous topic: Creating an application](#)

Filters for associating storage resources with applications and subcomponents

To monitor the capacity, space usage, and performance of applications and subcomponents, you create filters that associate the storage resources with applications and subcomponents.

Storage resources for applications and subcomponents

Filters for applications and subcomponents



You can associate the following resources with applications and subcomponents:

Table 1. Resources that can be associated with applications and subcomponents. The resources that be associated with an application.

Resources	Description
Volumes on servers	All of the volumes on one or more servers, or the volumes that match a pattern on one or more servers.
Volumes on storage systems	All of the volumes on one or more storage systems, or the volumes that match a pattern on one or more storage systems.
Volumes in pools	All of the volumes in one or more pools, or the volumes that match a pattern in one or more pools.
Filesets on storage systems	All of the filesets in one or more storage systems, or the filesets that match a pattern in one or more storage systems.
Vaults in object storage systems	All of the vaults in one or more object storage systems, or the vaults that match a pattern in one or more object storage systems.

Explicit and in-explicit referencing in filters

You can use explicit or in-explicit referencing in filters to associate storage resources with applications or subcomponents. With explicit referencing, you provide a comma-separated list of the names of the storage resources. With in-explicit referencing, you create naming patterns that match the names of the storage resources. If you want to add more than one naming pattern, you create a comma-separated list.

Tip: Instead of using filters to add storage resources to applications, you can right-click one or more storage resources and add them directly to the application or the subcomponent that you created. To complete this action, you right-click the storage system on the Storage Systems page, click View Details, and then open the page for the internal resource. You can also use the same procedure to remove storage resources from applications or subcomponents.

To create naming patterns, you can use the asterisk (*) and the question mark (?) wildcard characters. The asterisk represents a series of characters and the question mark represents a single character.

If you want to associate storage resources that begin with or end with the same series of characters to a filter, you use the asterisk. For example, you want to associate all volumes with names that begin with sales to an application. In this case, you type sales* as the naming pattern to associate the volumes with the filter.

If you want to associate storage resources that have names that match the following naming pattern, you use one or more question marks:

- One or more parts of the names are constant such as the beginning and end of the following server names:
 - sales.cn.abc.com
 - sales.uk.abc.com
 - sales.us.abc.com
- One or more characters that are not at the beginning or at the end of the name varies such as cn, uk, and us:
 - sales.cn.abc.com
 - sales.uk.abc.com
 - sales.us.abc.com

In this case, you type sales.?.?.abc.com as the naming pattern to associate the storage resources on the servers with the filter.

The advantage of in-explicit referencing is that you don't need to update the filter when storage resources are made available to applications and subcomponents or removed from applications and subcomponents. For example, you use a naming pattern to associate all volumes

with names that begin with `bksales_o1*` to a subcomponent. When you create new volumes with names that begin with `bksales_o1`, they are associated dynamically with the subcomponent.

However, if you use explicit referencing, you must update the filter in the following circumstances:

- When new storage resources become available for the application or subcomponent.
- When existing storage resources are no longer available for the application or subcomponent.

For example, you add the following list of volumes to associate volumes with a subcomponent:

`bksales_o1_1,bksales_o1_2,bksales_o12`. When you create new volumes that you want to associate with the subcomponent, such as `bksales_o1_4`, you must update the filter manually.

Related reference

- [Administering applications](#)
-

Creating departments

To monitor the capacity and space usage of departments and the performance of the applications that departments use, you create models of the departments in your organization.

Before you begin

IBM Storage Insights Pro only: You must subscribe to IBM® Storage Insights Pro to create departments. This advanced functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

- **[Department models](#)**

You create departments to see the storage resources that your departments use.

- **[Creating a department hierarchy](#)**

In these scenarios, you want to create a department hierarchy and associate applications with the department hierarchy to monitor the capacity and space usage of the department. You can also monitor the performance of the storage resources that are associated with the applications that you add to the department hierarchy.

Related concepts

- [Department models](#)
-

Related tasks

- [Modifying applications and departments](#)
 - [Creating applications](#)
-

Department models

You create departments to see the storage resources that your departments use.

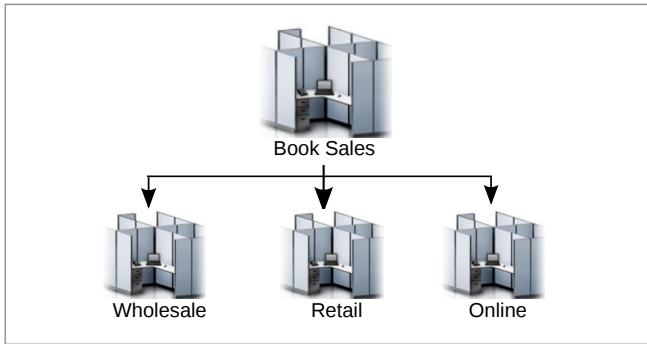
To monitor the capacity of departments, you create departments and then map the departments to the applications that they use.

Departments comprise three elements:

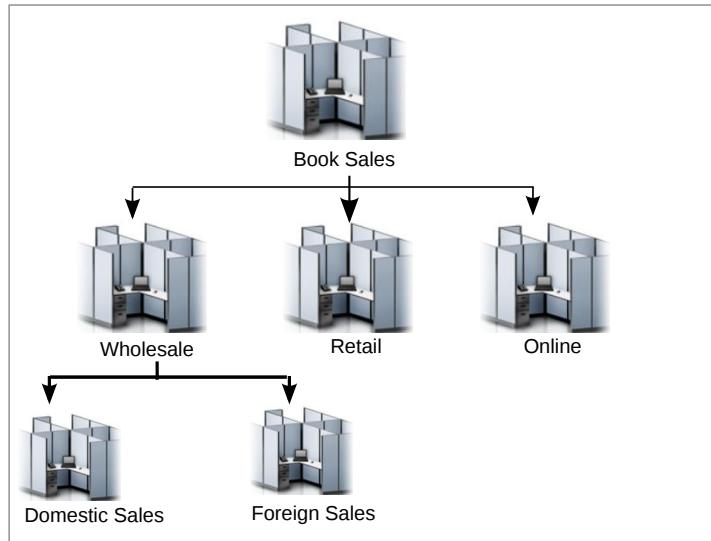
- The department
- The subdepartments that the department contains (optional)
- The application that the department uses

The department hierarchy that you create determines how you can view the capacity and the storage information that the department uses.

For example, to view the total capacity and space usage of a department, you create a department and map the applications to the department.



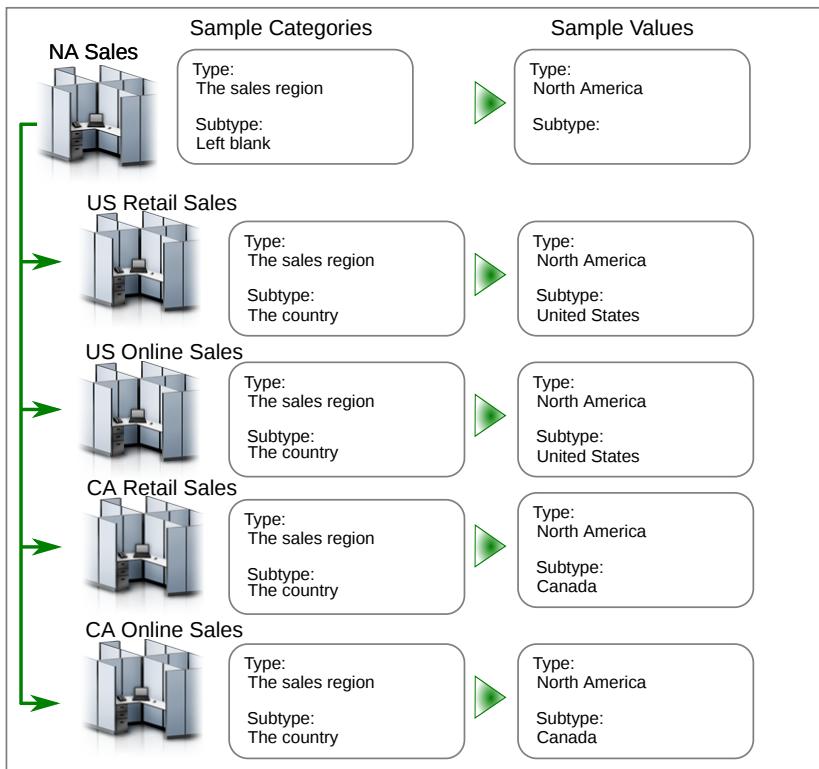
If, however, you want to view the total capacity and space usage for the department and the capacity and space usage for each of its subdepartments, you create a department hierarchy by adding subdepartments to departments. You then map the applications that each subdepartment uses to the subdepartments.



In the illustration, the department hierarchy is extended to include one more layer of subdepartments under the Wholesale subdepartment.

When you create departments, you can also organize and provide more information about your departments. For example, you can categorize your sales departments:

- By sales region such as North America
- By country such as US or Canada



In this example, the NA Sales Department is a container department that has four subdepartments. In the Type and Subtype fields, you specify the sales region and country for each of the subdepartments. On the Subdepartments page, you can filter all of the subdepartments that you created by the Type or Subtype fields.

You map the container department to the application that contains all of the storage resources that the departments for sales in North America use. You map the subdepartments to the applications that contain the storage resources that each subdepartment uses.

Tip: To add categories after you create the application, go to Resources > Departments. Right-click the department, click View Properties, and then click Edit.

Related tasks

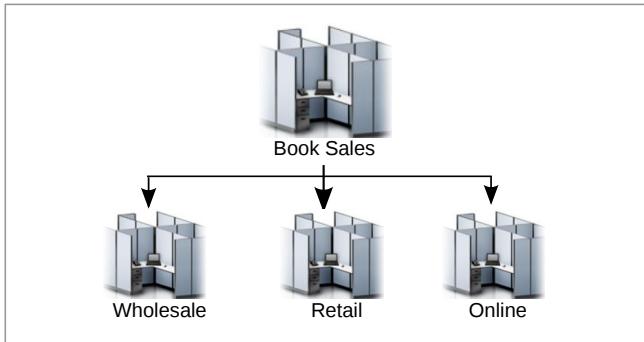
- [Creating a department hierarchy](#)

Creating a department hierarchy

In these scenarios, you want to create a department hierarchy and associate applications with the department hierarchy to monitor the capacity and space usage of the department. You can also monitor the performance of the storage resources that are associated with the applications that you add to the department hierarchy.

About this task

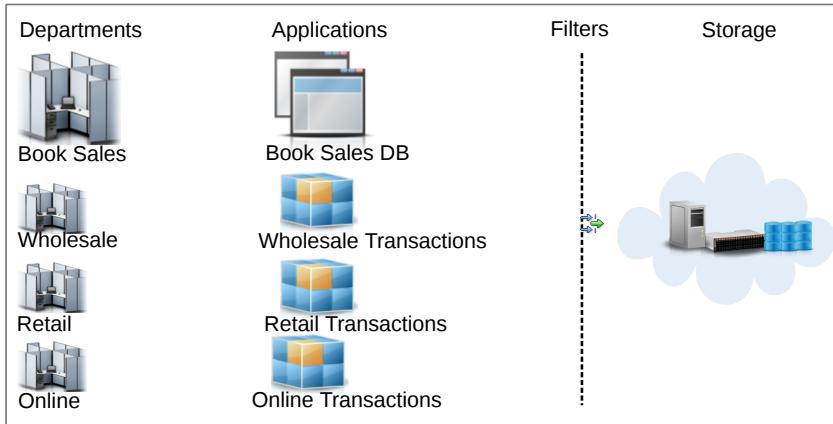
You want to monitor the capacity and space usage of departments in an organization that sells books. You also want to monitor the performance of the storage resources that are associated with the applications or application subcomponents that you add to the departments.



The sales department of the organization, Book Sales, has three subdepartments:

- Wholesale
- Retail
- Online

Although you can add applications and application subcomponents when you create departments, it is easier and quicker to create the applications and application subcomponents beforehand.



When you create the department hierarchy and add the applications and subcomponents, you can view the information that is collected on the Departments page and the Subdepartments page.

[1. Creating departments and adding applications to departments](#)

In this scenario, you create the departments and then add the applications to the departments.

[2. Adding departments as subdepartments to departments](#)

In this scenario, you create the subdepartments by adding the Wholesale, Retail, and Online departments as subdepartments to the Book Sales department.

Creating departments and adding applications to departments

In this scenario, you create the departments and then add the applications to the departments.

Before you begin

You created the application and application subcomponents that you want to add to the department and the subdepartments.

Procedure

Repeat the following steps for each department that you want to create:

1. From the Groups menu, click Departments.
2. Click Create Department.
3. Enter the information about the department that you want to create.
4. Click Create.
5. Click Add a set of applications.

6. Select the applications, application subcomponents, or both that the department uses.
7. Click Finish.

Results

Information about the departments that you added is shown on the Departments page.

Next topic: [Adding departments as subdepartments to departments](#)

Related concepts

- [Department models](#)

Related tasks

- [Creating departments](#)
- [Creating applications](#)
- [Modifying applications and departments](#)

Related reference

- [Administering departments](#)

Adding departments as subdepartments to departments

In this scenario, you create the subdepartments by adding the Wholesale, Retail, and Online departments as subdepartments to the Book Sales department.

About this task

The department that you add to another department becomes a subdepartment of the target department. For example, you created the following departments:

- The Book Sales department
- The Wholesale department
- The Retail department
- The Online department

You want to monitor the space usage for book sales and wholesale sales, retail sales, and online sales. So you add the Wholesale, Retail, and Online departments as subdepartments to the Book Sales department.

Procedure

1. From the Groups menu, click Departments.
2. Select the departments that you want to add as subdepartments.
3. Right-click, and then click Add to Department.
4. On the Add to Department page, select a department.
5. Click Save.

Results

You can now view charts and information about the capacity and space usage of the department and each of the subdepartments on the Departments page and the Subdepartments page. You can also view charts and information about the performance of the storage resources that are associated with the applications or application subcomponents that the departments and subdepartments use.

Tip: In the Subdepartments column for the department on the Departments page, the name of the subdepartment is shown. If you add two or more departments to a subdepartment, the number of subdepartments is shown. To view information about the subdepartments, click the name of the subdepartment or the number.

Previous topic: [Creating departments and adding applications to departments](#)

Related concepts

- [Department models](#)

Related tasks

- [Creating departments](#)
- [Creating applications](#)
- [Modifying applications and departments](#)

Related reference

- [Administering departments](#)

Creating general groups

Group your resources, such as the storage systems with lease agreements that end in the current year, so that you can view information about the resources at one location in the GUI.

Before you begin

IBM Storage Insights Pro only: You must subscribe to IBM® Storage Insights Pro to create general groups. This advanced functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

- [Creating a general group hierarchy](#)

Organizing resources into general groups and their subgroups can be helpful when you want to quickly view information about a group of resources, but you also want to view information about subgroups of resources within the group.

Creating a general group hierarchy

Organizing resources into general groups and their subgroups can be helpful when you want to quickly view information about a group of resources, but you also want to view information about subgroups of resources within the group.

About this task

In this scenario, you want to monitor all the ports on your SAN Volume Controller but you also want to separately monitor the following subsets of ports on the SAN Volume Controller:

- Ports that are used for inter-node communication
- Ports that are used for host I/O exchanges

To add the ports to a general group hierarchy, complete the following steps:

1. Add the ports that are used for inter-node communication to a general group, SVC Inter Node Ports.
2. Add the ports that are used for host I/O exchanges to another general group, SVC Host I/O Ports.
3. Add the groups as subgroups of a parent general group, SVC All Ports.

You can now quickly view information about the resources in the hierarchy on the details page for the general groups.

When you view the SVC Inter Node Ports or SVC Host I/O Ports groups, you see information about the specific ports that are members of that subgroup.

When you view the parent group, SVC All Ports, you see information about the ports that are members of the parent group and also the ports in the subgroups.

- [Creating general groups and adding resources](#)

When you create and associate storage resources with a general group, you can quickly view information about the group and its resources.

- [Adding general groups as subgroups](#)

When you add one or more general groups as subgroups to another general group, you can quickly view information about the resources in the group hierarchy.

Related reference

- [General group hierarchies](#)
-

Creating general groups and adding resources

When you create and associate storage resources with a general group, you can quickly view information about the group and its resources.

About this task

You can add the following resources and their internal resources to a general group:

- Storage systems
- Servers
- Other general groups

Only resources that you specifically add to a group are included as members of the group. For example, if you add a SAN Volume Controller, the internal resources of the SAN Volume Controller, such as volumes and pools, are not automatically added to the group. To add the volumes and pools, you must specifically select those resources and add them to the group.

Procedure

To create a general group and add resources to the group, complete these steps:

1. Take one of the following actions to go to the list page for the resource or group that you want to add:
 - To add top-level resources such as storage systems or servers, go to the appropriate resource page. For example, to add servers, in the menu bar, click Resources > Servers.
 - To add internal resources of top-level resources, complete the following steps:
 - Go to the resource list page for the top-level resource. For example, to add internal resources of a SAN Volume Controller, in the menu bar, click Resources > Block Storage Systems.
 - Right-click the resource and click View Details.
 - In the Internal Resources section, click the type of resource that you want to add, for example, volumes or pools.
2. Right-click one or more resources or groups and click Add to General Group.
3. Click Add to new group and specify a name and description for the new group.
4. Optional: Customize the icon for a new group by clicking the existing icon and selecting another icon.
5. Click Save.

Results

You can now quickly view information about the resources in the general group hierarchy on the details page for the general group.

Related tasks

- [Adding resources to general groups](#)

Related reference

- [Viewing and administering general groups](#)
-

Adding general groups as subgroups

When you add one or more general groups as subgroups to another general group, you can quickly view information about the resources in the group hierarchy.

Procedure

1. In the menu bar, click Groups > General Groups.
2. Right-click one or more general groups and click Add to General Group.
3. Take one of the following actions:
 - To add the groups as subgroups of existing groups, click Add to existing groups, click one or more groups in the list, and click Save.
 - To add the groups as subgroups of a new group, click Add to new group, specify a name and description for the new group, and click Save.

Related tasks

- [Adding resources to general groups](#)

Related reference

- [Viewing and administering general groups](#)
-

Viewing information about resources

Use IBM® Storage Insights to view a quick snapshot of key statistics about your resources. You can use the Resources menu to see detailed inventory information about your block storage systems and to add storage systems for monitoring. You can also see inventory information about your switches and fabrics, and add them for monitoring.

- **[Creating customized dashboards to monitor your storage](#)**

You can create dashboards to selectively monitor particular storage systems in your environment. For example, you might want a dashboard for each of your data centers that monitors all of the storage systems in the data center and another dashboard for your production systems.

- **[Viewing capacity information](#)**

You can monitor the capacity of your storage resources by viewing key metrics. For example, you can view the used capacity and available capacity of your monitored storage systems.

- **[Viewing performance information for storage systems](#)**

You can monitor the performance of your storage resources by viewing key metrics. For example, you can see charts for the response time, I/O rate, and data rate of your monitored storage systems.

- **[Viewing performance information for fabrics](#)**

You can monitor the performance of your fabrics by viewing key metrics. Use the port congestion and saturation analysis to assess performance.

- **[Removing storage systems](#)**

You can remove storage systems from your inventory of storage resources, such as storage systems your organization no longer use or ones that you do not manage.

- **[Removing enclosures and nodes](#)**

You can remove enclosures and nodes that are grouped by storage system type on the dashboard from your inventory of storage resources.

Creating customized dashboards to monitor your storage

You can create dashboards to selectively monitor particular storage systems in your environment. For example, you might want a dashboard for each of your data centers that monitors all of the storage systems in the data center and another dashboard for your production systems.

About this task

You select the storage systems you want to include in the dashboard and specify a name to create your customized dashboard.

Procedure

1. From the Custom Dashboard menu, click Create Custom Dashboard.
2. Select the storage systems, such as a SAN Volume Controller and a FlashSystem V9000, that you want to include in the new dashboard.
3. Specify a name for the dashboard, and click Create.

The dashboard view is refreshed with the new dashboard, and only the storage systems you selected are displayed.

Tips:

- To add or remove storage systems, from the Custom Dashboard menu, click Edit Dashboard.
- In a custom dashboard, if you add a storage system for monitoring and exit before the completion message is displayed, the custom dashboard will not include that storage system. After it's discovered and added for monitoring, you can view it in the All Storage Systems dashboard. To add the storage system to your custom dashboard, simply edit the dashboard.
- Any custom dashboards that you create are visible to other users of the IBM® Storage Insights instance.

Viewing capacity information

You can monitor the capacity of your storage resources by viewing key metrics. For example, you can view the used capacity and available capacity of your monitored storage systems.

About this task

Ensure that you deployed a data collector and that it can access the storage system.

Procedure

1. Choose one of the following options:
 - IBM® Storage Insights Pro: Click Dashboards > Operations.
 - IBM Storage Insights: Click Dashboards.
2. Click the storage system tile on the dashboard, for example, click a FlashSystem V9000 storage system for which the data collector is deployed.
The capacity information is displayed in the Overview page. You can see the used capacity, available capacity, and total storage system capacity. Additionally, if data is available, you can see compression savings, which is the estimated percentage of the capacity of the resource that is saved by using data compression.
Tip: On the Overview page, you can also see key performance information, such as the response time and I/O rate, for the storage system.

Viewing performance information for storage systems

You can monitor the performance of your storage resources by viewing key metrics. For example, you can see charts for the response time, I/O rate, and data rate of your monitored storage systems.

About this task

Ensure that you deployed a data collector and that it can access the storage system to collect performance metadata.

Procedure

1. Choose one of the following options:
 - IBM® Storage Insights Pro: Click Dashboards > Operations.
 - IBM Storage Insights: Click Dashboards.
2. Click the storage system tile on the dashboard, for example, click a FlashSystem V9000 storage system for which the data collector is deployed.
The performance information is displayed in the Overview page. You can see the charts for the response time, I/O rate, and data rate for the storage system for the previous 24 hours.
3. To see the read and write values for a particular time on a chart, click the pointer on the line for that time.
The values for that time are displayed on the right for each chart.

Tip: On the Overview page, you can also see key capacity information, such as the used capacity and available capacity, for the storage system.

Viewing performance information for fabrics

You can monitor the performance of your fabrics by viewing key metrics. Use the port congestion and saturation analysis to assess performance.

Before you begin

Ensure that you deployed a data collector so that fabric performance metadata can be collected.

Procedure

1. Choose one of the following options:
 - IBM® Storage Insights Pro: Click Dashboards > Operations. Then select the Fabrics dashboard from the Default Dashboards drop down.
 - IBM Storage Insights: Click Dashboards > Operations. Then select the Fabrics dashboard from the Default Dashboards drop down.
2. Click the fabric on the left, for example, click a Brocade fabric for which performance data was collected.
The performance information is displayed in the charts. You can also review hardware, logical and connectivity errors.

Removing storage systems

You can remove storage systems from your inventory of storage resources, such as storage systems your organization no longer use or ones that you do not manage.

Procedure

1. Choose one of the following options:
 - IBM® Storage Insights Pro: Click Dashboards > Operations.
 - IBM Storage Insights: Click Dashboards.
 2. From the menu on the top right of the tile for the storage system that you want to remove, such as a DS8000® storage system, click Remove.
The storage system tile is removed from the dashboard and events for that storage system are removed.
- Tip:** If you later want to monitor a storage system that you removed, click the Add Storage Systems tile on the dashboard, and add the storage system.

Removing enclosures and nodes

You can remove enclosures and nodes that are grouped by storage system type on the dashboard from your inventory of storage resources.

Procedure

1. Choose one of the following options:
 - IBM® Storage Insights Pro: Click Dashboards > Operations.
 - IBM Storage Insights: Click Dashboards.
 2. From the menu on the top right of the enclosures or nodes tile on the dashboard, such as an IBM FlashSystem® enclosures tile or a SAN Volume Controller nodes tile, click Remove.
 3. To remove all of the enclosures or nodes for the storage system type, click Remove. Alternatively, you can view the enclosures or nodes and remove specific ones from your inventory.
If you removed all of the enclosures or nodes for a storage system type, the tile is removed from the dashboard.
- Tip:** If you later want to monitor an enclosure or a node that you removed, click the Add Storage Systems tile on the dashboard, and add the storage system. If you removed several enclosures or nodes, you may have to add multiple storage systems.

Configuring

To monitor and optimize your storage resources more effectively, you can configure IBM® Storage Insights according to the standards, requirements, and best practices of your environment.

Before you begin

You must install IBM Storage Insights Pro, and you must have the prerequisite privileges to add storage resources and configure storage tiers.

About this task

The following tasks can be completed as part of the installation process or after IBM Storage Insights Pro is installed:

- [Adding storage systems](#)
- [Creating applications](#)
- [Creating departments](#)
- [Creating tiers and defining tier thresholds](#)
- **[Managing data collectors](#)**
Monitor the status of data collectors and complete administrative tasks such as deploying more data collectors, upgrading your data collectors, and assigning data collectors to monitor specific storage systems.
- **[Giving IBM Support permission to collect log packages](#)**
Give IBM Support permission to collect and upload log packages for storage systems without contacting you every time.
- **[Specifying which users are emailed about service outages](#)**
Specify the email addresses of the users that you want to notify when planned or unplanned service outages occur for your instance of IBM Storage Insights.
- **[Checking the collection of metadata for devices](#)**
Check the status of metadata collection for monitored devices. Depending on the type of device, this metadata includes performance information and configuration, capacity, and status information that is collected by probes. No application, personal, or identity information is ever collected.
- **[Assigning pools to tiers](#)**
To review the storage usage and growth of your tiered storage in one place, add your pools to tiers.
- **[Modifying applications and departments](#)**
You can modify the applications and application subcomponents and the departments and subdepartments that you create.
- **[Changing the owner of IBM Storage Insights](#)**
There might be cases where the person who is the main contact and "owns" the IBM Storage Insights service within your organization is leaving the company, moving to a different position, or needs to hand over responsibility to someone else. In these cases, you can change the main contact and owner of the service to ensure a smooth transition.
- **[Exporting information to a file](#)**
Export information from tables in IBM Storage Insights to a CSV, PDF, or HTML file.
- **[Customizing lists](#)**
Customize lists to focus on the information that is important to you. You can filter information, sort rows, and show, hide, and reorder columns in the table views for resources, alerts, events, and other objects.
- **[Modifying the properties of resources](#)**
Add or change the properties for individual resources or for multiple resources. You can use the properties to filter or sort the resources in the GUI or in an external application if the data is shared or exported.
- **[Settings for global alert notifications, outage notifications, and log permissions](#)**
Give IBM Support permission to collect and upload log packages without contacting you. You can also specify the email addresses of the users who are notified about service outages. For IBM Storage Insights Pro, configure the global alert notification settings to send notifications by email.

Managing data collectors

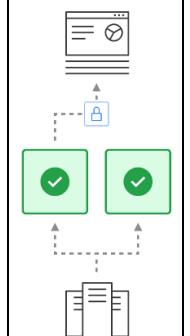
Monitor the status of data collectors and complete administrative tasks such as deploying more data collectors, upgrading your data collectors, and assigning data collectors to monitor specific storage systems.

Learn about deploying data collectors, including server requirements, deployment best practices, and key security facts:

- [What is a data collector?](#)
- [Security](#)

- [Deployment planning](#)
- [Deployment best practices](#)
- [Information on the Data Collectors page](#)

What is a data collector?

Description of data collectors	Illustration of how metadata is collected
<p>Data collectors are lightweight applications that are deployed on servers or virtual machines in your data centers. Data collectors collect capacity, configuration, and performance metadata and send the metadata for analysis over HTTPS connections to your unique instance of IBM® Storage Insights.</p> <p>In a matter of minutes, you can install the data collector and when you add the storage systems that you want to monitor, you get the capacity and performance insights that you need to monitor your data center.</p> <p>Because the metadata that IBM Support needs to investigate and close tickets is also collected, you can also upload logs automatically when you create or update tickets and IBM Support can access and investigate the metadata to resolve any issues that you might have.</p>	

Security

Protecting information about your storage is critical. The data collector initiates outbound-only connections over HTTPS to transmit metadata to your unique instance of IBM Storage Insights in the IBM Cloud data center.

The data collector collects metadata about your storage and doesn't access application, personal, or identity data.

All about security: Learn more about how data is collected, transmitted, and protected in IBM Storage Insights:

- [Understand security in 60 seconds or less](#) [PDF]
- [View the detailed security guide](#) [PDF]

Deployment planning

On the server or virtual machine, you must provide at least 1 GB of RAM and 3 GB of disk space, in addition to the disk space that is required to install the data collector. [Learn more about how disk space is used during service outages](#).

Pro Tips:

- To ensure the availability of metadata collection, deploy two or more data collectors on separate servers in each of your data centers.
- Do not install a data collector on a laptop or personal workstation. Shutting down a laptop or personal workstation or putting it into sleep mode interrupts the collection of data. The server or virtual machine where you install a data collector must be available 24x7.

You can install the data collector on the following operating systems:

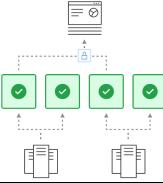
- Windows Server 2012 and later versions
 - POWER6® or later systems that use AIX® versions 7.x and later
 - Red Hat® Enterprise Linux® 7 and later versions on x86-64 only
 - CentOS Linux 7 and later versions on x86-64 only
 - Red Hat Enterprise Linux 7.x on PPC64LE (POWER8® only)
- Restriction: The data collector on Linux PPC64LE has the additional limitation that you cannot monitor FlashSystem A9000, XIV®, IBM Spectrum Accelerate, and non-IBM devices.

The firewall must be configured to allow the servers where you install the data collector to send outbound traffic on port 443 over TCP to your instance of IBM Storage Insights.

Deployment best practices

Redundancy

To make your data collection services more robust, install two or more data collectors on separate servers or virtual machines in each of your data centers.

Description of multiple data collectors	Illustration of multiple data collectors
<p>When you add storage devices, the data collectors that you deployed are tested to see whether they can communicate with those devices. If multiple data collectors can communicate with a device, then the data collector with the best response time collects the metadata. If the collection of metadata is interrupted, the data collectors are tested again and the data collectors with the best response times take over.</p>	

Monitoring storage devices in multiple data centers

To avoid high network latency and interruptions in the collection of metadata when you monitor storage devices in data centers in different locations, install two or more data collectors on separate servers in each data center.

Data collectors in an environment with multiple data centers	Illustration of multiple data collectors where one of them fails
<p>Let's say that you install data collectors in your Washington and Chicago data centers and both data centers are connected over the network. If the data collectors in your Washington data center go offline, then the data collectors in your Chicago data center will take over the collection of your metadata for both data centers.</p>	

Large environments

The best practice is to deploy one data collector for every 25 storage devices that you want to monitor. The number of volumes that your storage devices manage also determines the number of data collectors that you need to deploy. For example, if you add 10 storage devices that manage 50,000 volumes, you'll need to deploy more data collectors to manage the collection of metadata.

Remember: Make your metadata collection more robust by installing additional data collectors. IBM Storage Insights can automatically switch the collection of metadata to other data collectors if the metadata collection is interrupted.

In large environments, you must provide at least 4 GB of RAM and 4 GB of disk space on the server or virtual machine where the data collector is deployed.

IBM Support monitors your instance of IBM Storage Insights to make you aware of issues with collecting metadata. Recurring issues with collecting metadata can indicate that you need to deploy more data collectors to share the collection workload.

Proxy servers

When you install the data collector, you can connect to a proxy server.

To connect to the proxy server, you'll need its host name and port number. If you connect to a secure proxy server, you'll also need a user name and password credentials.

Information on the Data Collectors page

How to access the Data Collectors page: From the Configuration menu, click Data Collectors. The following information is shown for each data collector:

Name

The name of the data collector. You can change the default display name, which is the hostname of the data collector, to a name that is easily identifiable within your organization. For example, you can add a geographic component to the name, such as `chicago.storage.collector1`, `chicago.storage.collector2`, `newyork.storage.collector1`, and so on. For more information, see [Renaming data collectors](#).

Status

Connected

The data collector is working correctly and is communicating with IBM Storage Insights.

Not Connected

The data collector is stopped on the server and cannot collect metadata. The status might be shown if the data collector is not communicating with IBM Storage Insights because of network or firewall issues. Start the data collection service on the server to resume metadata collection.

This status might also be shown if the data collector is uninstalled on the server but has not been removed from the GUI.

Failed

The data collector is not working.

Down-level

The latest version of the data collector is not deployed on the server. Enable automatic upgrades to ensure that you always have the most up-to-date data collectors with the latest fixes.

Downloading

The current version of the data collector is in the process of being downloaded from IBM.

Performance Manager caching upload

The upgrade process is waiting for the Performance Manager data to finish uploading to IBM Storage Insights before continuing with the upgrade process.

Extracting

The downloaded data collector is in the process of being extracted onto the server or virtual machine.

Replacing

The old data collector files are being replaced by new ones before restarting the data collector.

Upgrade failed

The upgrade failed and IBM Storage Insights can't communicate with the data collector.

See [Troubleshooting a data collector upgrade](#).

Candidates

The number of devices that the data collector is assigned to. On the Assignments tab, you can assign a data collector to one or more devices. If a data collector that is monitoring a device fails, the next available candidate starts monitoring the device in its place.

Monitored devices

The number of devices that the data collector is currently monitoring.

Unreachable Devices

The number of candidate devices that the data collector cannot reach because of connection issues.

IP Address

The IP address of the device that the data collector is assigned to.

Version

The version number of the data collector that is currently running.

Time Zone

The time zone where the device that the data collector is assigned to is located.

Last Start Time

The date and time that the data collector started.

OS Type, OS Version and OS Architecture

Details of the Operating System that is running on the device that the data collector is monitoring.

Upgrade

The date, time, and status of the last attempted upgrade of the data collector.

- [**Assigning data collectors**](#)

Assign your data collectors to monitor specific devices.

- [**Stopping and starting the data collector service**](#)

You can stop the data collector service at any time. If you stop the service, it remains stopped until you start it again.

- [**Removing and uninstalling data collectors**](#)

Remove the data collectors that you are no longer using from the IBM Storage Insights GUI. If you don't want to use the data collector in the future, you must also uninstall it on the server or virtual machine.

- [**Upgrading data collectors**](#)

To get the latest bug and security fixes, your data collectors are upgraded.

- [**Resolving connection issues**](#)

To ensure that metadata is being updated in IBM Storage Insights, investigate connection issues.

- [**Restoring your dashboard after a service update or interruption**](#)

IBM Storage Insights is an off-premises, IBM Cloud® service, so IBM updates and manages it for you. In some cases, when the service resumes after an update or interruption, you might need to manually restart your data collectors to resume streaming metadata to your dashboard.

- [**Monitoring the status of data collectors**](#)

Monitor the status of the data collectors that are deployed to collect asset, configuration, and performance metadata from the devices in your storage environment.

- [**Renaming data collectors**](#)

In IBM Storage Insights, you can change the name of a data collector from the default hostname it is initially assigned to a more identifiable name.

- [**Uploading the data collector's log packages**](#)

Upload the data collector's log packages so that IBM Support can investigate and resolve the tickets that you opened.

Related reference

- [Learn more about installing data collectors](#)

Assigning data collectors

Assign your data collectors to monitor specific devices.

About this task

You can assign which data collectors collect metadata from your storage devices. For example, you can configure your data collection services as follows:

- Assign data collectors to devices based on the locations of the data centers.
- Assign multiple data collectors to devices so that if one data collector fails another data collector takes over.
- Assign data collectors to groups of devices to optimize and balance how metadata is collected.

Tip: All data collectors are available to monitor all devices by default. If you turn off the feature, all data collectors are automatically set to monitor all devices.

Procedure

1. In the menu bar, click Configuration and then click Data Collectors.
2. Click Assignments.
The first time that you view the Assignments tab, you are provided with the capability to turn on Manage the assignments between data collectors and devices.
3. To assign or unassign data collectors to a device, you select or deselect the required data collector in the device row.
By default all data collectors are assigned to all devices.
CAUTION:
If you deselect all data collectors for a device, metadata will not be collected for that device.

Example

Watch a short video about assigning data collectors to monitor specific devices.



Stopping and starting the data collector service

You can stop the data collector service at any time. If you stop the service, it remains stopped until you start it again.

About this task

When you stop the service, metadata is no longer collected by the associated data collector. If you installed multiple data collectors, the data collectors that were not stopped continue to collect metadata. Metadata that is collected before the service is stopped is maintained in IBM® Storage Insights Pro.

Important: On Windows operating systems, you must have Administrator rights to stop or start the data collector service. On AIX® or Linux® operating systems, you must have root privileges to stop or start the data collector service.

Procedure

Complete these steps for each data collector that you want to stop or start:

1. Log on to the server on which the data collector service is installed.
2. Open a command window or shell and go to the data collector directory.

The default name of the directory is DataCollector_windows on Windows operating systems, DataCollector_aix on AIX operating systems, and DataCollector_linux_ix86 on Linux operating systems.

3. Choose one of the following options to stop or start the data collector service:

Operating system	Options
Windows	<ul style="list-style-type: none">• From the desktop:<ul style="list-style-type: none">• Click the Start menu, type <code>services.msc</code>, and press Enter.• On the Services page, right-click the service name that begins with IBM Spectrum Control Storage Insights data collector and select Stop or Start.• (Optional) Tip: You can also restart a data collector that is already running. To restart, right-click the service name of the data collector and select Restart.<p>OR</p>• From a command prompt:<ul style="list-style-type: none">• Click the Start menu and type <code>cmd</code> to open a command prompt.• Go to the data collector directory. The default directory for Windows is DataCollector_windows.• To start the data collector, type <code>dataCollector.bat start</code> and press Enter. To stop the data collector, type <code>dataCollector.bat stop</code> and press Enter.
AIX or Linux	<ul style="list-style-type: none">• To start the data collector, type <code>dataCollector.sh start</code> and press Enter.• To stop the data collector, type <code>dataCollector.sh stop</code> and press Enter.• Tip: To restart a data collector that is already running, type <code>dataCollector.sh stop</code> and press Enter. Then, type <code>dataCollector.sh start</code> and press Enter.

Removing and uninstalling data collectors

Remove the data collectors that you are no longer using from the IBM® Storage Insights GUI. If you don't want to use the data collector in the future, you must also uninstall it on the server or virtual machine.

About this task

To remove a data collector, you must:

1. Remove the data collector entry in the IBM Storage Insights GUI. You must log in to the GUI as Administrator.
2. Uninstall the data collector from the server or virtual machine.

On Windows servers, you must log in as Administrator. On AIX® or Linux® servers, you must log in as root.

Warning: If you remove all the data collectors, IBM Storage Insights cannot receive the information that is needed to monitor your storage environment.

Procedure

1. In the IBM Storage Insights GUI, from the Configuration menu, click Data Collectors.

2. Right-click one or more data collectors with a status of Not Connected.

3. Click Remove.

If you already uninstalled the data collectors from the servers, the removal is complete and you can skip the remaining steps.

4. For each data collector that you are removing, log in to the server where you installed the data collector.

5. Open a command window or shell and go to the data collector directory.

The default directory for the data collector depends on the operating system:

- Windows: DataCollector_windows
 - AIX: DataCollector_aix
 - Linux: DataCollector_linux_ix86
6. Uninstall the data collector service.
 - For Windows operating systems, run the uninstallDataCollectorService.bat script.
 - For AIX or Linux operating systems, run the uninstallDataCollectorService.sh script.
 7. Delete the data collector directory.

Results

The data collectors are removed from IBM Storage Insights.

Removing data collectors temporarily from IBM Storage Insights: To temporarily remove a data collector, stop the collector on the server or virtual machine and remove it from the GUI. Because the collector is still installed, you can restart it at any time to automatically re-add it to IBM Storage Insights.

Upgrading data collectors

To get the latest bug and security fixes, your data collectors are upgraded.

By default, your data collectors are upgraded automatically to ensure that you're running the current version of the data collector. If you don't want your data collectors to be upgraded automatically, you can disable automatic upgrades on the Data Collectors page.

To upgrade data collectors and to enable and disable automatic upgrades, you must have the role of an Administrator.

- [**Upgrading data collectors automatically**](#)
Enable automatic upgrades to ensure that you always have the most up-to-date collectors with the latest fixes.
- [**Upgrading data collectors manually**](#)
Upgrade your data collectors manually to get the latest fixes and most up-to-date metadata collection.
- [**Upgrading data collectors individually**](#)
Upgrade your data collectors individually to prevent the data gaps in data collection.
- [**Resolving upgrading issues**](#)
If you can't upgrade the data collector, download and install the latest version of the data collector.

Related reference

- [Adding and removing users](#)
-

Upgrading data collectors automatically

Enable automatic upgrades to ensure that you always have the most up-to-date collectors with the latest fixes.

Procedure

1. From the Configuration menu, click Data Collectors.
 2. To enable automatic upgrades, set Automatic Upgrades to On. When new versions of the data collector are available, they are installed without you taking any action.
Disabling automatic upgrades: To disable automatic upgrades, set Automatic Upgrades to Off. You must manually upgrade your data collectors when new versions are available.
-

Upgrading data collectors manually

Upgrade your data collectors manually to get the latest fixes and most up-to-date metadata collection.

About this task

If you disabled automatic upgrades, you must manually upgrade your data collectors. An upgrade notification is shown in IBM® Storage Insights when a new version of the data collector is available. You can click the link in the notification message or you can go to the Data Collectors page to upgrade your data collectors.

Procedure

1. From the Configuration menu, click Data Collectors.
2. Click Upgrade All.

Results

The data collectors are upgraded. If you encounter issues and can't complete the upgrade, you might have to download and install the latest version of the data collector.

Related tasks

- [Resolving upgrading issues](#)

Related reference

- [Getting started troubleshooting](#)

»

Upgrading data collectors individually

Upgrade your data collectors individually to prevent the data gaps in data collection.

About this task

Upgrading data collectors individually provides you the control on the upgrade process of each data collector and also prevents the data gaps in data collection.

Note: Upgrade option is available only when the data collectors status is Down-level.

Procedure

1. From the Configuration menu, click Data Collectors.
2. Use one of the following options to upgrade the data collectors.
 - Select one or more data collectors with Down-level status, right-click, and click Upgrade.
 - Select one or more data collectors with Down-level status, go to Actions drop down, and click Upgrade.

«

Resolving upgrading issues

If you can't upgrade the data collector, download and install the latest version of the data collector.

Before you begin

If you want to contact IBM® support to help determine the cause of the issue, removing the data collector directory and files will prevent a thorough analysis. Therefore, from the deployment directory of the data collector, ensure you collect the version.txt file, the /log directory that contains all of the log files, and any JAVA error files.

About this task

To ensure that the new collector can be installed properly, you complete the following actions:

- Ensure that your user name is assigned the Administrator role
- Uninstall the current version of the data collector
- Remove the data collector directory and files
- Download and install the data collector

Procedure

1. On the server where you installed the data collector, open a command window.
2. Go to the directory where you installed the data collector.
3. Complete one of the following actions:

Operating systems	Actions
Windows	Run the <code>uninstallDataCollectorService.bat</code> script.
AIX® or Linux®	Run the <code>uninstallDataCollectorService.sh</code> script.
4. Delete the data collector directory and files.
5. From the Configuration menu, click Data Collectors.
6. Click Deploy Data Collector.
7. Complete the steps for downloading and installing the data collector.

Results

The latest version of the data collector is installed.

Related tasks

- [Downloading and installing data collectors](#)

Related reference

- [Getting support](#)

Resolving connection issues

To ensure that metadata is being updated in IBM® Storage Insights, investigate connection issues.

About this task

To send capacity, space, performance, and configuration metadata, the data collectors establish a connection between your data center and IBM Storage Insights. To determine whether the connection is active, the data collectors periodically send a signal to IBM Storage Insights. If it does not receive a signal from a data collector for a period greater than 10 minutes, a warning message is generated. The purpose of the warning message is as follows:

- To notify you that the device metadata shown in IBM Storage Insights might not be up to date.
- To investigate whether the connection between your data center and IBM Storage Insights is still active.

Remember: If you download the data collector and start IBM Storage Insights without adding devices for monitoring, the connection between the data center and the GUI remains active. If the connection is not active, a warning message is generated and you must resolve the connectivity issue before you add devices and collect metadata.

Procedure

To resolve connection issues, complete one or more of the following steps:

1. Check whether the server that hosts the data collector is running.
To find out the name of the server, click Configuration > Data Collectors.
2. Verify that a storage system can connect to a data collector.
 - a. Go to the storage system page. For example, for a block storage system, go to Resources > Block Storage Systems.
 - b. Right-click the storage system, then click Connections > Test Connection.
 - c. If the connection fails, you can right-click the storage system, then click Connections > Modify Connection to modify the connection.

- d. The data collector requires valid credentials to connect to the storage system. No attempts to collect metadata are made until the credentials are updated.
3. Manually restart the data collector. See [Stopping and starting the data collector service](#).
4. Contact your Storage Administrator and Network Administrator to ensure that the firewall policy or proxy server rules allow the data collector to IBM Storage Insights through TCP protocol on port 443.
5. If the issue is still not resolved, explore the support options in [Getting support](#).

Related tasks

- [Stopping and starting the data collector service](#)

Restoring your dashboard after a service update or interruption

IBM® Storage Insights is an off-premises, IBM Cloud® service, so IBM updates and manages it for you. In some cases, when the service resumes after an update or interruption, you might need to manually restart your data collectors to resume streaming metadata to your dashboard.

About this task

If your data collectors are not operational after a service update or interruption, metadata won't be collected or sent to your dashboard. Additionally, if your instance does not receive a signal for a period greater than 10 minutes, a warning message is generated. The purpose of the warning message is as follows:

- To make you aware that the data that is represented in the GUI might not be up-to-date
- To investigate whether the connection between your data center and the GUI is still active

Procedure

Complete these steps for each inactive data collector to reestablish a connection to your dashboard:

1. Log on to the server on which the data collector service is installed.
2. Choose one of the following options to start the data collector service:

Operating system	Options
Windows	<p>Ensure that you have Administrator rights on the Windows server. Then, complete one of the following actions:</p> <ul style="list-style-type: none"> • From the Windows desktop: <ul style="list-style-type: none"> • Click the Start menu, type <code>services.msc</code>, and press Enter. • On the Services page, select the service name that begins with <code>IBM Spectrum Control Storage Insights data collector</code> and start it. OR • From a command prompt: <ul style="list-style-type: none"> • Click the Start menu and type <code>cmd</code> to open a command prompt. • Go to the data collector directory. The default directory for Windows is <code>DataCollector_windows</code>. • Run the <code>dataCollector.bat</code> script with the <code>start</code> parameter.
AIX® or Linux®	<ol style="list-style-type: none"> a. Ensure that you have root privileges on the AIX® or Linux server. b. Open a command shell and go to the data collector directory. The default directory for AIX is <code>DataCollector_aix</code>. The default directory for Linux is <code>DataCollector_linux_ix86</code>. c. Run the <code>dataCollector.sh</code> script with the <code>start</code> parameter.

Results

After a restart, a notification to upgrade your data collectors might be displayed. To upgrade the data collectors, you can click the link in the notification message, or complete the following steps:

1. From the Configuration menu, click Data Collectors.
2. Click Upgrade All.

The screenshot shows the IBM Storage Insights Configuration interface. The top navigation bar includes links for Dashboards, Insights, Resources, Groups, Reports, and Configuration. The Configuration link is highlighted. Below the navigation is a section titled "Data Collectors" with a note: "Last Upgraded: No recent upgrades." It also states that "All data collectors send metadata to IBM Storage Insights at Agent-70e0abb215c848ba9a573d8552a942e0.gw-dev.ibmserviceengage.com:443". There are two tabs: "Data Collectors" (selected) and "Assignments". Under "Data Collectors", there is a "Actions" dropdown and a "+ Deploy Data Collector" button. A table lists two data collectors:

Name	Host Name	Status	Last Contact	Candidates	Monitored Devices	Unreachable Devices
michelangel...	michelangelos...	Connected	Apr 9, 2020, 15:13:52	2	1	0
farro8.storag...	farro8.storage....	Connected	Apr 9, 2020, 15:13:52	1	1	0

If you encounter issues and can't complete the upgrade, you might have to download and install the latest version of the data collector. For more information, see [Resolving upgrading issues](#).

Related tasks

- [Stopping and starting the data collector service](#)
- [Resolving upgrading issues](#)
- [Resolving connection issues](#)

Monitoring the status of data collectors

Monitor the status of the data collectors that are deployed to collect asset, configuration, and performance metadata from the devices in your storage environment.

Using the IBM Storage Insights GUI

You can monitor the status of the data collector by accessing the server or virtual machine where the data collector is installed.

To view the following information about each of your data collectors, click Configuration and then click Data Collectors:

- The status of the connection between the data collector and IBM® Storage Insights.
- The last time that communication occurred between the data collector and IBM Storage Insights.
- The server or virtual machine on which the data collector is installed.
- The number of candidate devices that the data collector was assigned to collect metadata from.
- The number of devices that the data collector is currently monitoring.
- The number of candidate devices that the data collector cannot reach because of connection issues.

Accessing the server or virtual machine

If you can't access the IBM Storage Insights, GUI, you can monitor the status of the data collector on the server or virtual machine where it is installed.

To check the status of a data collector, complete the following steps:

1. Log in to the server or virtual machine where the data collector is deployed.
2. Depending on the OS of the server, complete the following steps:

Windows

- a. On the Windows desktop, click the Start menu, type services.msc, and press Enter.
- b. On the Services page, locate the service name that begins with IBM Spectrum Control Storage Insights data collector.

AIX® or Linux®

- a. Open a command shell and go to the data collector directory. The default directory for AIX is DataCollector_aix. The default directory for Linux is DataCollector_linux_ix86.

- b. Type `dataCollector.sh status` and press Enter.
-

Renaming data collectors

In IBM® Storage Insights, you can change the name of a data collector from the default hostname it is initially assigned to a more identifiable name.

About this task

You can rename data collector services only one at a time. The new name assigned to the data collector service is used for IBM Storage Insights display purposes only.

Important:

You must have Administrator rights to rename a data collector service.

Procedure

1. From the Configuration menu, click Data Collectors.
2. Right-click on the data collector and click Rename.
3. Enter a unique new name. The new name must not include special characters such as these:

`$ ` ~ [] \ | ; : ' " < >`

4. Click Rename.

If you clear the input field in the rename window, the data collector name reverts to the hostname as default.

Results

The data collector is renamed in the IBM Storage Insights GUI.

Uploading the data collector's log packages

Upload the data collector's log packages so that IBM® Support can investigate and resolve the tickets that you opened.

About this task

If IBM Support can't collect log packages for the data collector that you installed, they ask a user with Administrator privileges in your organization to upload the log packages.

To upload the log packages, your Administrator runs the `logcollector.bat` batch file on Windows or the `logcollector.sh` script on Linux® or AIX® that is in a folder on the server or virtual machine that you use to run the data collector.

The parameters that are used to run the batch file or script depend on the following criteria:

- You want to upload the log packages to Enhanced Customer Data Repository (ECuRep).
- You want to upload the log packages to Blue Diamond.

To upload the log packages to ECuRep or Blue Diamond, your firewall must be configured to use the secure file transfer protocol (SFTP) on port 22.

Note: The communication between your data collectors and IBM Storage Insights is through HTTPS port 443. So, the firewall rules that were created for your data collector aren't applicable for uploading the data collector's log packages.

If your firewall isn't configured to use SFTP on port 22, you can run the batch file or script to generate a .zip file. The .zip file contains the data collector's log packages, which you can transfer to a computer that can access the internet so that your log packages can be uploaded to ECuRep or Blue Diamond.

- [Uploading the data collector's log packages to ECuRep](#)

To help IBM Support resolve your ticket, use the batch file or script to upload the data collector's log packages to ECuRep.

- [Uploading the data collector's log packages to Blue Diamond](#)

To help IBM Support resolve your ticket, use the batch file or script to upload the data collector's log packages to Blue Diamond.

Uploading the data collector's log packages to ECuRep

To help IBM® Support resolve your ticket, use the batch file or script to upload the data collector's log packages to ECuRep.

About this task

If your firewall is configured to use the secure file transfer protocol (SFTP) on port 22, the log packages for the data collector are automatically uploaded to ECuRep.

If your firewall isn't configured to use SFTP on port 22, use this procedure to upload the log packages for the data collector manually to ECuRep:

- Generate the log package as a .zip file.
- Transfer the log package to a computer with internet access.
- Upload the log package manually to ECuRep.

Procedure

1. Go to the folder that you created on your server or virtual machine to run the data collector.
2. Depending on the operating system of your server or virtual machine, choose one of the following options:

Operating system	Steps
Windows	Right-click the logcollector.bat file, and click Run as administrator.
AIX® and Linux® operating systems	Log in as root and run the logcollector.sh script.

3. To find out the parameters and values that you need to specify, use this information:

Parameter	Value
-t	Include the -t parameter and enter the number of the ticket.
-u	If your firewall is configured to upload log packages, include the -u parameter. If not, omit the -u parameter to create a .zip file, which you can copy to another computer, and manually upload to ECuRep.
-j	Include the -j parameter to upload the Java™ core files that are created when the data collector encounters a runtime exception. The Java core files contain information about the last running state of the data collector, information about system memory, and other information. Although uploading these logs might increase the size of the log packages and take longer to upload, IBM Support will need this information to investigate and resolve the issue that you encountered.
-c	Include the -c parameter to upload the contents of the conf folder, which is in the folder where the data collector was installed. IBM Support will need this information to investigate and resolve the issue that you encountered.

Example: Your firewall is configured to upload log packages:

```
-t TS001234567 -u -j -c
```

Example: You want to generate a .zip file and upload it manually to ECuRep:

```
-t TS001234567 -j -c
```

4. Press enter.

Results

The log package for the data collector is uploaded automatically to ECuRep.

To upload the log packages manually, complete the following steps:

- Copy the .zip file in that was saved in the service folder. The service folder is in the folder that was created on the server or virtual machine to run the data collector.
- Go to the [Sign in to the Enhanced Customer Data Repository](#) page to upload the .zip file to ECuRep.

Uploading the data collector's log packages to Blue Diamond

To help IBM® Support resolve your ticket, use the batch file or script to upload the data collector's log packages to Blue Diamond.

About this task

If your firewall is configured to use the secure file transfer protocol (SFTP) on port 22, the log packages for the data collector are automatically uploaded to Blue Diamond.

If your firewall isn't configured to use SFTP on port 22, use this procedure to upload the log packages for the data collector manually to Blue Diamond:

- Generate the log package as a .zip file.
- Transfer the log package to a computer with internet access.
- Upload the log package manually to Blue Diamond.

Procedure

1. Go to the folder that you created on your server or virtual machine to run the data collector.
2. Depending on the operating system of your server or virtual machine, choose one of the following options:

Operating system	Steps
Windows	Right-click the logcollector.bat file and click Run as administrator.
AIX® and Linux® operating systems	Log in as root and run the logcollector.sh script.

3. To find out the parameters and values that you need to specify, use this information:

Parameter	Value
-t	Include the -t parameter and enter the number of the ticket.
-u	If your firewall is configured to upload log packages, include the -u parameter. If not, omit the -u parameter to create a .zip file, which you can copy to another computer, and manually upload to Blue Diamond.
-j	Include the -j parameter to upload the Java™ core files that are created when the data collector encounters a runtime exception. The Java core files contain information about the last running state of the data collector, information about system memory, and other information. Although uploading these logs might increase the size of the log packages and take longer to upload, IBM Support will need this information to investigate and resolve the issue that you encountered.
-c	Include the -c parameter to upload the contents of the conf folder, which is in the folder where the data collector was installed. IBM Support will need this information to investigate and resolve the issue that you encountered.
-bc	If your firewall is configured to upload log packages, include the -bc parameter to specify that you are a Blue Diamond customer.
-bu	If your firewall is configured to upload log packages, include the -bu parameter and enter the username for Blue Diamond.
-bp	If your firewall is configured to upload log packages, include the -bp parameter and enter the password for Blue Diamond.
-bd	If your firewall is configured to upload log packages, include the -bd parameter. Enter the name of the folder that was assigned to your company for uploading files to the Blue Diamond SFTP server.

Example: Your firewall is configured to upload log packages:

```
-t TS001234567 -u -j -c -bc -bu my_username -bp my_password -bd my_directory
```

Example: You want to generate a .zip file and upload it manually to Blue Diamond:

```
-t TS001234567 -j -c
```

4. Press enter.

Results

If your firewall is configured to upload log packages, the log package is uploaded automatically to Blue Diamond.

To upload the log packages manually, complete the following steps:

- Copy the .zip file in that was saved in the service folder. The service folder is in the folder that was created on the server or virtual machine to run the data collector.
- Go to the [Sign in to the Blue Diamond Registration Portal](#) page to upload the .zip file to Blue Diamond..

Giving IBM Support permission to collect log packages

Give IBM® Support permission to collect and upload log packages for storage systems without contacting you every time.

About this task

When you open a ticket for IBM Support about a storage system, a log package is automatically added to the ticket. To resolve your ticket, IBM Support might want to collect and upload more log packages from the storage system. You can allow IBM® Support to collect and upload log packages from your storage systems without requesting permission from your organization. If you give this permission, it can help IBM® Support to resolve your support tickets faster.

Tip: Add a reminder to your maintenance procedure to turn access off during maintenance. For example, during firmware upgrades, SVC cluster node upgrades, and other maintenance activities. Don't forget to turn it on again when you've completed the maintenance procedure!

Procedure

1. Click Configuration > Settings.
2. Click Edit in the IBM Support Log Permissions section.
3. Select the check boxes for the storage system for which you want to give IBM® Support permission to collect log packages.
Tip: Select the check box for System Name to select all storage systems.
4. Click Set Permissions.

You can also watch a short video that demonstrates how to give IBM Support permission to collect log packages.



Results

IBM Support has permission to collect log packages from the storage systems you selected. IBM Support does not contact you for permission before they collect and upload log packages for those storage systems.

Specifying which users are emailed about service outages

Specify the email addresses of the users that you want to notify when planned or unplanned service outages occur for your instance of IBM® Storage Insights.

Planned service outages occur when your instance of IBM Storage Insights is being upgraded or maintained. Unplanned service outages are used to resolve critical incidents and minimize disruptions in service.

To modify the list of users who are emailed about service outages, click Configuration > Settings.

By default, the owner of the instance is notified when a service outage occurs. You can remove the owner's email address but you must specify at least one email address.

Tip: To ensure that the appropriate people are notified, include the email addresses of the users who administer IBM Storage Insights, such as the members of your storage operations team.

Checking the collection of metadata for devices

Check the status of metadata collection for monitored devices. Depending on the type of device, this metadata includes performance information and configuration, capacity, and status information that is collected by probes. No application, personal, or identity information is ever collected.

- When you add block storage systems or storage systems that manage block and file storage (such as Dell EMC Unity) for monitoring, asset, capacity, and configuration metadata and performance metadata for the block storage is automatically collected. By default, asset, capacity, and configuration metadata are collected daily and performance metadata is collected every 5 minutes for IBM® storage systems that manage block storage and every 15 minutes for Dell EMC storage systems that manage block storage. Event data is also received from storage systems when the configuration or capacity changes, such as when volumes are created or pools that are deleted. Use this information to monitor the current state of each storage system for health, configuration, and capacity.
- When you add storage systems that manage only file storage or storage systems that manage only object storage, you configure the schedule for collecting asset, capacity, and configuration metadata. For IBM Spectrum Scale 4.1.1 or later, if it is configured to collect node and file performance metadata, you can configure the schedule for collecting performance metadata.
- When you add chassis for monitoring, configuration and status metadata is automatically collected for the related fabrics and switches. By default, configuration and status metadata is collected daily and performance metadata is collected every 5 minutes. Event data is also received from switches when the configuration or status changes, so you can monitor the current state and health of a switch.

To check the status metadata collection for a device, complete the following steps:

Device	Instructions
Block storage (configuration, capacity, and performance)	<ol style="list-style-type: none">From the Resources menu, click Block Storage Systems.Check the value that is shown in the Data Collection column.
File and object storage (configuration, capacity, and status)	<ol style="list-style-type: none">From the Resources menu, click File Storage Systems or Object Storage Systems.For configuration, capacity, and status metadata, check the value that is shown in the Probe Status column.
IBM Spectrum Scale (performance)	<ol style="list-style-type: none">From the Resources menu, click File Storage Systems.For performance metadata, check the value that is shown in the Performance Monitor Status column.
Switches (configuration, capacity, status, and performance)	<ol style="list-style-type: none">From the Resources menu, click Switches.Check the value that is shown in the Data Collection column.

For block storage and switches, the Data Collection column is an aggregate of the Probe Status and Performance Monitor Status. You can see the Data Collection column status as "Running" only if the Probe Status configuration and capacity collection status is "Successful" and Performance Monitor Status is "Running". If the Data Collection status is something other than "Running", have a look on Probe Status and Performance Monitor Status column to find out the real problem.

- [Administering the collection of metadata](#)**

You can start, stop, or reschedule the collection of metadata for storage systems and chassis.

- [Restarting the collection of metadata](#)**

Stop and restart the collection of metadata for your devices. Metadata includes performance metadata and the configuration, capacity, and status metadata that is collected by probes.

- [Starting and stopping the collection of performance metadata for IBM Spectrum Scale](#)**

Stop and start collecting performance metadata for IBM Spectrum Scale storage systems by updating the data collection schedule and using the restart option.

- [Enabling and disabling the collection of performance metadata for Hitachi VSP storage systems](#)**

If you did not enable performance monitoring for your Hitachi VSP systems when you added them, you can choose to do so at any time. You can also stop the performance monitor from running.

- [Modifying the schedules for collecting metadata](#)**

You can modify the schedules that collect metadata about storage systems and switch chassis.

- [Aggregation and retention periods for the metadata that is collected](#)**

Learn more about when the metadata that is collected is aggregated and the periods for retaining the asset, capacity, and configuration metadata and the performance metadata.

Related tasks

- [Configuring the collection of performance data for IBM Spectrum Scale](#)**

- [Verifying that asset, capacity, and configuration metadata can be collected for object storage](#)**

Administering the collection of metadata

You can start, stop, or reschedule the collection of metadata for storage systems and chassis.

Actions for administering the collection of metadata for different devices is displayed in the following sections:

- [Collection of metadata for block storage](#)
- [Collection of metadata for file and object storage](#)
- [Collection of metadata for chassis](#)

Tips:

- Terminology: *Probe tasks* collect configuration, capacity, and status metadata about devices. *Performance monitor* tasks collect performance metadata about devices.
- Rescheduling data collection for multiple devices: If you select multiple devices and reschedule data collection, the schedule change applies to all of them. To ensure that performance is not adversely affected, the devices are probed at different times during the time span of the schedule.

Collection of metadata for block storage

When you add block storage systems or storage systems that manage block and file storage, you can complete the following actions on the Block Storage Systems page:

Actions	Instructions
Check the status of the collection of metadata. This metadata includes performance metadata and the configuration, capacity, and status metadata that is collected by probes.	<ol style="list-style-type: none">1. From the Resources menu, click Block Storage Systems.2. Check the value that is shown in the Data Collection column.
Restart collecting performance and probe metadata for the storage system.	<ol style="list-style-type: none">1. From the Resources menu, click Block Storage Systems.2. Right-click the storage system and select Data Collection > Restart Data Collection.
Stop collecting performance and probe metadata for the storage system.	<ol style="list-style-type: none">1. From the Resources menu, click Block Storage Systems.2. Right-click the storage system and select Data Collection > Stop Data Collection.
Reschedule the collection of performance and probe metadata.	<ol style="list-style-type: none">1. From the Resources menu, click Block Storage Systems.2. Right-click the storage system and select Data Collection > Schedule.

Collection of metadata for file and object storage

When you add storage systems that monitor only file storage or only object storage, you can complete the following actions on the File Storage Systems or Object Storage Systems page:

Actions	Instructions
Check the status of the collection of metadata. This metadata includes the configuration, capacity, and status metadata that is collected by probes.	<ol style="list-style-type: none">1. From the Resources menu, click File Storage Systems or Object Storage Systems.2. Check the value that is shown in the Probe Status column.
Check the status of the collection of performance metadata for IBM Spectrum Scale storage systems.	<ol style="list-style-type: none">1. From the Resources menu, click File Storage Systems.2. Check the value that is shown in the Performance Monitor Status column.

Actions	Instructions
Restart collecting metadata for the storage system. This metadata includes performance metadata and the configuration, capacity, and status metadata that is collected by probes.	<ol style="list-style-type: none"> From the Resources menu, click File Storage Systems or Object Storage Systems. Right-click the storage system and select Data Collection > Restart Data Collection.
Stop collecting performance and probe metadata for the storage system.	<ol style="list-style-type: none"> From the Resources menu, click File Storage Systems. Right-click the storage system and select Data Collection > Stop Data Collection.
Reschedule the collection of configuration, capacity, and status metadata. For IBM Spectrum Scale storage systems, you can also reschedule the collection of performance metadata. Restriction: Asset, capacity, and configuration metadata for storage systems that manage both block and file storage, such as Storwize® V7000 Unified, is collected daily and cannot be rescheduled.	<ol style="list-style-type: none"> From the Resources menu, click File Storage Systems or Object Storage Systems. Right-click the storage system and select Data Collection > Schedule.

Collection of metadata for chassis

When you add fabrics and switches for monitoring, you can complete the following actions on the Fabrics page or the Switches page:

Actions	Instructions
Check the status of the collection of configuration and status metadata.	<ol style="list-style-type: none"> From the Resources menu, click Fabrics or click Switches. Check the value that is shown in the Data Collection column.
Check the status of the collection of performance metadata.	<ol style="list-style-type: none"> From the Resources menu, click Switches. Check the value that is shown in the Data Collection column.
Start the collection of configuration and status metadata.	<ol style="list-style-type: none"> From the Resources menu, click Switches. Go to Chassis tab and select the chassis where the fabrics or switches are associated. Right-click a chassis from the list and select Data Collection > Restart Data Collection. Tip: You can start or restart the data collection anytime without depending on the status in the Data Collection column.
Stop the collection of configuration and status metadata.	<ol style="list-style-type: none"> From the Resources menu, click Switches. Go to Chassis tab and select the chassis where the fabrics or switches are associated. Right-click a chassis from the list and select Data Collection > Stop Data Collection. Remember: You can stop collecting the metadata only if the Data Collection column shows the Running status for that chassis.
Reschedule the collection of configuration, and status metadata.	<ol style="list-style-type: none"> From the Resources menu, click Switches. Go to Chassis tab and select the chassis where the fabrics or switches are associated. Right-click a chassis from the list and select Data Collection > Schedule. Tip: You can schedule the data collection anytime without depending on the status in the Data Collection column. By default, Enable Probe is checked and the probe schedule is set to Automatically with probe frequency Every day. You can make the necessary changes to the probe schedule as required.

Restarting the collection of metadata

Stop and restart the collection of metadata for your devices. Metadata includes performance metadata and the configuration, capacity, and status metadata that is collected by probes.

About this task

You might want to stop and restart data collection for a number of reasons. For example, stop data collection during maintenance work on storage systems to reduce the warnings and alerts that are triggered. You can then restart data collection when the maintenance work is

complete. Restarting the data collection might also help if data is not being collected for a storage system. When you stop the collection of metadata, the data collections that are currently running complete, and all subsequent collections of metadata are stopped.

If you do not stop data collection during maintenance work, the data collection fails. When the data collection fails, IBM® Support troubleshoots the issue and might contact your organization unnecessarily. IBM Storage Insights attempts to restart data collection automatically, but you can also restart the data collection manually. To restart the data collection successfully, the storage system and the data collector must both be available.

You might want to restart data collection to resolve performance monitoring problems.

Procedure

To restart the collection of performance and probe metadata, complete the following steps:

1. Choose one of the following options:

Offering	Actions
IBM Storage Insights Pro	From the Resources menu, select the type of device. <ul style="list-style-type: none">• To restart data collection for a storage system, select Block Storage Systems, File Storage Systems, or Object Storage Systems.• To restart data collection for a chassis, select Switches > Chassis.
IBM Storage Insights	On the dashboard, click the view table icon 

2. Select one or more devices.

3. Right-click the devices, and then choose one of the following options:

- Data Collection > Stop Data Collection
- Data Collection > Restart Data Collection

The collection of performance and probe metadata is stopped or restarted for selected devices.

Starting and stopping the collection of performance metadata for IBM Spectrum Scale

Stop and start collecting performance metadata for IBM Spectrum Scale storage systems by updating the data collection schedule and using the restart option.

Procedure

To stop and restart the collection of performance metadata, complete these steps:

1. Click Resources > File Storage Systems.
2. Right-click the IBM Spectrum Scale storage system and select Data Collection > Schedule.
3. Clear the Enable performance monitoring check box and click Save.
4. Right-click the storage system again and select Data Collection > Restart Data Collection.
The status in the Data Collection and Probe Status columns change to Running. When data collection is complete, the status in the columns change to Successful.
5. Right-click the storage system again and select Data Collection > Schedule.
6. Check the Enable performance monitoring check box and click Save.
7. Right-click the storage system again and select Data Collection > Restart Data Collection.
The status in the Data Collection, Probe Status, and Performance Monitor Status columns change to Running. When data collection is complete, the status in the columns change to Successful.

Enabling and disabling the collection of performance metadata for Hitachi VSP storage systems

If you did not enable performance monitoring for your Hitachi VSP systems when you added them, you can choose to do so at any time. You can also stop the performance monitor from running.

Before you begin

To collect performance metadata, Hitachi requires that the password for connecting to the storage system be temporarily stored as clear text in a file on the server where the data collector is installed. For security reasons, ensure access to that server is restricted to key personnel. The file is automatically deleted after metadata is collected.

Procedure

To start a performance monitor for one or more of your Hitachi VSP storage systems, complete these steps:

1. Click Resources > Block Storage Systems.
2. Select one or more Hitachi VSP storage systems.
3. Right-click, select Data Collection, and then select Performance Monitoring.
4. To enable performance monitoring, select the check box.
The performance monitor starts immediately and runs at 5 minute intervals.

Modifying the schedules for collecting metadata

You can modify the schedules that collect metadata about storage systems and switch chassis.

About this task

You can modify the schedule for collecting asset, capacity, and configuration metadata for the following file storage and object storage systems:

- IBM® Cloud Object Storage
- IBM Spectrum Scale

You can modify the schedule for collecting performance metadata for IBM Spectrum Scale.

Tip: For storage systems that manage block storage and for storage systems that manage block and file storage, asset, capacity, and configuration metadata and performance metadata is automatically collected when the storage systems are added. The schedule for collecting asset, capacity, and configuration metadata is set to daily and the schedule for collecting performance metadata is set to every 5 minutes for IBM block storage and is set to every 15 minutes for Dell EMC block storage systems. You can't change the collection schedules for storage systems that manage block or block and file storage, but you can start a probe to collect asset, capacity, and configuration metadata and view the logs that are generated when the probes are run.

When you schedule probes for multiple resources, a time span is calculated during which the resources are probed. The resources are probed at different times during the time span.

Procedure

1. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. Or click Switches > Chassis.
2. Select one or more storage systems.
3. Right-click the storage system or storage systems, and then click Data Collection > Schedule.
4. Configure the schedule for the probe.
5. Configure the schedule for the performance monitor.
Before you can configure the data collection schedule for the performance monitor, the data collection for the probe must be scheduled.
6. Click Save.

Results

If a successful probe run is completed for a storage system, the performance monitor runs according to the user-defined interval.

Aggregation and retention periods for the metadata that is collected

Learn more about when the metadata that is collected is aggregated and the periods for retaining the asset, capacity, and configuration metadata and the performance metadata.

As the metadata that is collected ages, the aggregation level of the data changes. For asset, capacity, and configuration metadata over a 24-month period, the aggregation levels of metadata change from daily, to weekly, to monthly based on the age of the metadata. For performance metadata, over a 52-week period, the aggregation levels change from sample, to hourly, to daily based on the age of the metadata. In effect, you get a more granular view of new data and a less granular view of aged data. Based on the collection date, asset, capacity, and configuration metadata is retained for 24 months and performance metadata is retained for 52 weeks.

For example, you collect asset, capacity, and configuration metadata for a storage system in January. You can view the daily aggregated values of the metadata that is collected in January for 12 weeks. When the metadata that is collected in January is 12 weeks old, you can view the weekly aggregated values of the metadata that is collected for 24 weeks. When the metadata that is collected in January is 24 weeks old, you can view the monthly aggregated values of the metadata that is collected for 24 months.

The following table lists the data aggregation levels for asset, capacity, and configuration metadata based on the age of the metadata that is collected:

Table 1. Aggregation levels for asset, capacity, and configuration metadata

Data aggregation level	Data age
Daily	12 weeks
Weekly	24 weeks
Monthly	24 months

The following table lists the data aggregation levels for performance metadata based on the age of the metadata that is collected:

Table 2. Aggregation levels for performance metadata

Data aggregation level	Data age
Sample	2 weeks
Hourly	4 weeks
Daily	52 weeks

The following information is also retained:

- Logs for the last five collections of asset, capacity, and configuration metadata and performance metadata.
- Information about resources that were removed is retained for 2 weeks.

If a storage resource is removed, the metadata that was collected for that storage resource is kept for two weeks. For example, you collected metadata for a storage system in January and information was collected about a volume called `volume_1`. On 1 February, the volume, `volume_1`, was decommissioned. The metadata that was collected about `volume_1` in January is kept for 14 days and then removed from IBM® Storage Insights Pro.

Assigning pools to tiers

To review the storage usage and growth of your tiered storage in one place, add your pools to tiers.

Procedure

1. From the Resources menu, click Pools.
2. On the pools page, select one or more pools.
3. Right-click the pools, click Set Tier and then click the tier level.
To remove the tier level, click None.
 - [Renaming tiers](#)
Change the default names of the tiers so that they match the names of the tiers in your storage environment.

Related tasks

- [Renaming tiers](#)

Related reference

- [Tiers](#)

Renaming tiers

Change the default names of the tiers so that they match the names of the tiers in your storage environment.

Procedure

1. From the Configuration menu, click Tiers.
2. On the Tiers page, click Rename Tiers.
3. On the Rename Tiers page, click Edit.
4. Click the names of the tiers that you want to change, type the new names, and then click Save.

Related tasks

- [Assigning pools to tiers](#)

Related reference

- [Tiers](#)

Modifying applications and departments

You can modify the applications and application subcomponents and the departments and subdepartments that you create.

Before you begin

Did you know?: You must subscribe to IBM® Storage Insights Pro to create and modify applications and departments. This advanced functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

- [**Adding applications as subcomponents to applications**](#)
You can add applications as subcomponents to an existing application to monitor the capacity of the subcomponents or the capacity of the application as a hierarchy.
- [**Adding subcomponents to applications**](#)
You can add subcomponents to an existing application to monitor the capacity of the subcomponents or the capacity of the application as a hierarchy. You can also add applications as subcomponents to another application.
- [**Adding storage resources to applications**](#)
You can assign storage resources to applications to monitor the capacity of the storage resources. You use filters to specify the storage resources to include.
- [**Adding storage resources to subcomponents**](#)
You can assign storage resources to subcomponents to monitor the capacity of the storage resources. You use filters to specify the storage resources to include.
- [**Adding applications to departments**](#)
To monitor the capacity of departments, you can add the applications that the department uses to the department.
- [**Adding applications to subdepartments**](#)
To monitor the capacity of subdepartments, you can add applications to the subdepartments.
- [**Removing applications**](#)
You can remove the applications that you do not want to monitor.
- [**Removing subcomponents**](#)
You can remove the subcomponents that you do not want to monitor.
- [**Removing departments**](#)
You can remove the departments that you do not want to monitor.
- [**Removing subdepartments**](#)
You can remove the subdepartments that you do not want to monitor.

Related reference

- [Administering departments](#)
- [Administering applications](#)

- [Viewing information and charts about departments](#)
-

Adding applications as subcomponents to applications

You can add applications as subcomponents to an existing application to monitor the capacity of the subcomponents or the capacity of the application as a hierarchy.

Before you begin

You must create the applications that you want to add as subcomponents, and also create the application to which you plan to add the subcomponents.

About this task

You add applications as subcomponents to another application.

Procedure

1. From the Groups menu, click Applications.
2. Click the applications that you want to add as subcomponents.
3. Right-click, and then click Add to Application.
4. On the Add to Application page, click the application to which you want to add the applications as subcomponents, and click Save.

Results

The applications are added as subcomponents to the application.

What to do next

You can view the capacity and space usage information that is collected about the application on the Applications page. You can view the capacity and space usage information about each subcomponent on the Subcomponents page.

Related tasks

- [Creating departments](#)

Related reference

- [Administering applications](#)
-

Adding subcomponents to applications

You can add subcomponents to an existing application to monitor the capacity of the subcomponents or the capacity of the application as a hierarchy. You can also add applications as subcomponents to another application.

Before you begin

You must create the application for which you plan to add subcomponents.

About this task

To add subcomponents to the application, you use the Subcomponents page to create the subcomponents. You can also add existing subcomponents to another application. To add applications as subcomponents to another application, you use the Applications page.

Procedure

1. From the Groups menu, click Applications.
2. Click the application for which you want to add subcomponents, click Actions, and click View Details.
3. In the General section, click Subcomponents.
4. On the Subcomponents page, click Create Subcomponent.
5. Enter the information for the subcomponent, and click Create.
6. (Optional) To add a subcomponent of an application to another application, on the Subcomponents page, click the subcomponent that you want to add to another application. Click Actions and click Add to Application. Check the application to which you want to add the selected subcomponent, and click Save.
7. (Optional) To add an application as a subcomponent to another application, on the Applications page, click the application that you want to add to another application. Click Actions and click Add to Application. Check the application to which you want to add the selected application as a subcomponent, and click Save.

Results

The subcomponents are added to the application. In the General section, the number of subcomponents is increased by the number of subcomponents that you added.

What to do next

You can view the capacity information that is collected about the application on the Applications page. You can view capacity information for each subcomponent on the Subcomponents page.

Related tasks

- [Creating departments](#)

Related reference

- [Administering applications](#)

Adding storage resources to applications

You can assign storage resources to applications to monitor the capacity of the storage resources. You use filters to specify the storage resources to include.

Before you begin

You must create the application to which you plan to assign storage resources.

About this task

To assign storage resources to an application, you use the Filters page to specify the storage resources.

Procedure

1. From the Groups menu, click Applications.
2. Right-click the application to which you want to assign storage resources, and click View Details.
3. In the General section, click Filters.
4. Click Create Filter, and follow the instructions in the wizard to specify the type of resource.
Tip: On the Create Filter page, you can specify a name pattern to determine which servers or which volumes to include. For volumes, you can specify name patterns to determine from which servers, storage systems, or pools the volumes are selected. You can then click Preview to view the servers or volumes that are selected for inclusion in your application.
5. Click Save.

Results

The storage resources that match the filter are assigned to the application. In the General section of the Overview page, the number of filters is increased.

Related tasks

- [Creating departments](#)

Related reference

- [Administering applications](#)
-

Adding storage resources to subcomponents

You can assign storage resources to subcomponents to monitor the capacity of the storage resources. You use filters to specify the storage resources to include.

Before you begin

You must create the subcomponent to which you plan to assign storage resources.

About this task

To assign storage resources to a subcomponent, you use the Filters page to specify the storage resources.

Procedure

1. From the Groups menu, click Applications.
2. Right-click the application for which you want to assign storage resources to a subcomponent, and click View Details.
3. In the General section, click Subcomponents.
4. Right-click the subcomponent, and click View Details.
5. In the General section, click Filters.
6. Click Create Filter, and follow the instructions in the wizard to specify the type of resource.
Tip: On the Create Filter page, you can specify a name pattern to determine which servers or which volumes to include. For volumes, you can specify name patterns to determine from which servers, storage systems, or pools the volumes are selected. You can then click Preview to view the servers or volumes that are selected for inclusion in your subcomponent.
7. Click Save.

Results

The storage resources that match the filter are assigned to the subcomponent. In the General section of the Overview page, the number of filters is increased.

Related tasks

- [Creating departments](#)

Related reference

- [Administering applications](#)
-

Adding applications to departments

To monitor the capacity of departments, you can add the applications that the department uses to the department.

Procedure

1. From the Groups menu, click Departments.
 2. Right-click the department, and click View Details.
 3. In the General section, click Applications.
 4. Click Create Application.
 5. Create and assign resources to the application.
-

Adding applications to subdepartments

To monitor the capacity of subdepartments, you can add applications to the subdepartments.

Before you begin

You created the subdepartment.

Procedure

1. From the Groups menu, click Departments.
 2. Right-click the department, and click View Details.
 3. In the General section, click Subdepartments.
 4. Right-click the subdepartment, and click View Details.
 5. In the General section, click Applications.
 6. Click Create Application.
 7. Create and assign resources to the application.
-

Removing applications

You can remove the applications that you do not want to monitor.

About this task

If the application that you want to remove contains subcomponents, you can remove the subcomponents or you can keep them.

Procedure

1. From the Groups menu, click Applications.
2. Select the application that you want to remove.
3. Right-click, and then click Remove. If you want to keep the subcomponents, clear the check box.
4. Click Remove.

Results

The application is removed.

Removing subcomponents

You can remove the subcomponents that you do not want to monitor.

Procedure

1. From the Groups menu, click Applications.
2. Select the application that contains the subcomponent that you want to remove.

3. Right-click, and then click View Properties.
4. On the Subcomponents tab for the application, select the subcomponent that you want to remove.
5. Right-click, and then click Remove.
6. Click Remove.

Results

The subcomponent is removed from the application.

Removing departments

You can remove the departments that you do not want to monitor.

About this task

If the department that you want to remove contains subdepartments, you can remove the subdepartments or you can keep the subdepartments.

Procedure

1. From the Groups menu, click Departments.
2. Select the departments that you want to remove.
3. Right-click, and then click Remove Department.
4. Click Remove.
If you want to keep the subdepartments, clear the check box.

Removing subdepartments

You can remove the subdepartments that you do not want to monitor.

Procedure

1. From the Groups menu, click Departments.
2. In the Subdepartments column, click the name of the subdepartment or the number that represents the number of subdepartments that the department contains.
3. In the properties notebook for the department, select the subdepartments that you want to remove.
4. Right-click, and then click Remove Department.
5. Click Remove.

Changing the owner of IBM Storage Insights

There might be cases where the person who is the main contact and "owns" the IBM® Storage Insights service within your organization is leaving the company, moving to a different position, or needs to hand over responsibility to someone else. In these cases, you can change the main contact and owner of the service to ensure a smooth transition.

About this task

So, what do you do if the owner of your organization's IBM Storage Insights service has left for some reason or needs to change? It's simple, and you don't need to create new subscription / URL to make the change. Instead, just complete the following steps:

Procedure

1. [Open a support case*](#) against IBM Storage Insights.
2. Indicate that you want to change the owner of your IBM Storage Insights service.

Include the following information:

- Company name and country
- Full name of the original owner
- Full name of the new owner
- Phone number of the new owner
- IBM ID and email address of the original owner
- IBM ID and email address of the new owner
- The URL of your IBM Storage Insights service.

You can also state whether access to IBM Support and IBM Storage Insights is to be revoked for the original owner of the subscription and whether the IBM ID of the original owner of the subscription is to be removed from the company's account.

3. Submit the case.

IBM Support will then assist you in changing the owner of your IBM Storage Insights service.

Exporting information to a file

Export information from tables in IBM® Storage Insights to a CSV, PDF, or HTML file.

About this task

Use the export action to save information about resources or other items that are listed on a page. The information is organized according to the sorting, filtering, and column order that is defined on that page. Columns that are hidden on a page are not included in the generated file. Depending on your web browser, you can determine the name and location of the file.

Procedure

1. Go to the page for which you want to export information. For example, to view the list of block storage systems, click Storage Systems > Block Storage Systems.
2. Click Export to select the type of file format you want to use and to export selected information. Alternatively, to export information from the list, right click any row and select Export > <file_format>, where <file_format> represents the format that you want to use for a file.

You can save information to the following formats:

CSV (comma-separated values)

A CSV file is a file that contains comma-delimited values and can be viewed with a text editor or imported into a spreadsheet application. The information in a CSV file has the following format:

```
"Column_name","Column_name","Column_name","Column_name","Column_name","Column_name"  
"data","data","data","data","data","data"
```

`Column_name` represents the name of a column in a table and `data` represents the data that is associated with a column.

PDF

You can view a PDF file with Acrobat reader. The information that you export to a PDF file is formatted into a table.

Tip: When you export a table of data that contains many columns, the rows in that table might span multiple pages in the resulting PDF. For example, if a table contains 20 columns, then the row for a specific resource might be shown on more than one page (10 columns on the first page and 10 columns on the second page). To reduce the number of pages that a table spans, before you select the export action, hide the columns that you do not want to include in the PDF. Continue to hide columns until the table no longer spans multiple pages.

HTML

You can view an HTML file with a web browser. The information that you export to an HTML file is formatted into a table.

Results

The selected information is saved in a file, which is in the specified format.

Customizing lists

Customize lists to focus on the information that is important to you. You can filter information, sort rows, and show, hide, and reorder columns in the table views for resources, alerts, events, and other objects.

- [**Filtering lists**](#)
Use filters to show the information that you want to see about resources, alerts, events, and other objects in table views.
 - [**Filtering storage systems using pattern matching**](#)
You want to show performance metrics for storage systems with names that match a series of characters.
 - [**Sorting lists**](#)
Each table view of resources, alerts, events, or other objects uses columns to determine the order of the information that is shown in each row. To customize the view of your resources or other objects, you can change how the information is sorted.
 - [**Showing, hiding, and reordering columns in lists**](#)
Each list in the table view has a set of columns that contain information about resources, alerts, events, or other objects. You can change the order of columns, show columns that are hidden, and hide columns that are shown in the table views for resources.
-

Filtering lists

Use filters to show the information that you want to see about resources, alerts, events, and other objects in table views.

Procedure

1. Go to the table view of the list of the objects that you want to filter.
 2. Click the Filter icon  to determine how to filter the list.
Restriction: Some columns in lists cannot be used for filtering and are not shown under the Filter by a Specific Column option.
 3. In Filter text box , type the text for filtering the list.
You can type letters, whole words, partial words, and numbers. When you filter on certain columns, you can select from a list of values rather than typing text.
 4. To apply the filter to the list, press Enter.
Only rows with values that match or partially match the filter text are shown.
Tip: The name of a column to which a filter applies is shown next to the Filter icon .
 5. Optional: To remove the filtering for a list, click Reset.
-

Filtering storage systems using pattern matching

You want to show performance metrics for storage systems with names that match a series of characters.

Before you begin

You must add the storage systems that you want to monitor and the performance monitor must be running.

About this task

You want to show the performance metrics for storage systems with names that contain the following series of characters: `svc`. The series of characters can occur anywhere in the name of the storage system.

Procedure

1. From the Resources menu, click Block Storage Systems or File Storage Systems.
2. Click the Performance tab.
3. Ensure that the Filter by column is set to Name.
4. Type `svc`.

Results

In the table view for the storage systems, the storage systems that contain the series of characters `svc` are shown.

Sorting lists

Each table view of resources, alerts, events, or other objects uses columns to determine the order of the information that is shown in each row. To customize the view of your resources or other objects, you can change how the information is sorted.

About this task

You can change the sort order of columns to organize a list of resources or other objects according to your requirements.

Tip: A visual indicator  is shown next to the primary column that determines the sort order of the list.

Procedure

1. Go to the list of resources or other objects that you want to sort.
2. Complete the following tasks to sort the rows in the list:
 - To change whether the rows in a list are sorted by ascending or descending order, click the name of the primary column in the heading row. Click the name of the column again to reverse the sort order.
 - To change the column that determines the sort order of the list, click the name of that column. For example, click the Name column to sort the list alphabetically.
Tip: When you click a column other than the primary sort column, that column becomes the new primary sort column. However, the previous primary column maintains its sort order (ascending or descending).
For example, if a list of resources is ordered by the Name column in ascending order and you click the Probe Status column, the rows are sorted according to the status of the probes. At the same time, the resources for each type of status are still sorted in ascending order by the Name column. A maximum of three columns can be sorted at the same time.
3. Optional: To reset the order of the rows for a column to the default setting, right-click the heading row in the list and select Restore Default View.

Example

On the Switches page, you can use the sorting function to group virtual or logical switches with their physical switch. First, show the Virtual and IP Address columns. Click the Virtual column to sort it in ascending alphabetical order. Then, click the IP Address column.

Showing, hiding, and reordering columns in lists

Each list in the table view has a set of columns that contain information about resources, alerts, events, or other objects. You can change the order of columns, show columns that are hidden, and hide columns that are shown in the table views for resources.

Procedure

1. Go to the list of resources or other objects that you want to sort.
For example, to reorganize the columns for storage systems, go to Resources > Block Storage Systems.
2. Complete the following tasks to customize the columns in the list:
 - To show or hide the columns in a list, right-click any of the column headings and select or clear the check box next to a column name.
 - To change the order of columns, click a column heading and drag it to a new position in the list.
Tip: The changes that you make to column settings are saved from session to session.
3. Optional: To reset the order and display of columns to the default setting, right-click any of the column headings and select Restore Default View.

Modifying the properties of resources

Add or change the properties for individual resources or for multiple resources. You can use the properties to filter or sort the resources in the GUI or in an external application if the data is shared or exported.

About this task

For servers, storage systems, switches, and fabrics you can modify the properties of a single resource or multiple resources. You can modify the properties of a single pool, but not the properties of multiple pools.

Did you know?: You must subscribe to IBM® Storage Insights Pro to modify the properties of resources. This advanced functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

Modifying the properties of multiple resources

1. From the Resources menu, click the type of resource that you want to edit. For example, if you want to edit the properties for servers, click Resources > Servers.
2. To select the resources, click Ctrl + click or Shift + click.
3. Right-click the selected resources and click Edit Properties.
In the Edit Properties property notebook, the properties can have the following values:
 - If the property is blank, it means that the values were never assigned or the resources that were selected have different values assigned to that property. For example, the selected servers have different locations.
 - If the selected resources have the same value for a property, the value is shown.
4. Modify the properties and click Save.

Modifying the properties of a single resource

1. From the Resources menu, click the type of resource that you want to edit. For example, if you want to edit the properties for servers, click Resources > Servers.
2. Right-click the resource that you want to modify and click View Properties.
3. In the property notebook, click Edit.
4. Modify the properties and click Save.

- **[Properties of resources that can be modified](#)**

You can modify the properties, such as the name or location, of the resources that are monitored by IBM Storage Insights Pro.

Related concepts

- [Customizing lists](#)

Related tasks

- [Identifying the locations of devices](#)

Properties of resources that can be modified

You can modify the properties, such as the name or location, of the resources that are monitored by IBM® Storage Insights Pro.

The following table lists the properties that you can modify for each type of resource:

Resource	Properties that can be modified
Storage systems	<ul style="list-style-type: none">• Name (label)• Location• Custom tags (3)
Pools	<ul style="list-style-type: none">• Tier• Back-end storage system type• Back-end storage RAID level• Back-end storage disk type• Back-end storage disks <p>Tip: You can edit the back-end values if the back-end storage system for the related storage virtualizer was not probed and the values for the pool are unknown. If you manually enter values for these properties, IBM Storage Insights Pro uses the values to help calculate the approximate read I/O capability of the pool.</p>
Servers	<ul style="list-style-type: none">• Name (label)• OS type• IP address• Location• Custom tags (3)
Switches	<ul style="list-style-type: none">• Name (label)• Location• Custom tags (3)

Resource	Properties that can be modified
Fabrics	<ul style="list-style-type: none"> • Name (label) • Location • Custom tags (3)
Chassis	<ul style="list-style-type: none"> • Name (label) • Location • Custom tags (3)

Settings for global alert notifications, outage notifications, and log permissions

Give IBM® Support permission to collect and upload log packages without contacting you. You can also specify the email addresses of the users who are notified about service outages. For IBM Storage Insights Pro, configure the global alert notification settings to send notifications by email.

To access the settings for alert notifications, outage notifications, and log permissions, click Configuration > Settings.

IBM Support Log Permissions

To save time when IBM Support are working on your tickets, you can give IBM Support permission to collect and upload log packages for your storage systems without contacting you every time. You can set this permission for each storage system.

Outage Notifications

Specify the email addresses of the users that you want to notify about planned or unplanned service outages for your instance of IBM Storage Insights. By default, the owner of the instance is notified about outages. You can remove the owner's email address but you must specify at least one email address.

To ensure that the appropriate people are notified, include the email addresses of the users who administer IBM Storage Insights, such as the members of your storage operations team.

Planned outages occur when your instance of IBM Storage Insights is being upgraded or maintained. Unplanned service outages are used to resolve critical incidents and minimize disruptions in service.

Global Alert Notifications

Specify the email addresses of the people that you want to notify when alerts are generated for the monitored resources in your environment. The email addresses that you specify are applied globally to all alert definitions, unless overridden.

To override the global email settings, specify an email address for an alert policy or for an alert definition for a specific resource or group. [Learn more about notifications and override behavior](#)

Remove Overrides of Global Alert Notifications

To ensure that all alert notifications are sent to the global email addresses, remove all email addresses that override the global addresses. All email addresses that are configured in the alert definitions for policies, resources, and groups are removed.

For example, an email override is specified in the alert definition for the storage system attribute, Available Capacity. When you click Remove All, the email override is removed from the alert definition. All email notifications of threshold violations for this alert will now be sent to the email addresses in the global alert notifications.

Related reference

- [Alert notifications](#)

Gaining insights

Review the recommendations that help you address issues in your storage environment and gain insights into storage reclamation and performance.

IBM Storage Insights Pro only: You must subscribe to IBM® Storage Insights Pro to access advanced insights into your storage. This functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

- [Viewing insight charts](#)

Go to the pages that show the charts that provide views of the recommended actions, performance, and the volumes that can be reclaimed.

- [Performance views](#)

Gain insights into the performance of the resources that are monitored in your storage environment. You can use performance metrics for volumes, disks, or ports to help you measure, identify, and troubleshoot performance issues and bottlenecks in storage systems.

- [Reclamation views](#)

Use the recommendations to reclaim capacity before you plan new capacity purchases.

- [Monitoring recommended actions](#)

Review recommended actions to understand how to address potential problems in your environment.

Viewing insight charts

Go to the pages that show the charts that provide views of the recommended actions, performance, and the volumes that can be reclaimed.

Table 1. Insight® charts

Actions	Navigation
View the chart that shows a list of the remedial actions that can be taken to improve your storage environment.	From the Insights menu, click Notifications.
View the chart that shows the changes that occur in the overall I/O rates of storage systems over 12 months.	From the Insights menu, click Performance.
View the chart that shows the volumes that can be reclaimed.	From the Insights menu, click Reclamation.

Related tasks

- [Viewing the performance of storage systems](#)
- [Creating tiers and defining tier thresholds](#)

Related reference

- [Capacity view of block storage systems](#)
- [Performance views](#)
- [Reclamation storage overview](#)

Performance views

Gain insights into the performance of the resources that are monitored in your storage environment. You can use performance metrics for volumes, disks, or ports to help you measure, identify, and troubleshoot performance issues and bottlenecks in storage systems.

Before you view performance information for storage systems, ensure that you added a storage system for monitoring and that data is being collected for the storage system.

On the Performance page, performance metrics for storage systems are displayed in a chart and related information for all storage systems is displayed in the performance chart legend.

By default, the 10 storage systems with the highest overall total I/O rate over a 12-hour period are displayed in the chart. These storage systems are listed under Resources on the left and are highlighted at the top of the performance chart legend, which is sorted by the Total I/O Rate - overall (ops/s) column.

The performance information is displayed in the following format:

Performance chart

The top section of the performance view shows information about the selected storage systems. You can view this information in a chart or table format:

Chart

The chart shows a visual representation of how storage system performance trends over time. Each line on the chart represents a metric and a storage system. For example, if you select two metrics and three storage systems, six lines are shown on the chart. The y-axis shows the unit of measurement for a metric.

To view a snapshot of performance information at a specific time, hover the mouse pointer over points on a line in the chart.

Table

The table shows performance information for the storage systems. Each row represents a storage system and a time stamp. For example, if a chart has six data points during the selected time range, there are six rows for each storage system in the table. Each metric is shown as a column in the table.

To view other metrics and information for a storage system, right-click anywhere in the header row of the table and select extra columns.

Performance chart legend

The bottom section of the performance view is a table that shows more information about the storage systems. Each row represents a storage system, and each column provides extra asset and performance information about the storage system.

- [Viewing the performance of storage systems](#)

View information that is collected about the performance of storage systems in your environment. You can view trends in performance over a period for storage resources to help you identify performance issues. To view performance trends, you can select metrics for volumes, disks, or ports and specify a time range.

Related concepts

- [Customizing lists](#)

Related reference

- [Performance metrics for resources that run IBM Spectrum Virtualize](#)
 - [Controls for performance views](#)
-

Viewing the performance of storage systems

View information that is collected about the performance of storage systems in your environment. You can view trends in performance over a period for storage resources to help you identify performance issues. To view performance trends, you can select metrics for volumes, disks, or ports and specify a time range.

Before you begin

Before you view performance information about storage systems, ensure that you added a storage system for monitoring so that information is collected about it.

Procedure

1. From the Insights menu, click Performance. The 10 storage systems with the highest overall total I/O rate over a 12-hour period are displayed in the chart and selected in the performance chart legend.
2. Hover the mouse pointer over points on a line in the chart to view a snapshot of performance information at a specific time. For example, to view the overall total I/O rate for a selected storage system for a specific time during the default 12-hour period, hover over the corresponding data collection point on the line that represents the storage system.

Tip: To change the performance view, you can use various controls, for example:

- To change the default period, click the relevant option, such as 1 hour, 1 month, or 1 year. Alternatively, to modify the time range, click the start time field or end time field at the bottom of the chart.
- To change the performance metrics that are displayed, click the Metrics  icon. On the Volume Metrics tab, the Disk Metrics tab, or the Port Metrics tab, click the metric or metrics you want to display and click OK.
- To display the chart information in table format, click the  icon.

Results

The chart shows performance information for the selected storage systems for the metrics and time range that you specified. The performance chart legend shows detailed information about the storage systems.

Related concepts

- [Customizing lists](#)

Related reference

- [Performance metrics for resources that run IBM Spectrum Virtualize](#)
 - [Controls for performance views](#)
-

Reclamation views

Use the recommendations to reclaim capacity before you plan new capacity purchases.

Got an alert that your storage system is running out of capacity? Or, did you click Resources > Pools, had a look at the values in the Zero Capacity column and saw that you were running out of capacity?

Instead of purchasing more capacity, click Insights > Reclamation to see how much capacity you can reclaim.

Prerequisites for running the reclamation analysis

To determine which volumes can be reclaimed, capacity and performance data must be available for the reclamation analysis. To run the reclamation analysis, capacity data is collected for the previous day, and a daily aggregation of the performance data is collected for the previous 14 days.

How it works

The reclamation analysis is run daily and if sufficient data is collected recommendations are generated to reclaim the volumes that meet either one of the following criteria:

- The volume isn't assigned to a server.
- I/O activity was not detected in the data that was collected for the volume.

For example, the reclamation analysis is run, and it is determined that a volume isn't assigned to a server. The volume is identified as reclaimable even if I/O activity is detected for the volume. Alternatively, the reclamation analysis is run, and no I/O activity is detected for the volume. The volume is identified as reclaimable even if the volume is assigned to a server.

The reclamation analysis also detects if volumes are replica volumes, VDisk mirrored volumes, or FlashCopy® volumes. The same criteria are used to identify whether the volumes are reclaimable, but the process varies depending on the type of copy volume:

Replica volumes

The source volumes of volumes with replicas, such as volumes that use Metro Mirror or Global Mirror copy services, are analyzed to determine whether the volumes are reclaimable.

VDisk mirrored volumes

Both copies of the VDisk mirrored volume are analyzed to determine whether the volumes are reclaimable.

FlashCopy volumes

The target volumes of volumes in FlashCopy relationships are analyzed if the source volumes are identified as reclaimable.

After the analysis is run, you see the total capacity that can be reclaimed, which is broken down by tier, and by volume. (The reclaimable capacity for volumes in storage systems that use data reduction technologies isn't shown. See the restrictions below.) In the table, you get a list of the volumes, the volume's capacity, and the information that you need to decide whether you want to decommission the volumes. Tip: See volumes that are identified as reclaimable, such as volumes that are used to back up data or volumes that you recently assigned to a new application? If you don't want to include these volumes in the reclamation analysis, right-click the volumes and click Exclude from Analysis.

Before you reclaim space

It's a good practice to verify that the identified volumes are available for reclamation. Before you delete or reclaim space that was identified by IBM® Storage Insights, keep in mind the following additional considerations:

- For volumes on IBM Spectrum Accelerate and CKD volumes on DS8000®, the volumes are identified as reclaimable based on I/O activity, because information about the assignment of volumes to servers is not available.
- For non-IBM storage systems, volumes are identified as reclaimable based on I/O activity because information about their existing server assignments, replication relationships, and snapshot targets might not be available for the storage system. Check with your storage administrators to ensure that the identified volumes are available for reclamation and are not part of these other configurations.
- Volumes in storage systems that use data reduction technologies are identified as reclaimable, but the actual physical capacity of the volumes can't be determined. For example, when data is deduplicated, multiple volumes can share identical blocks of data so we don't know the actual capacity of each volume. Because we can't determine the capacity of the individual volumes, the total reclaimable capacity for each volume is displayed as zero. This applies to:
 - Volumes in IBM storage systems that support data reduction pools or volumes in storage systems that run IBM Spectrum Virtualize.
 - Volumes in IBM FlashSystem® A9000 storage systems.

Private volumes in Dell EMC storage systems are excluded from the reclamation analysis.

- [Reclamation storage overview](#)**

Use the reclamation overview to see information about reclaimable capacity in your data center. You can see the savings that can be made by reclaiming capacity for tiered and non-tiered storage and a list of the reclaimable volumes. You can also exclude volumes from the analysis for reclamation recommendations.

- [Reclamation views of storage systems](#)**

Use the reclamation view of storage systems for detailed information about the reclaimable storage in your environment. You can view the storage savings that can be made by reclaiming storage, including information about the volumes that can be reclaimed.

Reclamation storage overview

Use the reclamation overview to see information about reclaimable capacity in your data center. You can see the savings that can be made by reclaiming capacity for tiered and non-tiered storage and a list of the reclaimable volumes. You can also exclude volumes from the analysis for reclamation recommendations.

To identify the volumes that are not being used, the storage resources that you add for monitoring are regularly analyzed. A list of the volumes that are not being used is generated. You can decide in accordance with the internal procedures of your organization which of the volumes in the list can be decommissioned.

On the Reclamation View by Reclaimable Capacity page, the overview information for reclamation is shown in the following format:

Reclamation donut chart

Blue area of the donut chart

Represents the amount of storage space that is used.

Green area of the donut chart

Represents the amount of storage space that can be reclaimed.

Center of the donut chart

Provides a rounded estimate of the storage space that can be saved when the volumes that are listed in the table are reclaimed.

Reclamation by tier bar charts

Shows the amount of storage space that can be reclaimed on each tier of storage that is defined in your data center. If you did not define tiers or if some of the storage in your data center is not tiered, a separate column shows the amount of storage space that can be reclaimed for the non-tiered storage in your data center.

Show the data: To see the amount of storage that can be saved, hover the mouse pointer over the column for the tier.

Recommendations tab

View the volumes that are identified as potential candidates for reclamation.

Tip: You can select a volume or multiple volumes for exclusion from the analysis for reclamation recommendations. To exclude a volume from the analysis, right-click the volume and select Exclude from Analysis. The volume is removed from the Recommendations table and added to the Excluded table, and the charts are refreshed.

Information about reclaimable volumes

The following information is provided about each volume that is identified as a potential candidate for reclamation:

Restriction: Definitions are provided only for column headings that might require more information to understand the values that are shown in the table.

Applications

If the volume is added to an application, the name of the application is shown. If the volume is added to an application and its subcomponent, a number is shown. You can click the name or the number to view detailed information about the application.

Available Capacity (GiB)

(Previously known as Unallocated Space) The total amount of remaining space that can be used by the volume. That is, the capacity that is not used by thin-provisioned volumes. This value is determined by the formula, *Capacity - Used Capacity*.

For FlashSystem A9000, FlashSystem A9000R, and Volumes from SpecV Data Reduction Pools, this value is not available.

Capacity (GiB)

The total amount of storage space that is committed to a volume. For thin-provisioned volumes, this value represents the provisioned capacity of the volume.

Availability: All storage systems.

Hosts

The name of the host to which a volume is assigned.

Tier

The tier level of the pool in which the volume is located. If the tier level was not defined for the pool in the data center, no value is shown.

Time of Last IO

The number of days, weeks, or months when the value for the I/O rate of the volume was detected. The I/O rate is one of the determining factors for identifying the volumes that are candidates for reclamation.

Used Capacity (GiB)

(Previously known as Used Pool Space) The amount of usable capacity that is taken up by data in a storage system, after data reduction techniques have been applied.

Excluded tab

View the volumes that are excluded from the analysis for reclamation recommendations.

Tip: You can select a volume or multiple volumes for inclusion in the analysis for reclamation recommendations. To include a volume in the analysis, right-click the volume and select **Include in Analysis**. The volume is removed from the Excluded table and added to the Recommendations table, and the charts are refreshed.

Reclamation views of storage systems

Use the reclamation view of storage systems for detailed information about the reclaimable storage in your environment. You can view the storage savings that can be made by reclaiming storage, including information about the volumes that can be reclaimed.

When you add a storage system for monitoring and schedule a storage systems probe, a reclamation analysis determines the volumes that can be reclaimed.

On the Reclamation  View by Storage Systems page, the reclamation information is displayed in the following format:

Reclamation donut chart

Blue area of the donut chart

Represents the amount of non-reclaimable used capacity.

Green area of the donut chart

Represents the amount of reclaimable space.

Show the data: If you defined storage tiers for the data center, to view the amount of storage that can be saved for each tier, hover the mouse pointer over the green area.

Center of the donut chart

Provides a rounded estimate of the storage capacity that can be saved when the volumes of the storage systems that are listed in the table are reclaimed.

Reclamation bar chart

Shows the amount of storage space that can be reclaimed on each storage system in your data center.

Reclamation chart legend

The bottom section of the reclamation view is a table that shows more information about the storage systems. Each row represents a storage system, and each column provides reclamation information about the storage system.

Information about storage systems

Use the following information for a detailed description of the columns in the table:

Used Capacity (GiB)

(Previously known as Used Pool Space) The amount of usable capacity that is taken up by data in a storage system, after data reduction techniques have been applied.

Inactive Capacity (GiB)

The amount of storage system space that did not have any I/O activity in the last 14 days.

Potentially Orphaned Capacity (GiB)

The amount of storage system space that is not attached to any host and that is not the target in FlashCopy® relationships or remote copy relationships.

Reclaimable Percentage (%)

The percentage of the total capacity of the storage system that can be reclaimed. This value is the Total Reclaimable Capacity divided by the Used Capacity.

Storage System

The display name of the storage system.

Total Reclaimable Capacity (GiB)

The total amount of storage system space that can be reclaimed. This is the sum of the Inactive Capacity amount and the Potentially Orphaned Capacity amount for the storage system.

Volumes

The number of volumes on the storage system that can be reclaimed. Click the number to view which volumes can be reclaimed.

Monitoring recommended actions

Review recommended actions to understand how to address potential problems in your environment.

Use the Advisor page to view, evaluate, and manage events that include a recommended action.

For each event that includes recommended actions, you can view details such as the severity, the time it occurred, the device, and the internal resource on which it occurred. You can acknowledge recommended actions, and create reports about them. You can also use the filter tags on the upper part of the dashboard to quickly filter your recommended actions.

Viewing recommended actions

To view lists of recommended actions, complete the actions in the following table:

View recommended actions for	Steps
All monitored devices	Click Insights > Advisor.
A specific monitored device	<ol style="list-style-type: none">From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems.Right-click a storage system in the list and click View Details.Click Advisor in the General section.

Customizing the lists of recommended actions

Click the filter tags on the upper part of the page to quickly filter your recommended actions by severity or acknowledgment status. To show recommended actions of a particular severity or status, click the appropriate tag. The tag is displayed in color. To hide those recommended actions, click the tag again. The tag is displayed without color.

For example, to show only recommended actions that have an error or warning severity, click Error and Warning. The Error and Warning tags are active and are displayed in color, as shown in the following screen capture:

Unacknowledged Recommendations: 802 ✖ 20 Error ⚠ 23 Warning ⓘ 759 Informational | ⓘ 102 Acknowledged

You can also use the list of recommended actions to filter actions, sort rows, and show, hide, and reorder columns. For more information about customizing the list of recommended actions, see [Filtering lists](#), [Sorting lists](#), and [Showing, hiding, and reordering columns in lists](#).

Viewing details of recommended actions

To view the details of a recommended action, double-click the recommended action. The recommended action details are displayed in a pane.

Click another recommended action to display its details. Alternatively, click the close icon .

Exporting recommended actions

You can export recommended actions from the table that displays the recommended actions to a file. For more information about exporting information to a file, see [Exporting information to a file](#).

Types of recommended actions monitored

You can monitor all events with recommended actions that are sent by devices to IBM, that is, Call Home events.

Restriction: You might see some events in the element manager of your device that are not displayed in IBM Storage Insights. Those events are not displayed because devices don't send all events to IBM Storage Insights.

- [Acknowledging recommended actions](#)

Some recommended actions are caused by conditions that occur regularly and can be ignored. You can acknowledge those recommended actions to indicate that they were reviewed and don't require immediate attention.

Acknowledging recommended actions

Some recommended actions are caused by conditions that occur regularly and can be ignored. You can acknowledge those recommended actions to indicate that they were reviewed and don't require immediate attention.

Procedure

1. Choose how to acknowledge a recommended action:

Option	Description
Acknowledge recommended actions in the Advisor page	a. Click Insights Advisor. b. Select the recommended actions and click Acknowledge.
Acknowledge recommended actions for a specific monitored device	a. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. b. Right-click a storage system in the list and click View Details. c. Click Advisor in the General section. d. Select the recommended actions and click Acknowledge.

If some of the recommended actions that you selected are already acknowledged, those recommended actions remain acknowledged.

2. Optional: To unacknowledge a recommended action, right-click the recommended action then click Unacknowledge.

Monitoring resources

Monitor the status, space usage, and performance of storage devices. You can also monitor the operational condition of fabrics and switches, the status of their internal resources, and the performance of switches.

Before you begin

To monitor storage systems, applications, departments, general groups, fabrics, and switches, complete the following tasks:

- Add the storage systems that you want to monitor so that the metadata about the status, space usage, and performance of the storage systems and their internal resources can be collected and analyzed.
- Add the fabrics and switches that you want to monitor so that metadata about their condition, the status of their internal resources, and about switch performance can be collected and analyzed.
- Create applications that define the relationships between applications and the storage resources that they use so that you can monitor the performance and space usage of applications.
- Create departments that define the relationships between departments and the applications that departments use to monitor the space usage of departments.
- Create general groups to view information about related resources in one place.

IBM Storage Insights Pro only: Some details about resources are shown in IBM® Storage Insights, but you must subscribe to IBM Storage Insights Pro to monitor and view *all* the details. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

Restriction: IBM Storage Insights doesn't monitor the performance of iSCSI ports.

Procedure

1. Open the IBM Storage Insights Pro GUI.
2. Choose one of the following options:

Option	Description
Resources > Block Storage Systems	Monitor block storage systems
Resources > File Storage Systems	Monitor file storage systems
Resources > Object Storage Systems	Monitor object storage systems
Resources > Switches	Monitor switches
Resources > Fabrics	Monitor fabrics
Groups > Applications	Monitor applications
Groups > Departments	Monitor departments
Groups > General Groups	Monitor general groups

- **[Resource overview](#)**

Gain insights into the overall usage of space and the performance for all of the storage systems that you added for monitoring. Identify storage issues and storage trends to optimize storage tiering and to reclaim space that is not being used.

- **[Capacity views](#)**

View the information that is collected about the capacity and space usage of resources such as storage systems, applications, departments, general groups, and servers.

- **[Performance views](#)**

View the charts and the performance metrics that are collected about storage resources and their internal and related resources. Also view charts and performance metrics for switches and their internal and related resources.

- **[Monitoring switches and fabrics through chassis](#)**

Detect and investigate switch and fabric issues that might affect the availability and performance of your storage. View and analyze performance metrics, such as response times, I/O rates, and data rates. You can also monitor the configuration, status, and health of your switches and fabrics.

- **[Monitoring the status and condition of resources](#)**

Monitor the operational condition of storage systems, fabrics, and switches and the status of their internal resources. You can also view the status of Fibre Channel ports for disk controllers that are associated with a server. Use this information to identify potential problem areas in a storage environment.

- **[Opening the management GUI for the storage system](#)**

Access the management GUI or element manager for the storage system.

- **[Opening, updating, and tracking IBM Support tickets](#)**

Get hardware and software issues resolved by opening and updating tickets for IBM Support. Log packages are automatically added to new tickets.

- **[Identifying the locations of devices](#)**

Identify the locations of devices that are monitored by IBM Storage Insights. You can also apply custom tags to more easily identify, sort, or group devices based on location or another attribute that you specify.

Related reference

- [NOC dashboard](#)
-

Resource overview

Gain insights into the overall usage of space and the performance for all of the storage systems that you added for monitoring. Identify storage issues and storage trends to optimize storage tiering and to reclaim space that is not being used.

To see the charts, add storage systems so that asset, capacity, configuration, and performance metadata can be collected and analyzed. To see a breakdown of capacity by tier, assign pools to tiers.

To find out more about what is shown on the Overview dashboard, go to the following sections:

- [Resources](#)
- [Capacity charts for storage systems](#)
- [Performance chart](#)
- [Reclaimable storage chart](#)
- [Tier analysis chart](#)

Resources

See the number of storage systems (block, file, and object), switches, and fabrics that were added for monitoring and see the number of servers, applications, and departments that consume storage.

If you want to see a list of the storage resources or the resources that consume storage, click the number next to the resource. If you haven't added a resource, such as an application, hover the mouse pointer over the number 0, and then click the plus sign.

Capacity charts for storage systems

To gain insights into the usage of space in your storage environment, view the stacked bar charts or stacked area charts for the storage systems that manage block, **Object**, and **file** storage. You can also view a projection of capacity trends to help you avoid running out of space and to plan the purchase of more capacity.

Capacity projection: If metadata isn't collected for 7 days or if a sudden dip occurs in space usage, capacity projection is turned off. You can turn on capacity projection by selecting a projection period or date, but the capacity projection might not be reliable. The period for capacity projection such as 1 month, is determined by the number of days that metadata is collected. For example, if metadata was collected for 7 to 30 days, the default period for capacity projection is one month.

Depending on the amount of metadata that is collected either a stacked bar chart or stacked area chart is shown. The stacked bar chart, which consists of a single column, is divided into two sections:

Top section of the column

Shows the total amount of available capacity for the storage systems that are being monitored.

Bottom section of the column

Shows the total amount of used capacity for the storage systems that are being monitored.

Show the data: Hover the mouse pointer over the column to see the values for the total capacity, used capacity, and available capacity for all of storage systems that are being monitored.

The stacked area chart is divided into two areas:

Top area in the chart

Shows the total capacity of the storage systems that are being monitored and the total amount of available capacity.

Show the data: Hover the mouse pointer over the top line of the top area of the chart until a data collection point is shown. The values for the total capacity and available capacity are shown.

Bottom area in the chart

Shows the total amount of used capacity for the storage systems that are being monitored.

Show the data: Hover the mouse pointer over the top line of the bottom area of the chart until a data collection point is shown. The value for the used capacity is shown.

To view the projected available capacity based on current usage trends, you can select a time period, for example, three months, or specify an end date that is a maximum of two years in the future. At least seven days of historical capacity metadata must be collected to view projections. The chart displays daily data points for the historical capacity and the projected capacity. A gray line indicates when the projection starts and a red line indicates the point at which the projected available capacity is zero. If you specify an end date for the projection and view the chart after that date, the projection is turned off. The default projection is three months.

Based on your analysis of the changes to the capacity, available capacity, and used capacity, you can determine whether the capacity of the storage systems meets current and future demands for storage.

Learn more: To view the Capacity chart that shows the capacity and used capacity for each storage system, click the title of the chart.

Performance chart

To investigate and troubleshoot issues that affect the performance of the storage systems, network devices (switches, chassis, fabrics), and their internal resources, view the performance chart.

The performance chart is the starting point for investigations into potential performance problems such as low or high I/O rates.

Based on your analysis of the changes in performance, such as performance peaks and troughs, you can conduct further investigations. For example, to investigate the potential causes of surges in I/O rates, you can examine the performance of specific storage systems.

The performance chart changes over time based on the amount of metadata that is available. Sample data is shown for the first three days, hourly data for the next four days, and daily data after the seventh day.

Learn more: To show detailed information about the performance of the storage systems, click the title of the chart. You can change the start and end date for the chart and show performance trends for different performance metrics.

Reclaimable storage chart

To see the savings that can be made by reclaiming storage, a chart is generated that shows the total amount of space that can be reclaimed in your data center.

Show the data: If you defined tiers for some or all of the block storage in your data center, hover the mouse pointer over the green area in the chart. You can see the total amount of storage that can be reclaimed, and the amount of storage that can be reclaimed on each tier of storage. The amount of storage that can be reclaimed for storage that is not tiered is also shown.

Each time that data is collected for the storage systems that are being monitored, the data is analyzed to identify the volumes that are not being used and the chart is updated. A list of the volumes that are not being used is also generated and shown on the Reclamation page under the Insights menu.

Learn more: To see a list of the volumes that can be reclaimed, click the title of the chart.

Tier analysis chart

Use the charts and the table to review storage usage, storage growth, and the distribution of pools across tiers.

Try it out: Click Configuration > Tiers and discover the information that is shown about the distribution and capacity of your tiered storage.

Table 1. Chart actions

Charts	Actions
	Hover the mouse pointer over each column in the Tier by Capacity chart to review the total capacity for each tier and the total capacity of the pools that aren't tiered.
	<ul style="list-style-type: none">Hover the mouse pointer over the ring chart to find out how many pools are tiered and how many pools aren't tiered.Click Untiered pools to review the list and choose whether to assign the pools to tiers.

Review the capacity information and explore the features that are available, such as reporting and renaming tiers.

Table 2. Table actions

Feature	Actions
Reporting	<ul style="list-style-type: none">From the Actions menu, click Export and choose the format of the report that you want to create.Click Create Report to generate a report that you can send by email to your colleagues.
Renaming tiers	Click Rename Tiers to change the names of the tiers.
Tracking capacity trends	Click the Capacity tab to detect capacity shortfalls, dips and peaks in storage usage, and to compare storage usage across your tiers.

Related concepts

- [Gaining insights](#)

Related reference

- [NOC dashboard](#)

Capacity views

View the information that is collected about the capacity and space usage of resources such as storage systems, applications, departments, general groups, and servers.

If sufficient data is collected, capacity information about storage is shown in the table and chart views. The charts are generated using default key values. You can select metrics to compare the capacity of resources, such as storage systems and their resources, and to detect changes in storage usage.

- [Viewing capacity charts](#)
Go to the charts that help you detect capacity shortages and investigate space usage trends.
- [Viewing dashboard capacity charts](#)
Monitor the storage usage of your storage systems, pools, and volumes.
- [Storage systems](#)
Monitor the detailed information, such as asset, capacity, and performance data, that is collected about the block, file, and object storage systems in your environment.
- [Applications](#)
Monitor the capacity, the space usage, and the performance of the applications and the application subcomponents in your data center.

- **[Departments](#)**
Monitor the capacity and space usage of departments and subdepartments and the performance of the applications and the application subcomponents that are added to departments and subdepartments.
- **[General groups](#)**
Group your resources, such as the storage systems with lease agreements that end in the current year, so that you can view information about the resources at one location in the GUI.
- **[Servers](#)**
Use IBM® Storage Insights Pro to collect asset and space usage information about the servers in your environment. These servers are automatically created based on the host connections of monitored storage systems. Each host connection is represented as an agentless server.
- **[Tiers](#)**
Use the charts and the table to review the capacity, storage growth rates, and the distribution of pools across tiers.
- **[Investigating capacity trends](#)**
Monitor capacity and investigate trends in storage usage.
- **[Capacity and space metrics](#)**
To review trends in capacity and space usage for storage, you add metrics to capacity charts. Use the charts to help you decide whether you need more capacity and to get insights into space usage trends.

Viewing capacity charts

Go to the charts that help you detect capacity shortages and investigate space usage trends.

Table 1. View capacity charts for block storage

Actions	Navigation
View capacity charts for all block storage systems.	1. From the Resources menu, click Block Storage Systems. 2. Click Capacity and select one or more storage systems from the table.
View capacity charts for specific block storage systems.	1. From the Resources menu, click Block Storage Systems. 2. Right-click one or more storage systems and click View Capacity.
View the capacity charts for all block storage pools.	1. From the Resources menu, click Pools. 2. Right-click one or more pools and click View Capacity.
View the capacity chart for the pools in the block storage system.	1. From the Resources menu, click Block Storage Systems. 2. Right-click the storage system and click View Details. 3. In the internal resource menu, click Pools. 4. Right-click one or more pools and click View Capacity.
View the capacity charts for volumes that are compressed, or thin-provisioned or that use Easy Tier® for re-tiering volume extents in the storage system.	1. From the Resources menu, click Block Storage Systems. 2. Right-click the storage system and click View Details. 3. In the internal resource menu, click Volumes. 4. Right-click one or more volumes and click View Capacity.

Table 2. View capacity charts for file storage

Actions	Navigation
---------	------------

Actions	Navigation
» View capacity charts for all file storage systems. «	<p>»</p> <ol style="list-style-type: none"> 1. From the Resources menu, click File Storage Systems. 2. Click Capacity and select one or more storage systems from the table. <p>«</p>
» View capacity charts for specific file storage systems. «	<p>»</p> <ol style="list-style-type: none"> 1. From the Resources menu, click File Storage Systems. 2. Right-click one or more storage systems and click View Capacity. <p>«</p>
View capacity charts for all of the filesets in a file storage system.	<ol style="list-style-type: none"> 1. From the Resources menu, click File Storage Systems. 2. Right-click the storage system and click View Details. 3. In the internal resource menu, click Filesets. 4. Right-click one or more filesets and click View Capacity.
View the capacity charts for all of the file systems in a file storage system.	<ol style="list-style-type: none"> 1. From the Resources menu, click File Storage Systems. 2. Right-click the storage system and click View Details. 3. In the internal resource menu, click File Systems. 4. Right-click one or more file systems and click View Capacity.
View the capacity charts for all of the file system pools in a file storage system.	<ol style="list-style-type: none"> 1. From the Resources menu, click File Storage Systems. 2. Right-click the storage system and click View Details. 3. In the internal resource menu, click File System Pools. 4. Right-click one or more file system pools and click View Capacity.

Table 3. View capacity charts for object storage

Actions	Navigation
» View capacity charts for all object storage systems. «	<p>»</p> <ol style="list-style-type: none"> 1. From the Resources menu, click Object Storage Systems. 2. Click Capacity and select one or more storage systems from the table. <p>«</p>
» View capacity charts for specific object storage systems. «	<p>»</p> <ol style="list-style-type: none"> 1. From the Resources menu, click Object Storage Systems. 2. Right-click one or more storage systems and click View Capacity. <p>«</p>
View the capacity charts for all of the containers in an object storage system.	<ol style="list-style-type: none"> 1. From the Resources menu, click Object Storage Systems. 2. Right-click the storage system and click View Details. 3. In the object resource menu, click Containers. 4. Right-click one or more containers and click View Capacity.

Table 4. View capacity charts for tiers

Actions	Navigation
View the capacity charts for tiers.	<ol style="list-style-type: none"> 1. From the Configuration menu, click Tiers. 2. Right-click one or more tiers and click View Capacity.

Viewing dashboard capacity charts

Monitor the storage usage of your storage systems, pools, and volumes.

About this task

Use the capacity charts at the top of the Overview page to see how much capacity is available and how much capacity is provisioned and used by your standard-provisioned and thin-provisioned volumes. If the storage system supports data reduction techniques, such as compression, drive compression, deduplication, and thin-provisioning, the savings are calculated and shown in the chart.

Procedure

1. Click Dashboards > Operations.
 2. Select a storage system.
 3. Choose one of the following options:
 - a. Click View capacity by pool to get a breakdown of storage usage and the monthly growth rate for used capacity.
 - b. Click View capacity by volume to get a breakdown of the capacity, and the used and available capacity for each volume.
 - c. Click View capacity savings to get a summary of the capacity savings that includes duplication, thin provisioning, drive compression, and pool compression.
-

Storage systems

Monitor the detailed information, such as asset, capacity, and performance data, that is collected about the block, file, and object storage systems in your environment.

Storage systems can be configured for block storage, file storage, object storage, a combination of block and file storage, or a combination of file and object storage. The method that a storage system uses for managing data determines the information that IBM® Storage Insights Pro collects about that storage system.

Depending on how a storage system is configured, information about that storage system might be shown on one or more of these pages:

Block Storage Systems and File Storage Systems pages

Storage systems that can be configured for both file and block data include Storwize® V7000 Unified, Dell EMC Unity, VNX, and VNXe, Hitachi VSP, and NetApp ONTAP 9 systems.

The information that you can view about non-IBM storage systems that can be configured for both file and block data represents the complete character of the storage system. So, for a storage system that is configured only as a file system, you can view some information on the Block Storage Systems page. Similarly, for a storage system that is configured only as a block system, you can view some information on the File Storage Systems page.

Tip: Dell EMC VMAX storage systems can be configured for both file and block data; however, you can view the storage properties that are supported in SMI-S 1.6 for block storage systems only.

Block Storage Systems page only

The storage systems that are configured for storing or retrieving data only in block format include DS8000®, IBM FlashSystem® family, SAN Volume Controller, Storwize family storage systems that are configured with block storage, and XIV®, IBM Spectrum Accelerate, and the IBM Spectrum Virtualize software-only solution.

File Storage Systems and Object Storage Systems pages

The storage system that can be configured for both file and object data is IBM Spectrum Scale.

Object Storage Systems pages only

The storage system that can be configured only for object data is IBM Cloud Object Storage.

- **[Storage system details](#)**

View detailed information about the internal resources and the related resources for storage systems.

- **[Administering storage systems](#)**

Go to the pages for adding and administering the storage systems that you want to monitor. You can add and remove storage systems, edit the properties, test the connection, update the user credentials to connect to storage systems, and open the GUI for the storage systems that you added for monitoring.

- **[Viewing charts and information about storage systems](#)**

Go to the pages that show detailed information and charts about all of the storage systems and the individual storage systems and their internal and related resources.

- **[Block storage systems](#)**

Use the Block Storage Systems page to administer and monitor the status, configuration, capacity, and performance information that is collected about the block storage systems in your environment.

- **[File storage systems](#)**

Use the File Storage Systems page to administer and monitor the status, configuration, capacity, and information that is collected about the file storage systems in your environment. For IBM Spectrum Scale, you can also monitor the performance of clusters, nodes, and file systems.

- **[Object storage systems](#)**

Use the Object Storage Systems page to administer and monitor the configuration and capacity information about the object storage systems in your environment.

- **[Storage system related resources](#)**

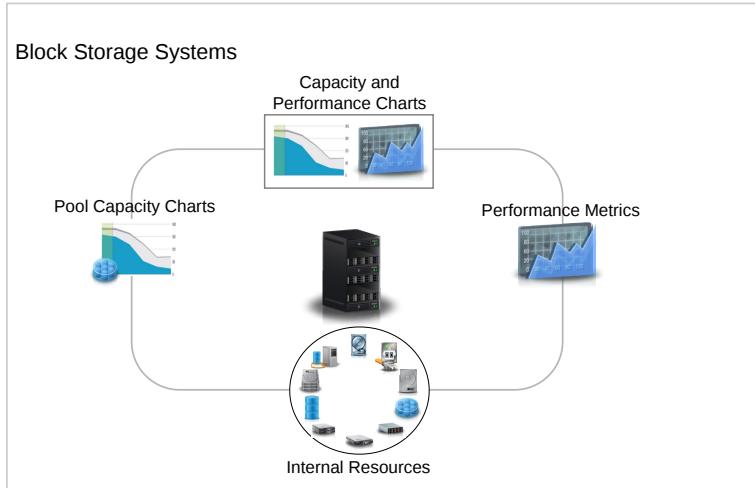
Related resources are resources that are connected to the storage system or are assigned storage from its volumes. Related resources that you can view include file systems, back-end storage systems for storage virtualizers, and object storage systems for IBM Spectrum Scale.

Related tasks

- [Opening the management GUI for the storage system](#)
- [Opening the management GUI for DS8000 storage systems](#)
- [Adding storage systems](#)

Storage system details

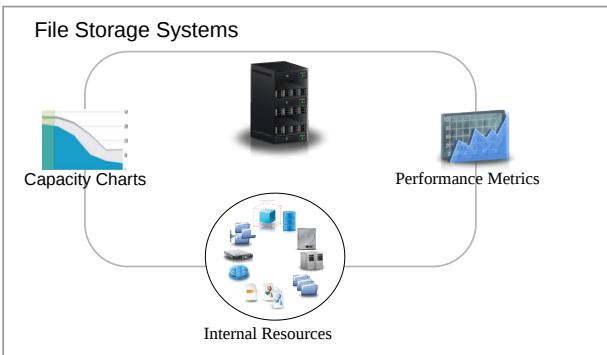
View detailed information about the internal resources and the related resources for storage systems.



Tip: To learn more, click an element in the image.

You can view the information about your block storage systems and their internal resources. You can also review the following charts to troubleshoot capacity and performance issues:

- Capacity and space usage and performance charts for the block storage system
- Capacity and space usage and performance charts for the pools in your block storage system
- Performance charts for the internal resources of your block storage system such as volumes



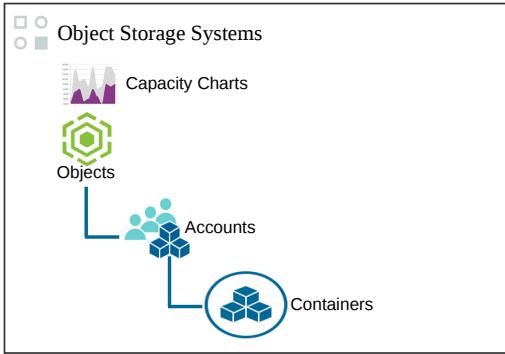
Tip: To learn more, click an element in the image.

You can view information about your file storage systems and their internal resources. You can also review the following charts to troubleshoot capacity issues:

- Capacity and space usage and performance charts for the file storage system
- Used and available capacity charts for file storage systems, file systems, and files



For IBM Spectrum Scale storage systems, you can also review the information about the performance of storage, file systems, and nodes.



Tip: To learn more, click an element in the image.

For object storage systems, you can view information about the capacity and space usage of object containers and object accounts. You can also view information about the internal resources of object storage systems, such as access pools, storage pools, COS Vaults, COS Accesser nodes, and COS Slicestor nodes.

You can view charts to monitor the capacity for your object storage systems and the availability of all the COS Vaults and COS Slicestor nodes in your object storage system.

Related reference

- [Block storage systems](#)
- [File storage systems](#)

Administering storage systems

Go to the pages for adding and administering the storage systems that you want to monitor. You can add and remove storage systems, edit the properties, test the connection, update the user credentials to connect to storage systems, and open the GUI for the storage systems that you added for monitoring.

Table 1. Add and administer the storage resources that you add for monitoring

Actions	Navigation
Add the storage systems that you want to monitor.	<ol style="list-style-type: none"> From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. Click Add Storage System.
View notifications of Call Home events on the storage system Learn more	<ol style="list-style-type: none"> Go to the details page for the storage system for which you want to view Call Home events. For example, go to Resources > Block Storage Systems. Right-click one of the storage systems, then click View Details. Click Notifications in the General section.
View recommended actions for the storage system Learn more	<ol style="list-style-type: none"> Go to the details page for the storage system for which you want to view recommended actions. For example, go to Resources > Block Storage Systems. Right-click one of the storage systems, then click View Details. Click Recommended Actions in the General section.
Set which alert policy manages a storage system Learn more	<ol style="list-style-type: none"> Go to the details page for the storage system for which you want to set the policy. For example, go to Resources > Block Storage Systems. Right-click one of the storage systems, then click View Details. Click Alerts in the General section. Click Set Policy from the Policy Actions menu. <p>To set the alert policy for multiple storage systems, go to Configuration > Alert Policies. Double-click the policy, click the resources tab, then click Edit Resources.</p>

Actions	Navigation
Create an alert policy from the alert definitions and notification settings in a storage system	<ol style="list-style-type: none"> 1. Go to the details page for the storage system from which you want to create the policy. For example, go to Resources > Block Storage Systems. 2. Right-click one of the storage systems, then click View Details. 3. Click Alerts Definitions in the General section. 4. Click Create Policy from the Policy Actions menu.
View or modify the alert policy that manages a storage system	<ol style="list-style-type: none"> 1. Go to the details page for the storage system whose policy you want to view. For example, go to Resources > Block Storage Systems. 2. Right-click one of the storage systems, then click View Details. 3. Click Alerts in the General section. 4. Click View Policy from the Policy Actions menu.
Test the connection with the storage system that you added for monitoring.	<ol style="list-style-type: none"> 1. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. 2. Right-click one of the storage systems, and click Test Connection.
Update the user name and password that is used to authenticate with the storage system that you added for monitoring. You can also change the host name or IP address.	<ol style="list-style-type: none"> 1. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. 2. Right-click one of the storage systems, and click Modify Connection.
Access the management GUI or the element manager for the storage system.	<ol style="list-style-type: none"> 1. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. 2. Click Launch Storage System GUI.
<p>Add or change the location and custom tag property settings for multiple storage systems. When you open the Edit Properties property notebook, the properties can have the following values:</p> <ul style="list-style-type: none"> If the property is blank, it means that the storage systems that were selected have different values assigned to that property. For example, the storage systems have different locations. If the selected storage systems have the same value for a property, the value is shown. 	<ol style="list-style-type: none"> 1. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. 2. Click Edit Properties.
Remove one or more of the storage systems that you added for monitoring.	<ol style="list-style-type: none"> 1. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. 2. Right-click one or more of the storage systems, and click Remove Storage System.
Stop or restart data collection for one or more storage systems.	<ol style="list-style-type: none"> 1. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. 2. Right-click one or more of the storage systems, and click Data Collection > Stop Data Collection or Data Collection > Restart Data Collection.

Related tasks

- [Restarting the collection of metadata](#)

Viewing charts and information about storage systems

Go to the pages that show detailed information and charts about all of the storage systems and the individual storage systems and their internal and related resources.

Table 1. Go to pages that show detailed information about storage systems

Actions	Navigation
» View capacity charts for block, file, and objects storage systems «	<p>»</p> <ol style="list-style-type: none"> From the Resources menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. Click Capacity and select the storage systems and the capacity metrics that you want to review. <p>«</p>
» View performance charts for block, file, and objects storage systems «	<p>»</p> <ol style="list-style-type: none"> From the Resources menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. Click Performance and select the storage systems and the performance metrics that you want to review. <p>«</p>
View the detailed information, such as the asset, capacity, and performance data, that is collected about block storage systems and the asset and capacity data that is collected about file and object storage systems.	From the Resources menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems.
View the properties of the storage system that you added for monitoring. More actions: Click Edit to add or change information about the storage system that you added for monitoring. For example, on the General tab, you can change the name and location of the storage system or add additional information about the storage systems in the custom tag fields.	<ol style="list-style-type: none"> From the Resources menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. Right-click one of the storage systems, and click View Properties.
View the charts that show the capacity, space usage, and the performance of the block storage system or the capacity and space usage of the file and object storage systems.	<ol style="list-style-type: none"> From the Resources menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. Right-click one of the storage systems, and click View Details.
View the information that is collected about the internal resources for the storage system.	<ol style="list-style-type: none"> From the Resources menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. Right-click one of the storage systems, and click View Details. In the Internal Resources section, click one of the resources such as Volumes.
View the information that is collected about the related resources. More actions: Click the Volume Mappings tab to view the information that is collected about the back-end storage systems such as how volumes are mapped, and for block storage resources click the Performance tab to view the chart that shows trends in the performance of the related resources.	<ol style="list-style-type: none"> From the Resources menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. Right-click one of the storage systems, and click View Details. In the Related Resources section, click a related resource such as the back-end storage systems that are associated with the monitored storage system.

- [Viewing information about enclosures](#)

View information about enclosures. Enclosures are the metal structures in which various storage components are mounted, including control units, nodes, disks and drives, and power supplies.

Viewing information about enclosures

View information about enclosures. Enclosures are the metal structures in which various storage components are mounted, including control units, nodes, disks and drives, and power supplies.

Information about enclosures is available for storage systems, including systems that run IBM Spectrum Virtualize.

To view information about enclosures and their related resources, complete any of the following tasks:

Table 1. Viewing information about enclosures

Actions	Navigation
<p>View information about the enclosures that are associated with a storage system.</p> <p>Depending on the type of storage system, the following information about an enclosure is shown:</p> <ul style="list-style-type: none">• Type of enclosure: Control, Expansion, or Storage• Machine Type model (MTM)• Physical location• I/O Group• The number of disks, drives, and slots that it contains• The number of nodes that it contains• The number of power supplies and canisters that it contains	<ol style="list-style-type: none">1. In the menu bar, go to Resources...> Block Storage Systems.2. Right-click a storage system and select View Details.3. Under Internal Resources, click Enclosures.
<p>View the disks in an enclosure.</p>	<ol style="list-style-type: none">1. In the menu bar, go to Resources...> Block Storage Systems.2. Right-click a storage system and select View Details.3. Under Internal Resources, click Enclosures.4. In the Disks column, click the number to view more information about each of the disks.
<p>View the enclosure that a disk or drive is in.</p>	<ol style="list-style-type: none">1. In the menu bar, go to Resources...> Block Storage Systems.2. Right-click a storage system and select View Details.3. Under Internal Resources, click Disks or Drives.4. In the Enclosure column, view the name of the enclosure.5. (Optional) To view information about the enclosure, click its name.
<p>View the nodes in an enclosure.</p>	<ol style="list-style-type: none">1. In the menu bar, go to Resources...> Block Storage Systems.2. Right-click a storage system and select View Details.3. Under Internal Resources, click Enclosures.4. In the Nodes column, click the number to view more information about each of the nodes.
<p>View the enclosure that a node is in.</p>	<ol style="list-style-type: none">1. In the menu bar, go to Resources...> Block Storage Systems.2. Right-click a storage system and select View Details.3. Under Internal Resources, click Nodes.4. In the Enclosure column, view the name of the enclosure.5. (Optional) To view information about the enclosure, click its name.

Actions	Navigation
<p>Add enclosures to general groups.</p> <p>Adding storage systems and their associated enclosures to general groups can be helpful when you want to receive alert notifications about changes to a group of logically related storage systems.</p>	<ol style="list-style-type: none"> In the menu bar, go to Resources > Block Storage Systems. Right-click a storage system and select View Details. Under Internal Resources, click Enclosures. Right-click an enclosure and select Add to General Group. Add the enclosure to an existing group or create a new group and click Save.

Block storage systems

Use the Block Storage Systems page to administer and monitor the status, configuration, capacity, and performance information that is collected about the block storage systems in your environment.

Information about block storage systems

Block storage consists of logical volumes that are provisioned to a server in a storage area network (SAN) environment. A block logical volume is typically attached to a single server with protocols such as Small Computer System Interface (SCSI) or Fibre Channel. I/O access on this type of storage system is accomplished through reading or writing individual blocks of data.

IBM Storage Insights subscribers: If you're currently using the free version of IBM® Storage Insights, some of the columns listed may not be available. Also, you must have a data collector deployed and connected to view data such as capacity and performance information. More detailed information than that provided in the hover help text is provided here for the following columns:

Acknowledged

Shows whether a user marked the status of a storage system as acknowledged. An acknowledged status means that the reported issue was reviewed and was either resolved or can be ignored.

Adjusted Used Capacity (%)

The amount of capacity that can be used without exceeding the capacity limit.

Example: Adjusted Used Capacity

Before Capacity Limit Was Set

100 GiB Capacity



■ Used Capacity = 40 GiB

□ Available Capacity = 60 GiB

After Capacity Limit Was Set

100 GiB Capacity



— Capacity Limit = 80% or 80 GiB

■ Adjusted Used Capacity = 50% or 40 GiB

↔ Capacity-to-Limit = 30% or 40 GiB

The formula for calculating Adjusted Used Capacity (%) is (Used Capacity in GiB/Capacity Limit in GiB)*100. For example, if the capacity is 100 GiB, the used capacity is 40 GiB, and the capacity limit is 80% or 80 GiB, then the value for Adjusted Used Capacity (%) is (40 GiB/80 GiB)* 100 or 50%. So, in this example, you can use 30% or 40 GiB of the usable capacity of the resource before you reach the capacity limit.

If the used capacity exceeds the capacity limit, the value for Adjusted Used Capacity (%) is over 100%.

To add the Adjusted Used Capacity (%) column, right-click any column heading on the Block Storage Systems page.

See these related values for more information Capacity Limit (%), and Capacity-to-Limit (GiB).

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Asynchronous Replica Volumes

The number of volume pairs that are in Global Mirror relationships.

Available Capacity (GiB)

(Previously known as Available Pool Space) The amount of usable capacity that is not yet used in the pools that are associated with a storage system. To calculate available capacity, the following formula is used:

(pool capacity - used capacity)

For XIV® systems and IBM Spectrum Accelerate, pool capacity is the physical capacity of the pools and does not include the provisioned capacity of the pools.

Available Written Capacity (GiB)

(Previously known as Effective Used Capacity) The amount of capacity that can be written to the pools before inline compression is applied. If the pools are not compressed, this value is the same as Available Capacity.

Important: Because data compression is very efficient, a pool can run out of Available Written Capacity while physical capacity is still available. To stay aware of your capacity needs, monitor this value and Available Capacity.

Capacity (GiB)

(Previously known as Pool Capacity) The total amount of physical and usable capacity in the storage system. Pools that are allocated from other pools are not included in the total capacity. For XIV systems and IBM Spectrum Accelerate, this value represents the physical ("hard") capacity of the storage system, not the provisioned ("soft") capacity.

Capacity Limit (%) and Capacity Limit (GiB)

The limit that was set on the capacity that is used by your storage systems. For example, the policy of your company is to keep 20% of the usable capacity of your storage systems in reserve. So, you log into the GUI as Administrator and set the capacity limit to 80%.

Example: Administrator Sets Capacity Limit to 80%



Click the illustration above to find out how to set capacity limits.

The GiB value for the capacity limit for the storage system is calculated when you set the value for the Capacity Limit (%).

To add the Capacity Limit (%) and the Capacity Limit (GiB) columns, right-click any column heading on the Block Storage Systems page.

See these related values for more information Adjusted Used Capacity (%) and Capacity-to-Limit (GiB).

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Compression Savings (%)

The estimated amount and percentage of capacity that is saved by using data compression, across all pools on the storage system. The percentage is calculated across all compressed volumes in the pools and does not include the capacity of non-compressed volumes.

For storage systems with drives that use inline data compression technology, the Compression Savings does not include the capacity savings that are achieved at the drive level.

The following formula is used to calculate the amount of storage space that is saved:

written capacity - compressed size

The following formula is used to calculate the percentage of capacity that is saved:

((written capacity - compressed size) ÷ written capacity) × 100

For example, the written capacity, which is the amount of data that is written to the volumes before compression, is 40 GiB. The compressed size, which reflects the size of compressed data that is written to disk, is just 10 GiB. Therefore, the compression savings percentage across all compressed volumes is 75%.

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

For FlashSystem A9000 and FlashSystem A9000R, all volumes in the pools are compressed.

Capacity-to-Limit (GiB)

The amount of capacity that is available before the capacity limit is reached.

Example: Capacity-to-Limit



- Capacity Limit = 80% or 80 GiB
- Adjusted Used Capacity = 50% or 40 GiB
- ↔ Capacity-to-Limit = 30% or 40 GiB

The formula for calculating Capacity-to-Limit (GiB) is (Capacity Limit in GiB - Used Capacity in GiB). For example, if the capacity limit is 80% or 80 GiB and the used capacity is 40 GiB, then the value for Capacity-to-Limit (GiB) is (80 GiB - 40 GiB or 80% - 50%) which is 30% or 40 GiB.

See these related values for more information Capacity Limit (%) and Adjusted Used Capacity (%).

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Condition

The overall condition of the storage system, which is determined by the most critical status that was detected for the storage system's internal resources. For example, if an error is detected on one of the internal resources, such as a disk, then the condition of the storage system is error. To view the individual statuses of internal resources, right-click the storage system and select View Details.

Data Collection

The aggregated status for the collection of asset, capacity, and configuration metadata and performance metadata. Two separate jobs are run to collect the metadata:

- A probe is run every day to collect asset, capacity, and configuration metadata.
- A performance monitor is run every 5 minutes to collect performance metadata. For Dell EMC storage systems, performance metadata is collected every 15 minutes.

Because separate jobs are run to collect the metadata, both collection jobs must be successful to get a Running status.

Depending on the issue with collecting metadata, the following values are shown:

Degraded

Asset, capacity, and configuration metadata or performance metadata is being collected, but the metadata might not be up-to-date or warning messages were generated when the metadata was being collected.

Failed

Asset, capacity, and configuration metadata or performance metadata, or both can't be collected. The issue is being investigated and you'll be notified when the data collection service is resumed.

In some cases, other failure status values might be displayed. You can use the wording of those other statuses to help determine why the data collection failed. For example, a status of Task expired means that the data collection didn't complete within a reasonable amount of time.

To address a status of Failed or Task expired, try restarting data collection.

To address other statuses where more information is provided in the status value, first try to address the problem that is described. (For example, a status of Credentials invalid might require that you update the user name and password that IBM Storage Insights uses to connect to a device.) Then, restart data collection.

If these problems persist, contact IBM Support. (See [Getting support](#).)

Tip: To quickly list storage systems where data collection failed, select Data Collection in the filter list and Failed in the Choose Value list. Doing so will return all storage systems that have any failure statuses reported.

Not Connected

Asset, capacity, and configuration metadata or performance metadata, or both can't be collected. If the data collection service isn't resumed, try these self-help options:

- Check that your storage system is online and that your network is up and running.
- Check that your firewall is configured to allow outbound access over HTTPS port 443 to your instance of IBM Storage Insights Pro.
- Check that the server where the data collector was installed is online.
- Restart the data collector.
- Refresh your browser.

Not Monitored

Asset, capacity, configuration, and performance metadata can't be collected from the storage system because the connection details for the storage system were not provided.

If a data collector is deployed and you want to monitor the storage system, click Dashboards > NOC, and then click Add Storage Systems.

If a data collector isn't deployed, click Configuration > Data Collectors, and then click Deploy Data Collector. Then, add the connection details for the storage system.

Multiple data collectors: If you deployed multiple data collectors, you don't have to choose which data collector collects the metadata from the storage system. To collect the metadata from the storage system, IBM Storage Insights Pro tests the response time for each data collector and chooses the data collector with the fastest response time.

Support: Subscribers are notified by email when issues with collecting data are detected. If an issue with collecting data persists and you can't resolve the issue, you can get help by submitting a post in the [IBM Storage Community](#). For other support options, see [Looking for help](#).

Deduplication Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication, across all data reduction pools on the storage system. The percentage is calculated across all deduplicated volumes in the pools and does not include the capacity of volumes that are not deduplicated.

The following formula is used to calculate the amount of storage space that is saved:

```
written capacity - deduplicated size
```

The following formula is used to calculate the percentage of capacity that is saved:

```
((written capacity - deduplicated size) ÷ written capacity) × 100
```

For example, the written capacity, which is the amount of data that is written to the volumes before deduplication, is 40 GiB. The deduplicated size, which reflects the size of deduplicated data that is written to disk, is just 10 GB. Therefore, data deduplication reduced the size of the data that is written by 75%.

Availability: FlashSystem A9000, FlashSystem A9000R, and resources that run IBM Spectrum Virtualize version 8.1.3 or later.

Drive Compression Savings (%)

The amount and percentage of capacity that is saved with drives that use inline data compression technology. The percentage is calculated across all compressed drives in the pools.

The amount of storage space that is saved is the sum of drive compression savings.

The following formula is used to calculate the percentage of capacity that is saved:

```
((used written capacity - compressed size) ÷ used written capacity) × 100
```

Availability: Storage systems that contain IBM FlashCore® Modules with hardware compression.

FC Ports

The number of Fibre Channel ports that are on the nodes on a storage system.

FlashCopy® Volumes

The number of volumes that are in FlashCopy pair relationships.

IP Ports

The number of Internet Protocol ports that are on the nodes on a storage system.

Mapped Capacity (GiB)

(Previously known as Assigned Volume Space) The total volume space in the storage system that is mapped or assigned to host systems.

Mirrored Volumes

The number of volumes that are used for VDisk mirroring. The number includes target volumes or secondary volumes of mirrored volumes in storage virtualizer pools. The mirrored volumes are in pools in SAN Volume Controller and Storwize® family storage systems that are configured with block storage.

Learn more: To view more information about the volumes, click the number that is shown in the column.

Name

A user-defined name of the storage system. If a name was not defined, the name that was defined when the storage system was added for monitoring is shown.

Provisioned Capacity (%)

(Previously known as Virtual Allocation) The percentage of physical capacity in the pools that is committed to the total provisioned capacity of the volumes. If the value is greater than 100%, more provisioned capacity is committed to the volumes than is physically available to the pools.

To calculate the provisioned capacity percentage, the following formula is used:

```
[(total provisioned capacity ÷ pool capacity) × 100]
```

For example, if the provisioned capacity percentage is 200% for a storage pool with a physical capacity of 15 GiB, then the provisioned capacity that is committed to the volumes in the pools is 30 GiB. Twice as much capacity is committed to the pools than is physically available to the pools. If the provisioned capacity percentage is 100% and the physical capacity is 15 GiB, then the provisioned capacity that is committed to the pools is 15 GiB. The total physical capacity that is available to the pools is allocated to the volumes in the pools.

A provisioned capacity percentage that is higher than 100% is considered to be aggressive because there is insufficient physical capacity available to the pools to satisfy the allocation of the committed capacity to the compressed and thin-provisioned volumes in the pools. In such cases, you can check the Shortfall (%) value to determine how critical the shortage of capacity is for the storage system pools.

Hover the mouse pointer over the percentage bar to view the following values.

Capacity

The total amount of capacity in pools.

Note: For Hitachi VSP, the following formula is used to calculate the capacity:

$$[(\text{provisioned capacity} + \text{overhead for thin pool space}) \div \text{pool capacity}] \times 100$$

Provisioned Capacity (GiB)

(Previously known as Total Volume Capacity) The total storage space on all the volumes in pools.

Raw Capacity (GB)

(Previously known as Raw Disk Capacity) The total raw (unformatted) disk capacity of a storage system. The capacity of managed disks and external disks for storage virtualizers is included in the calculation. The capacity of spare disks that are identified on IBM System Storage® DS8000® storage systems is not included in the calculation.

Read Cache

The amount of reach cache memory that is internal to the storage system.

Recent Fill Rate (%)

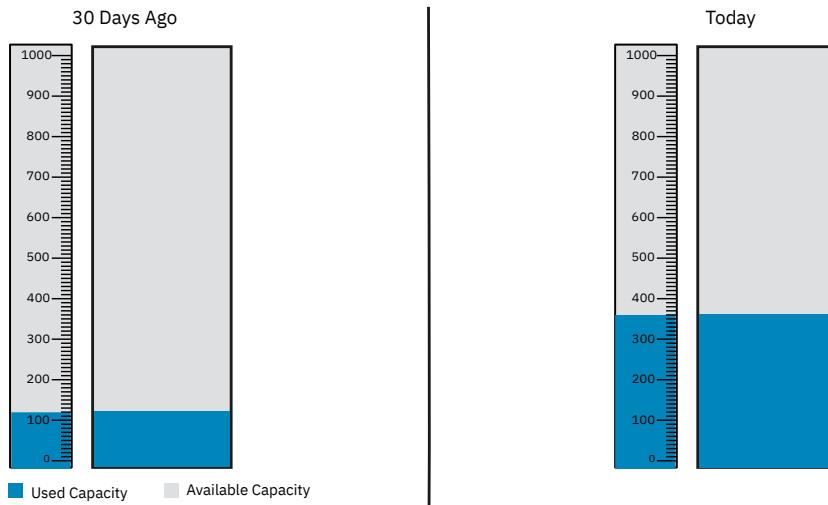
The rate at which the capacity of the storage system is being consumed over the last 30 days. Use this value to see how quickly your storage systems are filling up.

The Recent Fill Rate (%) tells you how quickly your storage systems are filling up

The Recent Fill Rate (%) of the storage system is the difference between the fill rate % of the storage system 30 days ago and today's fill rate % of the storage system.

The fill rate % of the storage system is calculated by dividing the capacity of the storage system by its used capacity and multiplying it by 100.

Example



The fill rate % of the storage system 30 days ago was $(120/1000) \times 100$, which is 12%.

The fill rate % of the storage system today is $(360/1000) \times 100$, which is 36%.

So, in this example, the Recent Fill Rate (%) for the storage system is $(36\% - 12\%)$, which is 24%.

If 30 days of historical data is not available, it is the difference between today's fill rate % and the oldest value for the fill rate % in the last 30 days.

If you want to add the growth rate in GiB, right-click any column heading and click Recent Growth (GiB).

To see the Recent Fill Rate (%) for the pools in IBM Storage Insights Pro, double-click the storage system, and click View capacity by pool on the Overview page.

To see the Recent Fill Rate (%) for the pools in IBM Storage Insights, double-click the storage system, and click View capacity by pool in the Capacity section of the Overview tab.

Did you know:

Create Capacity and Inventory Reports



➡ Create Capacity Reports



➡ Create Inventory Reports

IBM Storage Insights users can now also create capacity reports for block storage systems and pools, and inventory reports for block storage systems. Try it out! From the menu, click Reports and pick a report.

Recent Growth (GiB)

The amount of used capacity that is consumed by the storage system over the last 30 days. Use this value to identify the storage systems with the highest growth rates in used capacity.

Recent growth is the difference between today's used capacity of the storage system and the used capacity of the storage system that was reported 30 days ago. If 30 days of historical data is not available, it is the difference between today's used capacity for the storage system and the oldest value for the used capacity of the storage system that was reported in the last 30 days.

To see the growth in used capacity for the pools in IBM Storage Insights Pro, double-click the storage system, and click View capacity by pool on the Overview page.

To see the growth in used capacity for the pools in IBM Storage Insights, double-click the storage system, and click View capacity by pool in the Capacity section of the Overview tab.

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Safeguarded Capacity (GiB)

The total amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000.

Shortfall (%)

The percentage of the remaining unused volume capacity in a pool that is not available to be used. The shortfall represents the relative risk of running out of capacity for overallocated thin-provisioned volumes. If the pools have sufficient available capacity to satisfy the remaining unused volume capacity, no shortfall exists. As the remaining unused volume capacity grows, or as the available pool capacity decreases, the shortfall increases and the risk of running out of capacity becomes higher. If the available capacity of the pool is exhausted, the shortfall is 100% and any volumes that are not yet fully used have run out of space.

To calculate the shortfall, the following formula is used:

`[(overprovisioned capacity ÷ committed but available capacity) × 100]`

You can use this percentage to determine when the amount of over-committed capacity in pools is at a critically high level.

Specifically, if the physical capacity in pools is less than the committed provisioned capacity, then the pools do not have enough capacity to fulfill the commitment to provisioned capacity. The shortfall represents the percentage of the committed provisioned capacity that is not available in pools. As more space is used over time by volumes while the pool capacity remains the same, this percentage increases.

For example, there are two pools in a storage system. Each pool has a different capacity and amount of space that is committed to its volumes.

- The physical capacity of pool "A" is 70 GiB, but 150 GiB of provisioned capacity was committed to volumes. If the volumes are using 50 GiB, 100 GiB is still committed to the volumes (150 GiB - 50 GiB). Only 20 GiB of capacity (70 GiB - 50 GiB) in the pool is available. For this pool, the overprovisioned capacity is 80 GiB (100 GiB - 20 GiB) and the shortfall is 80% [(80 GiB ÷ 100 GiB) × 100].
- The physical capacity of pool "B" is 200 GiB, but only 35 GiB of provisioned capacity was committed to volumes. If the volumes are using 10 GiB, 25 GiB is still committed to the volumes (35 GiB - 10 GiB). In this case, 190 GiB of remaining capacity in the pool (200 GiB - 10 GiB) is enough to contain the 25 GiB that is still committed to the volumes. For this pool, the overprovisioned capacity is 0 GiB and the shortfall percentage is 0%.

If a storage system consists of pools A and B, the overprovisioned capacity for the storage system is 80 GiB (80 GiB from pool A + 0 GiB from pool B). The space that was committed to volumes but not yet allocated is 125 GiB (100 GiB from pool A + 25 GiB from pool B). Therefore, the shortfall percentage for the storage system is 64% [(80 GiB ÷ 125 GiB) × 100].

The first section of the bar uses the color blue and a percent (%) sign to represent the shortfall percentage. The second section of the bar uses the color gray to represent the volume space that is not allocated. Hover the mouse pointer over the percentage bar to view the following values.

Overprovisioned Capacity

(Previously known as Unallocatable Volume Space) The amount of capacity by which the Provisioned Capacity exceeds the physical capacity of a pool. In thin-provisioned environments, it is possible to over commit (over provision) storage in a pool by creating volumes with more provisioned capacity than can be physically allocated in the pool. This value represents the amount of volume capacity that cannot be used based on the current capacity of the pool.

Unused Capacity

(Previously known as Unallocated Volume Space) The amount of the Provisioned Capacity in pools that is not used. The space that is used by thin-provisioned volumes is typically less than their provisioned capacity. Therefore, the capacity that is not used represents the difference between the provisioned capacity and the used capacity for all the volumes in the pool.

»Support Contract«

Shows if the storage system has a contract with IBM support and the status of that contract. The following values might be shown:

Confirmed

The storage system or component has an active contract with IBM Support.

Blank

This value is blank if the storage system or component does not have an active contract with IBM Support.

Tip: To see the status of the support contract for storage virtualizers, you must view the properties of the associated nodes or enclosures.

«

Synchronous Replica Volumes

The number of volume pairs that are in Metro Mirror relationships.

Total Capacity Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication, pool compression, thin provisioning, and drive compression, across all volumes in the pool.

The following formula is used to calculate the amount of storage space that is saved:

[Provisioned Capacity - Used Capacity]

The following formula is used to calculate the percentage of capacity that is saved:

((Provisioned Capacity - Used Capacity) ÷ Provisioned Capacity) × 100

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Turbo Performance

The turbo performance mode determines whether the performance of the Storwize or SAN Volume Controller storage system is enhanced. If turbo performance mode is not available for the storage system, the field is left blank.

Unmapped Capacity (GiB)

(Previously known as Unassigned Volume Space) The total volume space in the storage system that is not mapped or assigned to storage systems.

Unprotected Volumes

The number of volumes that don't have copies and that are not the source volume or the target volume of a copy services relationship.

Used Capacity (%)

(Previously known as Physical Allocation) The percentage of physical capacity in the pools that is used, including overhead capacity. The value is always less than or equal to 100% because you cannot use more physical capacity on the volumes than is available in the pools.

To calculate used capacity percentage, the following formula is used:

[(used capacity ÷ pool capacity) × 100]

For example, if the used capacity percentage is 25% for a storage pool with a capacity of 200 GiB, then the capacity that is allocated to the volumes is 50 GiB.

A bar is displayed which represents the total amount of storage capacity in pools. Move the mouse pointer over the bar to display a text summary and details of the used capacity and the pool capacity, which is divided into the following values:

Used Capacity

(Previously known as Allocated Space) The physical capacity that is used on all of the volumes, which includes thin-provisioned, compressed, and standard-provisioned volumes, in the pools on the storage system. If the empty thin-provisioned volumes are removed from the pools, it might not change the value of used capacity, which represents that the thin-provisioning and data reduction are combined.

Note: For Hitachi VSP, used capacity is the total amount of capacity that is allocated to standard-provisioned volumes that are not used for thin-provisioned pools, and the real capacity that is allocated to thin-provisioned volumes.

Capacity

The total amount of space in storage system pools.

Used Written Capacity (%)

(Previously known as Effective Used Capacity) For devices with inline hardware compression, the effective used capacity percentage is the percentage of capacity that is provisioned to the standard-provisioned volumes and the thin-provisioned volumes, given the drive compression savings.

Used Written Capacity (GiB)

(Previously known as Effective Used Capacity) The amount of capacity that is written to the volumes in a pool before inline disk compression is applied. If a pool is not compressed, this value is the same as Used Capacity.

Write Cache

The amount of write cache memory that is internal to the storage system.

Written Capacity Limit (GiB)

(Previously known as Effective Capacity) The maximum of amount of capacity that can be written to a pool before inline-disk compression is applied. If a pool is not compressed, this value is the same as Capacity.

WWN

The worldwide name (WWN) of a back-end storage system that is providing storage to a storage virtualizer. A WWN is the unique 64-bit identifier for a back-end storage system. This column is only shown on this page when you view the back-end storage systems that are related to a storage virtualizer.

- [**Overview charts**](#)

Monitor the activity and storage usage of your storage systems. Use the charts and key metrics to gauge the workload activity of your storage resources and to check whether you have sufficient capacity.

- [**Setting capacity limits**](#)

If your company has a policy to maintain a reserve of available capacity, you can set a limit on the amount of capacity that is used by your storage systems and pools.

- [**Block internal resources**](#)

See information about the status, capacity, and space usage of the internal resources for block storage systems.

- [**Block storage copy data resources**](#)

See information about the capacity, space usage, and relationships of block storage systems and how the copy data resources are used for primary and copied data.

Overview charts

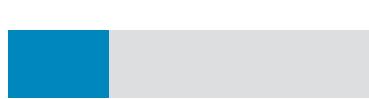
Monitor the activity and storage usage of your storage systems. Use the charts and key metrics to gauge the workload activity of your storage resources and to check whether you have sufficient capacity.

Block storage systems

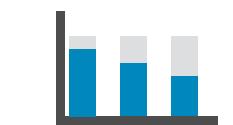
To monitor storage usage, detect capacity shortages, and plan your capacity needs, use the charts on the Overview page.

Figure 1. Capacity and activity charts

Types of Overview Charts



Capacity Overview Charts



Capacity by Resource Charts



Workload Activity Charts

Three types of charts are provided:

- Capacity overview charts
- Capacity by storage resource charts
- Workload activity charts

The Capacity chart at the top of the Overview page shows how much capacity is used and how much capacity is available for storing data.

The Provisioned Capacity chart shows the written capacity values in relation to the total provisioned capacity values before data reduction techniques are applied. The following values are shown:

- The capacity of the data that is written to the volumes as a percentage of the total provisioned capacity of the volumes.
- The amount of capacity that is still available for writing data to the thin-provisioned volumes in relation to the total provisioned capacity of the volumes. Available capacity is the difference between the provisioned capacity and the written capacity, which is the thin-provisioning savings.

In the capacity overview chart, a horizontal bar is shown when a capacity limit is set for the storage system. Just hover over the chart to find out what the capacity limit is and how much capacity is left before the capacity limit is reached.

To get a breakdown of the capacity usage by pool or volume, click the links.

Try it: Click View capacity by pool. You get a capacity breakdown of the storage system by pool, and you can see the recent fill and growth rates for each pool in the storage system.

Depending on the type of storage system, the following activity and capacity by storage resource charts are shown:

Table 1. Capacity by storage resource

Chart Name	Purpose
Capacity	Use this chart to monitor the available, used, and provisioned capacity in your storage system over the last 30 days.
Capacity by Host	Use this chart to monitor the current capacity of the storage system that is mapped to hosts.
Capacity by Pool	Use this chart to monitor the current available and used capacity of your largest pools.
Capacity by Volume	Use this chart to monitor the current used and unused provisioned capacity of your largest volumes.
Capacity by Tier	Use this chart to monitor the current used and available capacity of the pools that are assigned to tiers.

Table 2. Activity charts

Chart Name	Purpose
Overall system activity	Use this chart to monitor the overall activity of your storage system, which is broken down into total I/O rate, read I/O rate, and write I/O rate in operations per second over the last 24 hours.
Most Active Nodes	Use this chart to monitor the nodes with the heaviest workloads, which is calculated in operations per second, over the last 24 hours.
Most Active Pools	Use this chart to monitor the pools with the heaviest workloads, which is calculated in operations per second, over the last 24 hours.
Most Active Volumes	Use this chart to monitor the volumes with the highest response times over the last 24 hours.
MDisk Activity	Use this chart to monitor managed disks (M Disks) with the heaviest workloads, which is calculated in operations per second, over the last 24 hours.

Setting capacity limits

If your company has a policy to maintain a reserve of available capacity, you can set a limit on the amount of capacity that is used by your storage systems and pools.

Before you begin

Only users with Administrator privileges can set capacity limits.

About this task

When you set a limit on the amount of capacity that is used, you can monitor whether the capacity that is used is above or below the limit that you set. You can also define alerts that notify you when you are over the capacity limit.

You can set the same capacity limit:

- For all storage systems or one or more storage systems
- For all pools or one or more pools

Alternatively, you can set different capacity limits for storage systems and pools.

Tip: FlashSystem A9000 and FlashSystem A9000R storage systems are configured to report storage consumption at the storage system rather than the pool level. So, if you want to set a capacity limit for these types of storage systems, set the capacity limit for the storage systems.

Procedure

1. To set the capacity limit for storage systems or pools, choose one of the following options:

Storage Resource	Step
Block Storage Systems	Click Resource, and then click Block Storage Systems.
Pools	Click Resource, and then click Pools.

2. Select the storage systems or pools.

Tip: To select multiple storage systems or pools, press Shift and click.

3. Right-click and click View Properties.
4. Click Edit Properties
5. Enter the percentage value for the capacity limit.
6. Save your changes.

Results

The capacity limit is set and can be shown as a percentage value or GiB value. Just right-click any column heading and add Capacity Limit (%) or Capacity Limit (GiB) to the Block Storage Systems or Pools pages. You can also add the Adjusted Used Capacity (%) column which tells you how much used capacity is left based on the capacity limit. By default, the Capacity-to-Limit (GiB) column is shown on the Block Storage Systems and Pools pages so that you can see how much available capacity you have left before you reach the capacity limit.

Zero capacity: When you set the capacity limit for pools, the values shown for Zero Capacity are readjusted to take into account the capacity limit of the pool. The date will represent when the capacity limit of the pool is reached. If the pool has already reached the capacity limit, Depleted is shown. None is shown when a trend in storage consumption can't be detected because the pool's storage isn't being consumed or because not enough data was collected to predict storage consumption.

- [**Tutorial: Investigating compliance with the capacity limit**](#)
Track the compliance of your block storage systems with the capacity limit.
 - [**Removing the capacity limit**](#)
Remove the capacity limit that was set for your storage systems and pools.
 - [**Capacity limit metrics**](#)
Monitor how much capacity is available for storing data when you set a capacity limit for your storage systems and pools.
-

Tutorial: Investigating compliance with the capacity limit

Track the compliance of your block storage systems with the capacity limit.

About this task

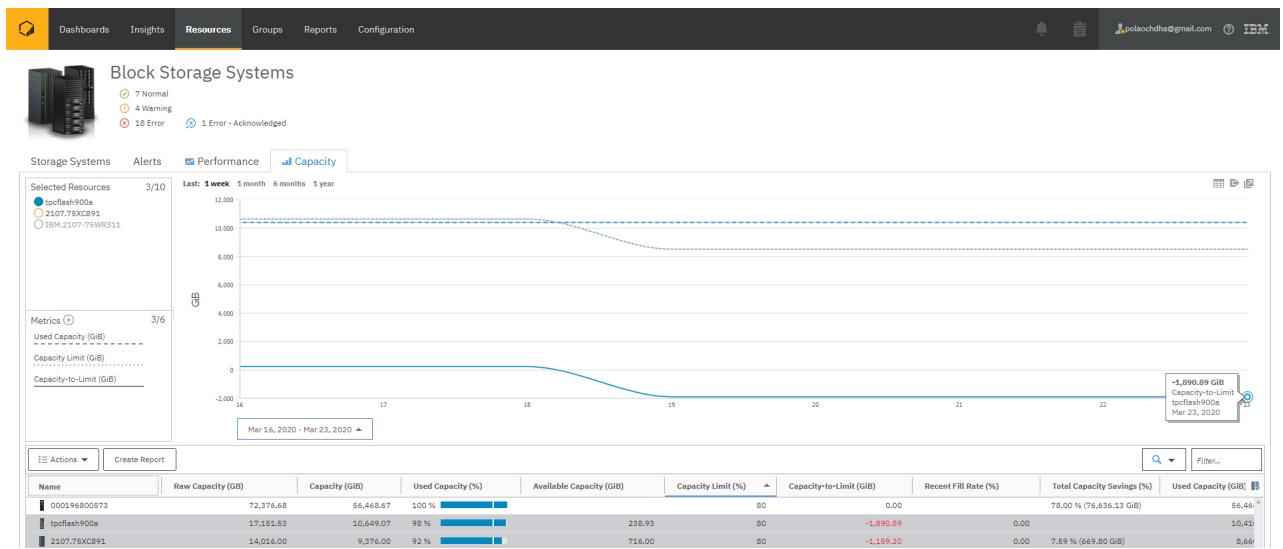
In this tutorial, you set the capacity limit for the storage systems on your production platform to 80%. Today, you want to create a chart that plots the compliance of your block storage systems with the capacity limit that was set.

Because you want to track capacity in relation to the capacity limit, you remove the Capacity (GiB) metric from the chart. And, you add the following metrics to track whether the available capacity of each storage system is over or under the capacity limit:

- Capacity Limit (GiB)
- Capacity-to-Limit (GiB)

Procedure

1. From the Resources menu, click Block Storage Systems.
2. Click the Capacity tab.
3. Select the storage systems that you want to add to the capacity chart.
To select multiple storage systems, press shift and click. You can add up to 10 storage systems at a time to the capacity chart.
4. Click the Select Chart Metrics button, add Capacity Limit (GiB) Capacity-to-Limit (GiB), and click Save.



Tip: To see the capacity metrics for a single resource, click a storage system in the Selected Resources section of the chart. And, if you want to focus on a specific period, you can change the default date range of a month to a week, or select start and end dates.

Results

You can identify the storage systems that comply with the capacity limit that was set.

Removing the capacity limit

Remove the capacity limit that was set for your storage systems and pools.

About this task

Only users with Administrator privileges can remove the capacity limit.

Procedure

1. To remove the capacity limit for storage systems or pools, choose one of the following options:

Storage Resource	Step
Block Storage Systems	Click Resource, and then click Block Storage Systems.
Pools	Click Resource, and then click Pools.

2. Select the storage systems or pools.

Tip: To select multiple storage systems or pools, press shift and click.

3. Right-click, and then click View Properties.

4. Click Edit.

5. Complete one of the following action:

- If the pools or storage systems have the same capacity limit, delete the capacity limit.
- If the pools or storage systems have different capacity limits, enter 0 in the Capacity Limit (%) field and press the Backspace key.

6. Save your changes.

Capacity limit metrics

Monitor how much capacity is available for storing data when you set a capacity limit for your storage systems and pools.

Capacity Limit (%)

As an Administrator, you can set a Capacity Limit (%) for block storage systems, or pools, or both. In this scenario, you want to keep 20% of your usable capacity in reserve so you set the capacity limit to 80%.

Example: Administrator Sets Capacity Limit to 80%



To see the GiB or percentage value for the capacity limit, right-click any column heading on the Block Storage Systems or the Pools pages and add them.

To monitor how much capacity is available in relation to the capacity limit that you set, the used and available capacity values are adjusted and are shown in the following columns:

- Adjusted Used Capacity (%)
- Capacity-to-Limit (GiB)

To see the values for Adjusted Used Capacity (%), right-click any column heading on the Block Storage Systems page or Pools page and add it.

Adjusted Used Capacity (%)

To know how much capacity can be used without exceeding the capacity limit, monitor the value for Adjusted Used Capacity (%).

Example: Adjusted Used Capacity



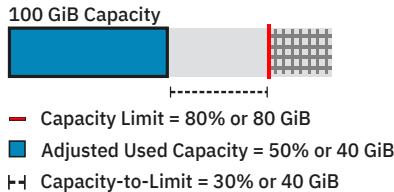
The formula for calculating Adjusted Used Capacity (%) is $(\text{Used Capacity in GiB}/\text{Capacity Limit in GiB}) * 100$. Using the values that are shown in the illustration above, the value is $(40 \text{ GiB}/80 \text{ GiB}) * 100$ or 50%. So, in this scenario, you can use 30% or 40 GiB of the usable capacity of the resource before you reach the capacity limit.

If the used capacity exceeds the capacity limit, the value for Adjusted Used Capacity (%) is over 100%.

Capacity-to-Limit (GiB)

Use the value for Capacity-to-Limit (GiB) to monitor how much available capacity is left before the capacity limit is reached.

Example: Capacity-to-Limit



The formula for calculating Capacity-to-Limit (GiB) is $(\text{Capacity Limit in GiB} - \text{Used Capacity in GiB})$. Using the values that are shown in the illustration above, the value is $(80 \text{ GiB} - 40 \text{ GiB})$ or 40 GiB.

If the capacity limit is exceeded, a negative value is shown for Capacity-to-Limit (GiB).

Block internal resources

See information about the status, capacity, and space usage of the internal resources for block storage systems.

- [Nodes, modules, and directors](#)

View the information that is shown about nodes, spare nodes, modules, and directors in block storage systems.

- [**Drives and disks**](#)
View the information that is shown about disk drives or disks in block storage systems.
- [**Enclosures**](#)
View information about the enclosures for storage systems. Enclosures are the metal structures in which various storage components are mounted, including control units, nodes, disks or drives, and power supplies.
- [**External disks**](#)
View the information that is shown about external disks or disk drives in block storage systems.
- [**FC ports**](#)
View the information that is shown about Fibre Channel (FC) ports in block storage systems.
- [**Host connections**](#)
View the information that is shown about host connections in block storage systems. For VMAX storage systems, the Host Connections tab is renamed Masking Views.
- [**I/O groups**](#)
View the information that is shown about I/O groups in block storage systems.
- [**IP ports**](#)
View information about IP ports to monitor the health and status of the IP ports, and to determine whether the ports are used for hosts, storage, or management. You can view information about IP ports on nodes on block storage systems that run IBM Spectrum Virtualize, such as IBM FlashSystem® family, SAN Volume Controller, and the IBM® Storwize® family.
- [**Managed disks, external volumes, and array LUNs**](#)
View the information that is shown about managed disks or disk drives, external volumes, and array LUNs in block storage systems.
- [**Pools, aggregates, and common provisioning groups**](#)
View the information that is shown about pools, aggregates, and common provisioning groups in block storage systems.
- [**»Host adapters«**](#)
View the information that is shown about host adapters in DS8000® block storage systems.
- [**RAID arrays**](#)
View the information that is shown about RAID arrays in block storage systems.
- [**»Device adapters«**](#)
View the information that is shown about device adapters in DS8000 block storage systems.
- [**Volumes**](#)
View the information that is shown about volumes in block storage systems.

Nodes, modules, and directors

View the information that is shown about nodes, spare nodes, modules, and directors in block storage systems.

The type of the storage system determines which of these components can be viewed. For example, the Nodes tab is renamed Directors for VMAX storage systems.

The following information is shown for the nodes or modules in the storage system:

Acknowledged

Shows whether a user marked the status of a node or module as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of a node is Error, then the status of the related storage system is also Error. If the Error status of the node is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Compression

The compression level of a node is inherited from the associated I/O group. Possible values are listed.

Unsupported

Indicates that the associated I/O group does not support compressed volumes or nodes are down-level for supporting compressed volumes.

Supported

Indicates that the associated I/O group supports compressed volumes.

Active

Indicates that the associated I/O group is compression active, and contains at least one compressed volume.

Availability: Nodes on storage systems that run IBM Spectrum Virtualize. These nodes support Random Access Compression Engine (RACE) compression for volumes in standard pools.

Configuration Node

Indicates whether a node is a configuration node. This value is set to Yes if the node is the only node in the cluster.

Enclosure

The enclosure that is associated with the canister node. A node can be associated with a single enclosure only.

FC Ports	The number of Fibre Channel ports that are on the node or module.
I/O Group	The display name of the I/O group in which the node is a member.
IP Ports	The number of Internet Protocol ports that are on a node.
Read Cache (GiB)	The amount of read cache memory that is available on the node.
Spare Nodes	The nodes that are available as spares for a node. Availability: Storage systems that are running IBM Spectrum Virtualize Version 8.1.0 and later.
Status	The status of the node or module. Use the status to determine the condition of the storage resource, and if any actions must be taken. For example, if a node has an Error status, take immediate action to correct the problem.
Write Cache (GiB)	The amount of write cache memory that is available on the node.
WWN	The worldwide network name of the node.
Site	The physical location of the node in a stretched cluster. The site column is blank if no site is configured.

Drives and disks

View the information that is shown about disk drives or disks in block storage systems.

The following information is shown for each drive or disk:

Acknowledged	Shows whether a user marked the status of a disk or drive as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined. For example, if the status of a disk or drive is Error, then the status of the related storage system is also Error. If the Error status of the disk or drive is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.
Aggregate	The aggregate that contains the disk. An aggregate is a collection of RAID groups that consist of physical disks. Availability: NetApp storage systems.
Array Site	The array site to which this disk belongs. Usually, each array site has four or eight disks. Applies to DS8000® disks only.
Capacity (GiB)	For uncompressed disks or drives, the capacity is the same as the physical capacity and represents the total amount of unformatted storage space. For compressed disks or drives, the capacity is the estimated amount of data that can be written to the disk or drive. This value is larger than the physical capacity because drive compression is used to reduce the size of the data.
Capacity (GB)	The decimal equivalent of the Capacity (GiB) metric.
Class	The technology type of the disk or drive, such as Solid-State Drive, NVMe SSD, Storage Class Memory, Flash, Fibre Channel (FC), SATA, and other types.
Compressed	Shows whether the disk or drive uses inline data compression to automatically compress the data that is written.
Enclosure	For FlashSystem A9000 and FlashSystem A9000R The number of the flash enclosure in which a drive is installed. For FlashSystem 9100 and FlashSystem 900 The enclosure where the drive resides. A drive can be associated with a single enclosure only. For SAN Volume Controller, the IBM® Storwize® family, and FlashSystem V9000 The enclosure or node where the disk resides. A disk can be associated with a single enclosure or node only.
Location	A code that represents the physical location of a disk within the hardware of a storage system. Applies to DS6000™ and DS8000 disks only.

Name	The internal identifier of a disk or drive. For DS8000 storage systems, this name uniquely identifies a disk within a single array site.
Physical Capacity (GiB)	The total amount of unformatted storage space on the disk or drive. For disks or drives that use inline data compression, the physical capacity is smaller than the capacity of the disk or drive because compression is used to reduce the size of the data. Available for: Storage systems with disks or drives that use inline data compression, such as FlashSystem 9100 and Storwize V7000 Gen3.
Rank	The rank to which a disk belongs. This rank is associated with the array site of the disk. If no rank is defined, the value None is shown. Applies to DS8000 disks only.
Slot	The slot number of the disk or drive within the associated enclosure or node.
Spare	Shows whether a disk or drive is a spare disk or drive. A spare disk or drive is not allocated for storage and is predesignated for use as a replacement for a failed disk or drive.
Speed (RPM)	The number of revolutions per minute of a disk.
Status	The status of a disk or drive. Use the status to determine the condition of the disk or drive, and if any actions must be taken. For example, if a disk has an Error status, take immediate action to correct the problem. If the disk has an Operational status, then it is operating normally and no further action is required.

Enclosures

View information about the enclosures for storage systems. Enclosures are the metal structures in which various storage components are mounted, including control units, nodes, disks or drives, and power supplies.

Use the information on the Enclosures page to complete these monitoring tasks:

- View the physical site where the enclosure is located.
- View the number of disks, drives, slots, nodes, power supplies, and canisters in the enclosure.
- Understand the associations between the enclosure and its disks and nodes.
- Identify the I/O group that is associated with the enclosure.
- Determine whether an enclosure is a control, expansion, or storage enclosure.

Information about enclosures is available for the following storage systems:

- FlashSystem 9100
- FlashSystem V9000
- FlashSystem 900
- SAN Volume Controller
- IBM® Storwize® family

Additional information is provided about the following attributes of enclosures:

Acknowledged

Shows whether a user marked the status of an enclosure as acknowledged. An acknowledged status indicates that its status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of the associated storage system is determined.

For example, if the status of an enclosure is Error, then the status of the related storage system is also Error. If the Error status of the enclosure is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Canisters

The number of power supply units (PSUs) in the enclosure. Each enclosure has at least 2 PSUs for redundancy.

I/O Group

The I/O group that is associated exclusively with the enclosure. For FlashSystem V9000, the storage enclosure is shared by all I/O groups.

Machine Type Model (MTM)

The 7-character identifier for the enclosure. The first 4 characters are the machine type and the last 3 characters are the model, such as 2076-112, 2145-24F, 9840-AE2. Typically, MTM is shown on labels on the front and rear of the enclosure.

Power® Supplies

The number of power supply units (PSUs) in an enclosure. Each enclosure has at least 2 PSUs for redundancy.

Status

The status of an enclosure is determined by the most critical status of its native operation, power supplies, and canisters. For example, if an enclosure is operating normally, but one of its PSUs is offline, the overall status of the enclosure is Warning.

Use the status to determine the condition of the enclosure, and if any actions must be taken. Possible values are listed:

Normal (Online)

An enclosure, its PSUs, and its canisters are operating normally.

Warning

The enclosure is visible to the SAS network but not down both strands, or one of its canisters or PSUs is offline.

Error (Offline)

A managed enclosure is not visible to the SAS network, or its PSUs or canisters are offline. For troubleshooting information, see the IBM Docs for the related storage system.

Type

The type of enclosure. Possible values are Control, Expansion, and Storage. The model of storage system determines the type of enclosure that is present.

Related information

- [Accessing IBM Documentation for storage systems](#)
-

External disks

View the information that is shown about external disks or disk drives in block storage systems.

The following information is shown for each external disk:

Acknowledged

Shows whether a user marked the status of an external disk as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of an external disk is Error, then the status of the related storage system is also Error. If the Error status of the external disk is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Available Capacity (GiB)

The storage capacity that is available (not allocated) on an external disk.

Capacity (GiB)

(Previously known as Total Capacity) The capacity on an external disk.

Pool

The name of the storage pool to which an external disk belongs. If an external disk is associated with a primordial pool, or is not yet assigned to a pool, then it is unmanaged. The value None is displayed.

Status

The status of an external disk. Use the status to determine the condition of the external disk, and if any actions must be taken. For example, if an external disk has an Error status, take immediate action to correct the problem. If the external disk has an Operational status, then it is operating normally and no further action is required.

Volumes

The number of volumes that are partially or completely on an external disk.

FC ports

View the information that is shown about Fibre Channel (FC) ports in block storage systems.

The following information is shown for each FC port:

Acknowledged

Shows whether a user marked the status of a port as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of a port is Error, then the status of the related storage system is also Error. If the Error status of the port is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Location

For DS8000®, a code that represents the physical location of a port within the hardware of a storage system. The location information is shown in the following format:

frame - I/O enclosure - host adapter - port

For example, the location value R1-I4-C5-T3 corresponds to frame 1, I/O enclosure 4, host adapter 5, and port 3. The value for I/O enclosure is the number of the enclosure in the frame.

For more detailed information about the location of the port, view the following columns:

Frame

The DS8000 hardware unit where the port is located.

I/O Enclosure

The number of the I/O enclosure in the storage system. This value might be different from the I/O enclosure value for Location if the DS8000 has expansion frames.

Host Adapter

The DS8000 physical subunit that contains the port and attaches to one of more host I/O interfaces.

Protocol

For DS8000, the Fibre Channel communication protocol that is used by the port, which determines the type of traffic that is transmitted. Each port on a DS8000 uses either the SCSI FCP (SCSI Fibre Channel Protocol) or FICON® (Fibre Connection) protocol. The value Unknown is shown if the DS8000 is not probed.

Speed (Gbps)

The negotiated speed of a port.

Status

The status of a Fibre Channel port. Statuses include Normal, Warning, Error, and Unknown. Use the status to determine the condition of a port, and if any actions must be taken. For example, if a port has an Error status, take immediate action to correct the problem.

WWPN

The World Wide Port Name (WWPN) of a port. A WWPN is the unique 64-bit identifier for a port in a Fibre Channel fabric.

Related reference

- [Ports for collecting metadata from storage systems](#)
-

Host connections

View the information that is shown about host connections in block storage systems. For VMAX storage systems, the Host Connections tab is renamed Masking Views.

On the Host Connections tab, the following information is shown for each host connection:

Associated Resource

The name of the server or virtualizer that is associated with the host definition. For the server name to be known, it must be probed or added automatically as an agentless server. For a virtualizer name to be known, the virtualizer must be discovered and probed.

Cluster

The name of the cluster, if any, as defined on the storage system. If no cluster is defined for the particular host connection, this field is blank.

FC Ports

The number of Fibre Channel ports that are on the node or module.

Host Type

The type of host connection as defined on the storage system. The type of host connection determines the low-level SCSI parameters that are used for communication between the storage system and the host.

Tip: The host connection type can be different from the operating system of the host.

IP Ports

The number of Internet Protocol ports that are on a node.

IQN

The iSCSI qualified name of the port.

Volume Group

The name of the volume group that is associated with the host connection. Applies only to DS8000® storage systems.

Volumes

The number of volumes that are assigned to a specific cluster, host, or port.

WWPNs

The World Wide Port Names (WWPN) that are associated with a host, as defined on the storage system. A WWPN is the unique 64-bit identifier for a port in a Fibre Channel fabric.

On the Volume Mappings tab, the following information is shown for each volume mapping:

Associated Resource

The name of the server or virtualizer that is associated with the host definition. For the server name to be known, it must be probed or added automatically as an agentless server. For a virtualizer name to be known, the virtualizer must be discovered and probed.
Encrypted
Shows whether a volume is encrypted. The value N/A indicates that encryption is not supported for this volume.
FC Ports
The number of Fibre Channel ports that are on the node or module.
Host
The name of the host, as defined on the storage system.
Host Type
The type of host connection, as defined on the storage system. This type determines the low-level SCSI parameters that are used for communication between the storage system and the host. Tip: The host connection type can be different from the operating system of the host.
IP Ports
The number of Internet Protocol ports that are on a node.
IQN
The iSCSI qualified name of the port.
Pool
The name of the pool in which this volume is a member.
Thin Provisioned
Indicates whether this volume is thin-provisioned, and if applicable, the type of thin-provisioning that is used. Thin-provisioned volumes on a DS8000 storage system can be defined as extent space-efficient (ESE) or as track space-efficient (TSE).
Used Capacity (GiB)
The storage space of a thin-provisioned volume that is used, measured in GiB, as of the time when asset and health data was last collected for the storage system. The capacity that is used by a thin-provisioned volume is typically less than its provisioned capacity, which is shown in the column Volume Space.
Volume
The name or label of the volume, if available. This name uniquely identifies the volume within the storage system.
Volume Capacity (GiB)
The storage capacity of the volume, which is measured in GiB. For thin-provisioned volumes, this value is the provisioned capacity of the volume, called the soft size on an XIV®, and not the real space. The real space is called hard size on an XIV and it is allocated.
Volume Group
The name of the volume group on the DS8000 storage system that is associated with the host connection.
Volume ID
The identifier of the volume, such as a serial number or internal ID.

The following information is available for each host port on a host connection:

Associated Resource
The name of the server or virtualizer that is associated with the host definition. For a virtualizer name to be known, the virtualizer must be discovered and probed.
Associated Port
The name of the server or virtualizer port as displayed on the server or storage system page. If the connected resource is not discovered and probed, the value Unavailable is shown.
WWPN
The World Wide Port Names (WWPN) that are associated with a host, as defined on the storage system. A WWPN is the unique 64-bit identifier for a port in a Fibre Channel fabric.

I/O groups

View the information that is shown about I/O groups in block storage systems.

Each pair of nodes within a single enclosure is known as an input/output (I/O) group.

The following information is shown for each I/O group:

Compression
The compression level of the I/O group. Possible values are listed.
Unsupported
Indicates that the I/O group does not support compressed volumes or its nodes are down-level for supporting compressed volumes.
Supported
Indicates that the I/O group supports compressed volumes.
Active
Indicates that the I/O group contains at least one compressed volume.

Availability:	Nodes on storage systems that run IBM Spectrum Virtualize. These nodes support Random Access Compression Engine (RACE) compression for volumes in standard pools.
Enclosure	The enclosure that is associated exclusively with the I/O Group. For FlashSystem V9000, the storage enclosure is shared by all I/O groups.
Nodes	The nodes that form the I/O group. Each node is separated by a comma. A single node in this list might indicate a node failure.
Total FlashCopy® Memory (MiB)	The total amount of I/O group memory that is configured for standard FlashCopy and incremental FlashCopy. The amount of memory that is configured determines the amount of volume space that can be associated with FlashCopy targets. The column is blank if no memory is available.
Total Mirroring Memory (MiB)	The total amount of I/O Group memory that is configured for volume mirroring. This value determines the amount of volume space that can be mirrored. The column is blank if no memory is configured for volume mirroring.
Total Remote Copy Memory (MiB)	The total amount of I/O group memory that is configured for Metro Mirror and Global Mirror. The amount of memory that is configured determines the amount of volume space that can be associated with Metro Mirror and Global Mirror targets. The column is blank if no memory is available.
Used FlashCopy Memory (MiB)	The amount of I/O group memory that is used for FlashCopy. This column is blank if no memory is available.
Used Mirroring Memory (MiB)	The amount of I/O Group memory that is used for volume mirroring. This column is blank if no memory is available.
Used Remote Copy Memory (MiB)	The amount of I/O group memory that is used for Metro Mirror and Global Mirror. This column is blank if no memory is available.
Volumes	The number of volumes (virtual disks) that are assigned to the I/O Group.

IP ports

View information about IP ports to monitor the health and status of the IP ports, and to determine whether the ports are used for hosts, storage, or management. You can view information about IP ports on nodes on block storage systems that run IBM Spectrum Virtualize, such as IBM FlashSystem® family, SAN Volume Controller, and the IBM® Storwize® family.

The following information is shown for each IP port:

Duplex

The node is either in full-duplex state or half-duplex state. In full-duplex state, the ports on the node can send and receive data at the same time. In half-duplex state, the ports can send data when they are not receiving data. If the node is offline, no information is shown.

Failover

Shows whether the port is failed over to a different node.

Host Attach

Shows whether the port is configured to attach to hosts.

IP Address

Shows the IP addresses for IP ports that are configured for management, and IP addresses for iSCSI ports. Both IPv4 and IPv6 addresses are shown.

IQN

The iSCSI qualified name of the port.

Management

Shows whether the port is configured for management commands, or whether it is used only for management commands.

MTU

The maximum transmission unit that is available on the link between the port and the node.

Remote Copy Relationship

Shows the status of the IP replication if the port is used for replication. The standby status indicates that the port is assigned to a copy group, but is not active.

Speed

The negotiated speed of the link between the port and the node.

Status

Shows the configuration status and the link state of an IP port. Use the status to determine the condition of the port, and if any actions must be taken. For example, if an IP port has an unconfigured status you might want to investigate why no iSCSI address is configured for the port. Also, if an IP port has an inactive status you might want to investigate why the port link is not active.

Storage Attach

Shows whether the port is configured to attach to storage.

Managed disks, external volumes, and array LUNs

View the information that is shown about managed disks or disk drives, external volumes, and array LUNs in block storage systems.

To view information about the managed disks, external volumes, or array LUNs that are associated with a storage system, click Managed Disks, External Volumes, or Array LUNs. The type of the storage system determines which of these components can be viewed.

A managed disk is storage that is virtualized by a storage virtualizer. A managed disk can represent a volume that is assigned from a back-end storage system. The disk can also represent one or more physical disks that are installed locally in a storage virtualizer. One or more managed disks can be added to a pool or managed disk group, from which volumes are allocated and assigned to host servers.

Important: Managed disks are displayed only when you view the details of the following storage systems:

- Storage systems that run IBM Spectrum Virtualize
- Hitachi VSP as External Volumes
- NetApp storage systems that run ONTAP 9 as Array LUNs

The following information is shown for each managed disk:

Acknowledged

Shows whether a user marked the status of a managed disk as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of a managed disk is Error, then the status of the related storage system is also Error. If the Error status of the managed disk is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Available Capacity (GiB)

The storage capacity that is available (not allocated) on a managed disk.

Back-end Storage System

The name of the storage system that is providing storage to a managed disk.

Capacity (GiB)

(Previously known as Total Capacity) Total amount of storage space on a managed disk.

Class

The technology type of the managed disk, such as Tier 0 and Tier 1 flash solid-state drives (SSDs), NVMe SSDs, Storage Class Memory, Enterprise and Nearline hard disk drives (HDDs), and other types. Managed disks that consist of internal, local disks are classified automatically by the cluster, but you must manually classify managed disks that consist of external disks.

Easy Tier®

The tier that a managed disk is assigned to by the internal cluster auto-detection for internal disks or by the user for external disks. This classification is used by the storage virtualizer to determine when to activate the Easy Tier function for certain pools.

»Easy Tier Load«

»The workload size of a managed disk. Easy Tier uses this value to identify the IOPS capability of the associated storage tier. Possible values are low, medium, high, and very high. You can use this value to fine tune the utilization of backend storage and troubleshoot performance issues, such as determining if the setting is incorrect for a managed disk.«

Mode

The allocation mode of the managed disk. The following allocation modes might be shown:

Unmanaged

The external volume is virtualized as a managed disk, but is not being used.

Managed

The external volume is virtualized as a managed disk and is assigned to a pool or a managed disk group.

Image

The external volume is not virtualized, which means that the associated volume provides a direct block-for-block translation of the external volume.

Array

One or more internal or local disks are used to form the managed disk.

Pool

The name of the storage pool or managed disk group to which a managed disk belongs. If a managed disk is associated with a primordial pool, or is not yet assigned to a pool, then it is unmanaged. The value None is displayed.

Quorum disk

A quorum disk is an MDisk that is used exclusively for system management. A storage system might have only one active quorum disk.

RAID Level

The RAID level of a managed disk, such as RAID 5 and RAID 10, or if the managed disk is a distributed RAID array, the RAID level is prefixed with "D", such as DRAID 5. The RAID level affects the performance and fault tolerance of the volumes that are used by a

managed disk. This value is shown only when the managed disk is a RAID array that was built from internal, local disks in the storage virtualizer. The value None indicates that a managed disk is a single, local disk and performance or fault tolerance is not improved.

Status

The status of a managed disk. Use the status to determine the condition of a managed disk, and if any actions must be taken. For example, if a managed disk has an Error status, take immediate action to correct the problem.

Storage System

The name of the storage virtualizer that contains a managed disk. A storage virtualizer is a storage system that virtualizes storage space from internal storage or from another storage system, such as a SAN Volume Controller or Storwize® V7000.

Volumes

The number of volumes that are partially or completely on a managed disk.

Pools, aggregates, and common provisioning groups

View the information that is shown about pools, aggregates, and common provisioning groups in block storage systems.

To view information about the pools, aggregates, or common provisioning groups that are associated with a storage system, click Pools, Aggregates, or Common Provisioning Groups. The type of the storage system determines which of these components can be viewed.

A storage pool is a grouping of storage that consists of volumes, logical unit numbers (LUNs), or addresses that share a common set of administrative characteristics.

An aggregate is a collection of physical disks or partitions arranged into one or more RAID arrays (NetApp RAID groups).

A common provisioning group is a user-defined pool of storage space on a HPE 3PAR StoreServ Storage system.

Tip: To see the information about all of the block storage pools in your data center, click Resources Pools.

Special considerations for particular storage system models:

Pure FlashArray//M and FlashArray//X

While Pure storage systems do not have the concept of pools, a pool is displayed to maintain consistency in the IBM® Storage Insights data model and to correctly display relationships between storage components.

SAN Volume Controller / Storwize® V7.4 and later

These storage systems have the capacity to define parent and child pools. A parent pool has all the capabilities and functions of a normal SAN Volume Controller / Storwize pool. A child pool is a logical sub division of a storage pool or managed disk group. Like a storage pool, a child pool supports volume creation and migration, but the user can specify the capacity of the child pool at creation.

- A child pool inherits its tier setting from the parent pool. Changes to a parent's tier setting are inherited by child pools. Changes to a child pool are applied to the parent pool and inherited by other siblings.
- A child pool supports the Easy Tier® function if the parent pool has Easy Tier enabled. The child pool also inherits Easy Tier status, pool status, capacity information, solid state status, and back-end storage information. The activity of parent pool and child pool are the same since the volumes from the child pool reside on the parent pool.

The following information is shown for each pool:

Restriction: Definitions are provided only for column headings that might require more information to understand the values that are shown in the table.

Tip: To see information that is not shown by default in the table, right-click a column heading and select the information that you want to be shown.

Acknowledged

Shows whether a user marked the status of a pool as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used to determine the status of related, higher-level resources.

For example, if the status of a pool is Error, the status of the storage system that contains it is also Error. If the Error status for the pool is acknowledged, then its status is not used to determine the overall status of the associated storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Activity

Shows the activity level of pools. For pools on storage systems other than XIV® systems and IBM Spectrum Accelerate, the activity level is set to the following value:

`[Read I/O Rate × (1 - Read I/O Cache Hit %)] ÷ Total Pool Capacity`

The activity level of pools on XIV systems and IBM Spectrum Accelerate is set to the following value:

`(Total I/O Rate ÷ Total Capacity)`

Adjusted Used Capacity (%)

The amount of capacity that can be used without exceeding the capacity limit.

Example: Adjusted Used Capacity

Before Capacity Limit Was Set

100 GiB Capacity



After Capacity Limit Was Set

100 GiB Capacity



- Used Capacity = 40 GiB
- Available Capacity = 60 GiB

- Capacity Limit = 80% or 80 GiB
- Adjusted Used Capacity = 50% or 40 GiB
- ↔ Capacity-to-Limit = 30% or 40 GiB

The formula for calculating Adjusted Used Capacity (%) is $(\text{Used Capacity in GiB}/\text{Capacity Limit in GiB}) * 100$. For example, if the capacity is 100 GiB, the used capacity is 40 GiB, and the capacity limit is 80% or 80 GiB, then the value for Adjusted Used Capacity (%) is $(40 \text{ GiB}/80 \text{ GiB}) * 100$ or 50%. So, in this example, you can use 30% or 40 GiB of the usable capacity of the resource before you reach the capacity limit.

If the used capacity exceeds the capacity limit, the value for Adjusted Used Capacity (%) is over 100%.

To add the Adjusted Used Capacity (%) column, right-click any column heading on the Pools page.

See these related values for more information Capacity Limit (%) and Capacity-to-Limit (GiB).

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Available Capacity (GiB)

(Previously known as Available Pool Space) The amount of physical space that is available in the pool. If the pool is a parent pool, the amount of space that is used by the volumes in the child pools is also included.

Availability: All storage systems. For FlashSystem A9000 and FlashSystem A9000R, this value represents provisioned capacity rather than physical space.

Available Repository Capacity (GiB)

The available, unallocated storage space in the repository for Track Space-Efficient (TSE) thin-provisioning.

Availability: DS8000® thin-provisioned pools.

Available Soft Capacity (GiB)

The amount of virtual storage space that is available to allocate to volumes in a storage pool.

Availability: XIV systems, and IBM Spectrum Accelerate storage systems.

Available Volume Capacity (GiB)

(Previously known as Effective Unallocated Volume Space) The total amount of remaining capacity that can be used by the existing volumes in the pools. The following formula is used to calculate this value:

Provisioned Capacity – Used Capacity

The capacity that is used by thin-provisioned volumes is typically less than their provisioned capacity. Therefore, the available capacity represents the difference between the provisioned capacity and the used capacity for all the volumes in the pool. For Hitachi VSP non-thin provisioned pool capacity, the unused volume capacity is always zero.

Availability: All storage systems, except FlashSystem A9000 and FlashSystem A9000R.

Available Written Capacity (GiB)

(Previously known as Effective Used Capacity) The amount of capacity that can be written to the pools before inline compression is applied. If the pools are not compressed, this value is the same as Available Capacity.

Important: Because data compression is very efficient, a pool can run out of Available Written Capacity while physical capacity is still available. To stay aware of your capacity needs, monitor this value and Available Capacity.

Back-End Storage Disks

The number of physical disks that contribute to the volumes on the back-end storage system. Available only for pools on storage systems that run IBM Spectrum Virtualize.

If the back-end storage system was not probed, then the value in this column is blank. To manually define the number of disks to help calculate the approximate read I/O capability of the pool, right-click a pool in the list and select View Properties. On the Back-end Storage tab in properties notebook, click Edit.

Back-End Storage Disk Type

The class and speed of the physical disks that contribute to the volumes on the back-end storage system. Available only for pools on storage systems that run IBM Spectrum Virtualize.

If the back-end storage system was not probed, then the value in this column is blank. To manually define a disk type to help calculate the approximate read I/O capability of the pool, right-click a pool in the list and select View Properties. On the Back-end Storage tab in properties notebook, click Edit.

Back-End Storage RAID Level

The RAID level of the volumes on the back-end storage system that are providing storage space to a pool. Available only for pools on storage systems that run IBM Spectrum Virtualize.

If the back-end storage system was not probed, then the value in this column is blank. To manually define a RAID level to help calculate the approximate read I/O capability of the pool, right-click a pool in the list and select View Properties. On the Back-end Storage tab in properties notebook, click Edit.

Back-End Storage System Type

The type of storage system that is providing storage space to a pool. Available only for pools on storage systems that run IBM Spectrum Virtualize.

If the back-end storage system was not probed, then the value in this column is blank. To manually select a type of storage system to help calculate the approximate read I/O capability of the pool, right-click a pool in the list and select View Properties. On the Back-end Storage tab in properties notebook, click Edit.

Capacity (GiB)

The total amount of storage space in the pool. For XIV systems and IBM Spectrum Accelerate, capacity represents the physical or ("hard") capacity of the pool, not the provisioned ("soft") capacity.

Availability: All storage systems.

Capacity Limit (%) and Capacity Limit (GiB)

The limit that was set on the capacity that is used by your pools. For example, the policy of your company is to keep 20% of the usable capacity of your pools in reserve. So, you log into the GUI as Administrator and set the capacity limit of your pools to 80%.

Example: Administrator Sets Capacity Limit to 80%



Click the illustration above to find out how to set capacity limits.

The GiB value for the capacity limit for the pool is calculated when you set the value for the Capacity Limit (%).

To add the Capacity Limit (%) and the Capacity Limit (GiB) columns, right-click any column heading on the Pools page.

See these related values for more information Adjusted Used Capacity (%) and Capacity-to-Limit (GiB).

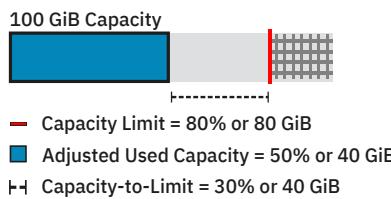
Zero capacity: When you set the capacity limit for pools, the values shown for Zero Capacity are readjusted to take into account the capacity limit of the pool. The date will represent when the capacity limit of the pool is reached. If the pool has already reached the capacity limit, Depleted is shown. None is shown when a trend in storage consumption can't be detected because the pool's storage isn't being consumed or because not enough data was collected to predict storage consumption.

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Capacity-to-Limit (GiB)

The amount of capacity that is available before the capacity limit is reached.

Example: Capacity-to-Limit



The formula for calculating Capacity-to-Limit (GiB) is $(\text{Capacity Limit in GiB} - \text{Used Capacity in GiB})$. For example, if the capacity limit is 80% or 80 GiB and the used capacity is 40 GiB, then the value for Capacity-to-Limit (GiB) is $(80 \text{ GiB} - 40 \text{ GiB})$ or $80\% - 50\%$ which is 30% or 40 GiB.

See these related values for more information Capacity Limit (%) and Adjusted Used Capacity (%).

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Compression Savings (%)

The estimated amount and percentage of capacity that is saved by using data compression. The percentage is calculated across all compressed volumes in the pool and does not include the capacity of non-compressed volumes.

For storage systems with drives that use inline data compression technology, the Compression Savings does not include the capacity savings that are achieved at the drive level.

The following formula is used to calculate the amount of storage space that is saved:

written capacity - compressed size

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{written capacity} - \text{compressed size}) \div \text{written capacity}) \times 100$$

For example, the written capacity, which is the amount of data that is written to the volumes before compression, is 40 GiB. The compressed size, which reflects the size of compressed data that is written to disk, is just 10 GiB. Therefore, the compression savings percentage across all compressed volumes is 75%.

Availability: IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Custom tag 1, 2, and 3

Any user-defined text that is associated with the pool. This text can be included in reports that you create for the pool.

Deduplication Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication. The percentage is calculated across all deduplicated volumes in the pool and does not include the capacity of volumes that are not deduplicated.

The following formula is used to calculate the amount of storage space that is saved:

written capacity - deduplicated size

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{written capacity} - \text{deduplicated size}) \div \text{written capacity}) \times 100$$

For example, the written capacity, which is the amount of data that is written to the volumes before deduplication, is 40 GiB. The deduplicated size, which reflects the size of deduplicated data that is written to disk, is just 10 GB. Therefore, data deduplication reduced the size of the data that is written by 75%.

Availability: Storage systems that run IBM Spectrum Virtualize version 8.1.3 or later.

Drive Compression Savings (%)

The amount and percentage of capacity that is saved with drives that use inline data compression technology. The percentage is calculated across all compressed drives in the pools.

The amount of storage space that is saved is the sum of drive compression savings.

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{used written capacity} - \text{compressed size}) \div \text{used written capacity}) \times 100$$

Availability: Storage systems that contain IBM FlashCore® Modules with hardware compression.

Easy Tier

The Easy Tier value determines whether Easy Tier is enabled and the Easy Tier Status determines how tiering is managed. For example, Easy Tier can be configured to tier all pools, single-tier pools (pools with one class drive), or multitier pools (pools with multiple class drives).

You can configure Easy Tier for DS8000 and storage systems that run IBM Spectrum Virtualize.

The following table shows the possible Easy Tier and related Easy Tier Status values:

Number of Tiers	Easy Tier	Easy Tier Status
One	Off	Inactive
Two or more	Off	Inactive
One	Measure	Measured
Two or more	Measure	Measured
One	Auto	Balanced
Two or more	Auto	Active
One	On	Balanced
Two or More	On	Active

Encryption Group

The identifier of the encryption group that was specified when the pool was created. Available only for DS8000 pools.

Enterprise HDD Available Capacity (GiB)

The amount of storage space that is available on the Enterprise hard disk drives that can be used by Easy Tier for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Enterprise HDD Capacity (GiB)

The total amount of storage space on the Enterprise hard disk drives that can be used by Easy Tier for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Extent Size (MiB)

The extent granularity that was specified when a pool was created. Smaller extent sizes limit the maximum size of the volumes that can be created in a pool, but minimize the amount of potentially wasted space per volume. Available only for pools on storage systems that run IBM Spectrum Virtualize.

Format

The formats of the volumes that are allocated from a pool, such as FB (fixed block) or CKD (count key data). Available only for DS8000 pools.

Mapped Capacity (GiB)

The space on all of the volumes in a pool that are mapped or assigned to host systems. For a thin-provisioning pool, this value includes the provisioned capacity of thin-provisioned volumes, which might exceed the total space in the pool.

Nearline HDD Available Capacity (GiB)

The amount of storage space that is available on the Nearline hard disk drives that can be used by Easy Tier for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Nearline HDD Capacity (GiB)

The total amount of storage space on the Nearline hard disk drives that can be used by Easy Tier for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Overhead Capacity (GiB)

The amount of usable capacity that is occupied by metadata in a pool or system and other data that is used for system operation.

Overprovisioned Capacity (GiB)

(Previously known as Unallocatable Volume Space) The capacity that cannot be used by volumes because the physical capacity of the pool cannot meet the demands for provisioned capacity. The following formula is used to calculate this value:

$$[\text{Provisioned Capacity} - \text{Capacity}]$$

In thin-provisioned environments, it is possible to over commit (over provision) storage in a pool by creating volumes with more provisioned capacity than can be physically allocated in the pool. This value represents the amount of volume capacity that cannot be allocated based on the current capacity of the pool. For Hitachi VSP non-thin provisioned pool capacity, this value is always zero.

Availability: All storage systems, except FlashSystem A9000, FlashSystem A9000R, XIV, and IBM Spectrum Accelerate.

Owner Name

The name of the user who owns the child pool.

Parent Name

The name of the parent pool.

Pool Attributes

Shows whether data reduction, encryption, thin provisioned, or all the three are configured for the pool. If neither feature is configured, the column is blank.

Data reduction is available for pools on FlashSystem A9000, FlashSystem A9000R, and storage systems that run IBM Spectrum Virtualize version 8.1.1 or later.

Encryption is available for all pools.

Examples:

- If only data reduction is configured, the value Data Reduction is shown.
- If only encryption is configured, the value Encryption is shown.
- If both features are configured, the value Data Reduction, Encryption is shown.

Provisioned Capacity (%)

(Previously known as Virtual Allocation) The percentage of the physical capacity that is committed to the provisioned capacity of the volumes in the pool. If the value exceeds 100%, the physical capacity doesn't meet the demands for provisioned capacity. The following formula is used to calculate this value:

$$[(\text{Provisioned Capacity} \div \text{Capacity}) \times 100]$$

Example: If the provisioned capacity percentage is 200% for a total storage pool size of 15 GiB, then the provisioned capacity that is committed to the volumes in the pool is 30 GiB. This configuration means that twice as much space is committed than is physically contained in the pool. If the provisioned capacity percentage is 100% for the same pool, then the provisioned capacity that is committed to the pool is 15 GiB. This configuration means that all the physical capacity of the pool is already used by volumes.

A provisioned capacity percentage that is higher than 100% is considered aggressive because insufficient physical capacity is available in the pool to satisfy the maximum allocation for all the thin-provisioned volumes in the pool. In such cases, you can use the value for Shortfall (%) to estimate how critical the shortage of space is for a pool.

Availability: All storage systems.

Provisioned Capacity (GiB)

The total amount of provisioned capacity of volumes within the pool. If the pool is a parent pool, it also includes the storage capacity that can be made available to the volumes in the child pools.

RAID Level

The RAID level of the pool, such as RAID 5 and RAID 10. The RAID level affects the performance and fault tolerance of the volumes that are allocated from the pool. In some cases, there might be a mix of RAID levels in a pool. The RAID levels in a mixed pool are shown in a comma-separated list.

Rank Group

The rank group to which a pool is assigned. Available only for DS8000 pools.

Recent Fill Rate (%)

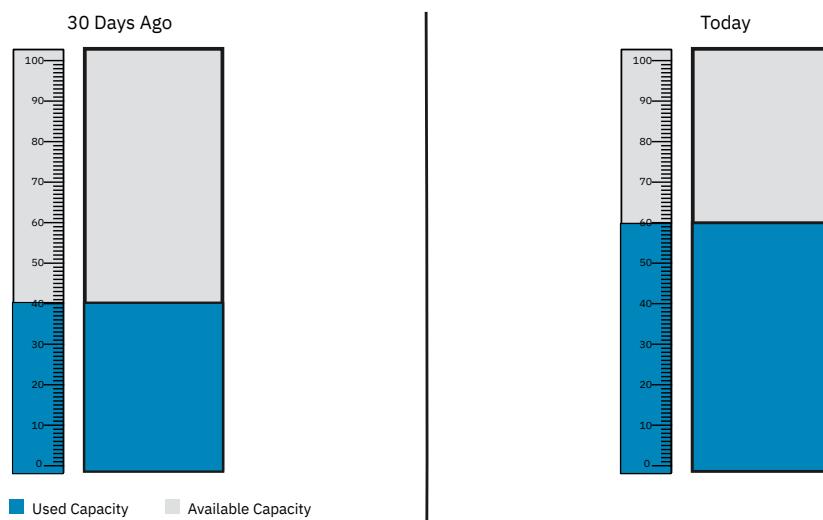
The rate at which the capacity of the pool is being consumed over the last 30 days. Use this value to see how quickly your pools are filling up.

The Recent Fill Rate (%) tells you how quickly your pools are filling up

The Recent Fill Rate (%) of the pool is the difference between the fill rate % of the pool 30 days ago and today's fill rate % of the pool.

The fill rate % of the pool is calculated by dividing the capacity of the pool by its used capacity and multiplying it by 100.

Example



The fill rate % of the pool 30 days ago was $(40/100) \times 100$, which is 40%.

The fill rate % of the pool today is $(60/100) \times 100$, which is 60%.

So, in this example, the Recent Fill Rate (%) for the pool is (60% - 40%), which is 20%.

If 30 days of historical data is not available, it is the difference between today's fill rate % and the oldest value for the fill rate % in the last 30 days.

If you want to add the growth in used capacity in GiB, right-click any column heading and click Recent Growth (GiB).

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Recent Growth (GiB)

The amount of used capacity that is consumed by the storage system over the last 30 days. Use this value to identify the pools with the highest growth rates in used capacity.

Recent growth is the difference between today's used capacity of the pool and the used capacity of the pool that was reported 30 days ago. If 30 days of historical data is not available, it is the difference between today's used capacity for the pool and the oldest value for the used capacity of the pool that was reported in the last 30 days.

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Repository Capacity (GiB)

The total storage capacity of the repository for Track Space-Efficient (TSE) thin-provisioning.

Availability: DS8000 thin-provisioned pools.

Reserved Volume Capacity

(Previously known as Unused Space) The amount of pool capacity that is reserved but has not been used yet to store data on the thin-provisioned volume.

Availability: Resources that run IBM Spectrum Virtualize.

Safeguarded Capacity (GiB)

The total amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000.

SCM Available Capacity (GiB)

The available capacity on Storage Class Memory (SCM) drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: IBM Spectrum Virtualize systems, such as FlashSystem 9100, FlashSystem 7200, and Storwize family storage systems that are configured with block storage.

SCM Capacity (GiB)

The total capacity on Storage Class Memory (SCM) drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: IBM Spectrum Virtualize systems, such as FlashSystem 9100, FlashSystem 7200, and Storwize family storage systems that are configured with block storage.

Shortfall (%)

The difference between the remaining unused volume capacity and the available capacity of the associated pool, expressed as a percentage of the remaining unused volume capacity. The shortfall represents the relative risk of running out of space for overallocated thin-provisioned volumes. If the pool has sufficient available capacity to satisfy the remaining unused volume capacity, no shortfall exists. As the remaining unused volume capacity grows, or as the available pool capacity decreases, the shortfall increases and the risk of running out of space becomes higher. If the available capacity of the pool is exhausted, the shortfall is 100% and any volumes that are not yet fully allocated have run out of space.

If the pool isn't thin-provisioned, the shortfall percentage equals zero. If shortfall percentage isn't calculated for the storage system, the field is left blank.

The following formula is used to calculate this value:

Overprovisioned Capacity ÷ Committed but Unused Capacity

You can use this percentage to determine when the amount of over-committed space in a pool is at a critically high level. Specifically, if the physical space in a pool is less than the committed provisioned capacity, then the pool does not have enough space to fulfill the commitment to provisioned capacity. This value represents the percentage of the committed provisioned capacity that is not available in a pool. As more space is used over time by volumes while the pool capacity remains the same, this percentage increases.

Example: The remaining physical capacity of a pool is 70 GiB, but 150 GiB of provisioned capacity was committed to thin-provisioned volumes. If the volumes are using 50 GiB, then 100 GiB is still committed to the volumes (150 GiB – 50 GiB) with a shortfall of 30 GiB (70 GiB remaining pool space – 100 GiB remaining commitment of volume space to the volumes).

Because the volumes are overcommitted by 30 GiB based on the available capacity in the pool, the shortfall is 30% when the following calculation is used:

```
[ (100 GiB unused volume capacity - 70 GiB remaining pool capacity)
  ÷ 100 GiB unused volume capacity] × 100
```

Availability: DS8000, Hitachi Virtual Storage Platform, and storage systems that run IBM Spectrum Virtualize.

For FlashSystem A9000 and FlashSystem A9000R, this value is not available.

Soft Capacity (GiB)

The amount of virtual storage space that is configured for the pool.

Availability: XIV systems and IBM Spectrum Accelerate storage systems.

Solid State

Shows whether a pool contains solid-state disk drives. If a pool contains solid-state disks and other disks, the value Mixed is shown.

Status

The status of a pool. Statuses include Normal, Warning, Error, and Unknown. Use the status to determine the condition of a pool, and if any actions must be taken. For example, if a pool has an Error status, take immediate action to correct the problem.

Tier

The tier level of pools on storage virtualizers. If the pool is not assigned a tier level, the cell is blank. To set or change the tier level, select one or more pools. Right-click, and then select Set Tier. Note that tier changes to a parent or child pool affect all pool family members.

Tier 0 Flash Available Capacity (GiB)

The amount of storage space that is available on the Tier 0 flash solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 0 Flash Capacity (GiB)

The total amount of storage space on the Tier 0 flash solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 1 Flash Available Capacity (GiB)

The amount of storage space that is available on the Tier 1 flash, read-intensive solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 1 Flash Capacity (GiB)

The total amount of storage space on the Tier 1 flash, read-intensive solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 2 Flash Available Capacity (GiB)

The available capacity on Tier 2 flash, high-capacity drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: DS8000 storage systems.

Tier 2 Flash Capacity (GiB)

The total capacity on Tier 2 flash, high-capacity drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: DS8000 storage systems.

Tier Distribution (%)

The distribution of volume extents across the Easy Tier drive classes in a pool, such as the percentage of volume extents on SCM drives, Tier 0, Tier 1, and Tier 2 flash drives, Enterprise hard disk drives, and Nearline hard disk drives.

Total Capacity Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication, pool compression, thin provisioning, and drive compression, across all volumes in the pool.

The following formula is used to calculate the amount of storage space that is saved:

Provisioned Capacity - Used Capacity

The following formula is used to calculate the percentage of capacity that is saved:

((Provisioned Capacity - Used Capacity) ÷ Provisioned Capacity) × 100

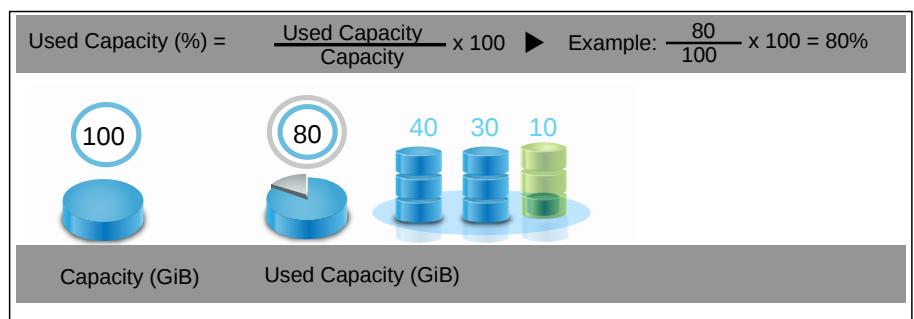
Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Unmapped Capacity (GiB)

The total amount of space in the volumes that are not assigned to hosts. For a thin-provisioning pool, this value includes the provisioned capacity of thin-provisioned volumes, which might exceed the total space in the pool.

Used Capacity (%)

(Previously known as Physical Allocation)



The percentage of physical capacity that is used by the volumes in the pool, including the volumes in child pools. This value is always less than or equal to 100% because you cannot allocate more physical space than is available in a pool. Check the value for used capacity to see:

- Whether the physical capacity of the pool is fully allocated. That is, the value for used capacity is 100%.
- Whether you have sufficient capacity to provision new volumes with storage
- Whether you have sufficient capacity to allocate to the compressed and thin-provisioned volumes in the pool

Availability: All storage systems, except FlashSystem A9000 and FlashSystem A9000R.

Used Capacity (GiB)

(Previously known as Allocated Space) The amount of physical capacity that is used by the volumes in the pool. If the pool is a parent pool, the amount of space that is used by the volumes in the child pools is also included.

The capacity that is used by thin-provisioned volumes is less than their provisioned capacity, which is shown in the Provisioned Capacity column. If a pool does not contain thin-provisioned volumes, this value is the same as Provisioned Capacity.

Availability: All storage systems, except FlashSystem A9000 and FlashSystem A9000R.

Used Written Capacity (GiB)

(Previously known as Effective Used Capacity) The amount of capacity that is written to the volumes in a pool before inline disk compression is applied. If a pool is not compressed, this value is the same as Used Capacity.

Volumes

The number of volumes that are allocated from a pool.

Written Capacity Limit (GiB)

(Previously known as Effective Capacity) The maximum of amount of capacity that can be written to a pool before inline-disk compression is applied. If a pool is not compressed, this value is the same as Capacity.

Zero Capacity

The capacity information that is collected over 180 days is analyzed to determine, based on historical storage consumption, when the pools will run out of capacity. The pools that have already run out of capacity are marked as depleted. For the other pools, a date is provided so that you know when the pools are projected to run out of capacity. None is shown when a trend in storage consumption can't be detected because the pool's storage isn't being consumed or because not enough data was collected to predict storage consumption. When you set the capacity limit for pools, the values shown for Zero Capacity are readjusted to take into account the capacity limit of the pool. The date will represent when the capacity limit of the pool is reached. If the pool has already reached the capacity limit, depleted is shown.

For a demonstration of the Zero Capacity value, watch the video at https://youtu.be/hIhpG_TymS8.

Related tasks

- [Assigning pools to tiers](#)

Related reference

- [Pool capacity and capacity usage](#)
-

Host adapters

View the information that is shown about host adapters in DS8000® block storage systems.

The following information is shown for each host adapter:

Acknowledged

Shows whether a user marked the status of a host adapter as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of a host adapter is Error, then the status of the related storage system is also Error. If the Error status of the host adapter is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Name

The identifier for the host adapter that includes code and location.

For example, for IBM®.1400-1B3-75766/R0-P1-C6, the value IBM.1400-1B3-75766/R0 represents the code and P1-C6 represents the location.

Frame

The unique identifier of the equipment frame for the host adapter. The DS8000 hardware unit where the host adapter is located.

I/O Enclosure

The ID of the enclosure that is associated with the host adapter.

Status

The status of a host adapter. Values include Operational, Warning, and Error. If the adapter has an error status, identify and correct the problem immediately.

Type

The type of host adapter.

Example: Fibre channel LW/SW.

Speed

The maximum speed of the ports that are associated with host adapter.

Associated ports

The number of ports that are associated with the host adapter.

Location

Specifies the I/O enclosure and the host adapter location.

The I/O enclosure location format is Uttt.mmm.pppssss.

Example: **U1400.1B3.RJ49745-P1-C3**.

The host adapter location format is Pn-Cn where Pn indicates the Planner number (1) and Cn indicates the card number (1 - 6).

Serial number

The unique identifier of the host adapter.

Example: YM10BK04W2JN.

RAID arrays

View the information that is shown about RAID arrays in block storage systems.

The following information is shown for each RAID array:

Acknowledged

Shows whether a user marked the status of a RAID array as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of a RAID array is Error, then the status of the related storage system is also Error. If the Error status of the RAID array is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Available Capacity (%)

The percentage of physical storage space that is unused on all the disk drive modules (DDMs) in the RAID array.

Available Capacity (GiB)

The total amount of physical storage space that is unused on all the DDMs in the RAID array.

Available Written Capacity (GiB)

For uncompressed RAID arrays, the available written capacity is the same as the available capacity (available capacity here refers to available physical capacity) and represents the total amount of unused storage capacity on all the DDMs in the RAID array.

For compressed RAID arrays, the available written capacity represents the amount of uncompressed data that is left unused in the array, of which can be written to the same array.

Available for: RAID arrays with DDMs that use inline data compression, such as RAID arrays on FlashSystem 9100, Storwize® V7000 Gen3, and FlashSystem 900.

Capacity (GiB)

(Previously known as Physical Capacity) The total amount of data that can be stored at array. For compressed RAID arrays, after inline data compression takes place the capacity (capacity here refers to physical capacity) is smaller than the written capacity limit of the array because drive compression is used to reduce the size of the data.

Compressed

Shows whether the DDMs in the RAID array contain a built-in compression function that automatically compresses the data that is written to the drives.

Compression Savings (%)

For compressed RAID arrays, the amount and percentage of capacity that is saved by using drive compression.

The following formula is used to calculate the amount of storage space that is saved:

`Written Capacity Limit - Available Written Capacity - (Capacity - Available Space)`

The following formula is used to calculate the percentage of capacity that is saved:

`[(Written Capacity Limit - Available Written Capacity - (Capacity - Available Space)) ÷ (Written Capacity Limit - Available Written Capacity)] × 100`

Available for: RAID arrays with DDMs that use inline data compression, such as RAID arrays on FlashSystem 9100 and FlashSystem 900.

DDM Capacity (GB), DDM Capacity (GiB)

The storage capacity of each disk drive module (DDM) in a RAID array, which is measured in GiB (gibibyte) and GB (gigabyte). 1 GiB is equal to approximately 1.074 GB. For example, if the capacity of a DDM is 135 GiBs, its value in GB is 146.

DDM Class

The technology type of the disk drives in the array, such as Solid-State Drive, NVMe SSD, Storage Class Memory, Flash, Fibre Channel (FC), SATA, and other types.

DDM Speed (RPM)

The revolutions per minute (RPM) of the DDMs in a RAID array. Examples: 5600, 7200, 10000, or 15000.

Device Adapter Pair

The device adapter (DA) pair that is associated with a RAID array. Available for DS8000® arrays only.

Encryption

Shows whether the DDMs in the RAID array are encrypted.

Available for: RAID arrays on storage systems that run IBM Spectrum Virtualize.

Encryption Group

The encryption group of a rank.

Format

The format of a RAID array. Examples: FB (fixed block), CKD (count key data). Available for DS8000 arrays only.

Node

For DS4000®, DS5000, DS6000™, and ESS storage systems, the name of the disk controller that is associated with the RAID array.

For all other storage systems, the node to which a RAID array is associated.

Pool

The name of the pool in which a RAID array is a member.

RAID Level

The RAID level of an array, such as RAID 5, or RAID 10, or for distributed arrays, the RAID level is prefixed with "D", such as DRAID 5.

RAID State

The state of a RAID array, based on the CLI value for the array. States include Online, Offline, Degraded, Expanding, Synchronizing, Initializing, No Spare, and Unknown. Use the state to determine the condition of the array, and if any actions must be taken. For example, a RAID array might have one of the following states:

Degraded

A drive failed in the array and no spare is available. This state is a critical situation because if a second drive fails before the first one is replaced and rebuilt, all data on the RAID array is lost.

Expanding	A new drive is being added to the RAID array. When the expansion is complete, the capacity columns show the updated capacity of the array.
No Spare	A drive failed and was replaced automatically by the spare drive. Now, no spares are available for the array. Replace the failed drive as soon as possible, but the RAID array can sustain another drive failure without data loss.
Synchronizing	A drive failed in the array and is being replaced by the spare drive. The data that was on the failed drive is being rebuilt and is being written to the new drive, which used to be the spare drive. This state is a temporary critical situation because if a second drive fails before the data is rebuilt, data on the RAID array is lost.
Rank	The rank of which a RAID array is a member. A rank is a logically contiguous storage space. Typically, the relationship between arrays and ranks is a one-to-one relationship. Available for DS8000 arrays only.
Status	The status of a RAID array. Statuses include Normal, Warning, Error, and Unknown. Use the status to determine the condition of an array, and if any actions must be taken. For example, if an array has an Error status, take immediate action to correct the problem.
Rank Group	The rank group that is associated with a RAID array.
Site	The identifier of the array site for a RAID array. Available for DS8000 arrays only.
Tier	In Easy Tier®, the performance capability of a tier is determined by the type of disks that the pool uses. Tier values might include Enterprise Tier, Nearline Tier, Tier 0 Flash, Tier 1 Flash, or Tier 2 Flash.
Width	The rank width of a RAID array. Available for DS8000 arrays only.
Written Capacity Limit (GiB)	(Previously known as Total Capacity) For uncompressed RAID arrays, the written capacity limit is same as the capacity (capacity here refers to physical capacity) and represents the total storage capacity of all the DDMs in the array. For compressed RAID arrays, the written capacity limit is the maximum amount of uncompressed data that can be written to the array. This value is larger than the capacity (capacity here refers to physical capacity) as the drive compression is used to reduce the size of the data.

Device adapters

View the information that is shown about device adapters in DS8000® block storage systems.

The following information is shown for each device adapter:

Acknowledged

Shows whether a user marked the status of a device adapter as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.
For example, if the status of a device adapter is Error, then the status of the related storage system is also Error. If the Error status of the device adapter is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Name

The identifier for the device adapter that includes code and location.
For example, for IBM®.1400-1B3-75766/R0-P1-C6, the value IBM.1400-1B3-75766/R0 represents the code and P1-C6 represents the location.

Frame

The unique identifier of the equipment frame for the device adapter. The DS8000 hardware unit where the device adapter is located.

I/O Enclosure

The ID of the enclosure that is associated with the device adapter.

Status

The status of a device adapter. Values include Operational, Warning, and Error. If the adapter has an error status, identify and correct the problem immediately.

Device adapter pair

The pair ID that is associated with the device adapter. Device adapter pairs are located in I/O enclosure pairs.
An even-numbered device adapter pair ID indicates the first device adapter pair in an I/O enclosure pair. An odd-numbered device adapter pair ID indicates the second device adapter pair in an IO enclosure pair.

Location

Specifies the I/O enclosure and the device adapter location.

The I/O enclosure location format is Uttt.mmm.pppssss.

Example: **U1400.1B3.RJ49745-P1-C3.**

The device adapter location format is Pn-Cn where Pn indicates the Planner number (1) and Cn indicates the card number (1 - 6).

Serial number

The unique identifier of the device adapter.

Example: YM10BK04W2JN.

Volumes

View the information that is shown about volumes in block storage systems.

Go the following sections to learn about the status and space usage of the volumes:

- [Information about volumes](#)
- [Learn more about key storage values](#)

Information about volumes

Next to the name of the volume, one of the following icons is shown to identify the type of volume and whether the volume is encrypted:

Icon	Type of volume	Encrypted	Encryptable
	Standard		
	Thin-provisioned		
	Compressed		
	Not visible to hosts		
	Dell EMC meta volume		
	Dell EMC private volume		

The following information is shown for each volume:

Tip: To see information that is not shown by default in the table, right-click a column heading and select the information that you want to be shown.

Acknowledged

Shows whether a user marked the status of a volume as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of a volume is Error, then the status of the related storage system is also Error. If the Error status of the volume is acknowledged, then its status is not used to determine the overall status of the storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Auto Expand

Shows whether a thin-provisioned volume automatically expands its allocated capacity as more of its space is used. The value is shown only for volumes on storage systems that run IBM Spectrum Virtualize.

Available Capacity (GiB)

(Previously known as Unallocated Space) The total amount of remaining space that can be used by the volume. That is, the capacity that is not used by thin-provisioned volumes. This value is determined by the formula, *Capacity - Used Capacity*.

For FlashSystem A9000, FlashSystem A9000R, and Volumes from SpecV Data Reduction Pools, this value is not available.

Block Size

The size of the data blocks that are written to disk for DS8000®. The size depends on the format of the volume, which is either fixed block (FB) or count key data (CKD). For FB volumes, the block size is 512 bytes. For CKD volumes, the block size depends on the device emulation mode and model, and is equal to the number of bytes per cylinder. For example, for disk model 3390, the block size for a CKD volume is 849960 bytes.

Capacity (GiB)

The total amount of storage space that is committed to a volume. For thin-provisioned volumes, this value represents the provisioned capacity of the volume.

Availability: All storage systems.

Compressed

Shows whether a storage volume is compressed.

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV® storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Compression Savings (%)

The estimated amount and percentage of capacity that is saved by using data compression.

The following formula is used to calculate the amount of storage space that is saved:

written capacity - compressed size

The following formula is used to calculate the percentage of capacity that is saved:

((written capacity - compressed size) ÷ written capacity) × 100

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Exception: For compressed volumes that are also deduplicated, on storage systems that run IBM Spectrum Virtualize, this column is blank.

Copies

The number of secondary copies (virtual disk copies) for a volume. The primary copy of a virtual disk is not counted as a mirror. This information is shown only for volumes on storage systems that run IBM Spectrum Virtualize.

Copy ID

The identifier for the volume copy. Each IBM Spectrum Virtualize volume has a copy ID of **0** or **1**, even if the volume is not in a mirrored volume relationship.

For mirrored volumes, the copy ID distinguishes between the primary and secondary volume copies.

Availability: Volumes on storage systems that run IBM Spectrum Virtualize.

Copy Relationship

Shows whether a volume is in a replication relationship that creates a snapshot or point-in-time copy of the volume on a specified target volume. A volume can either be a source, target, or both a target for one copy pair and a source for a different copy pair. In storage systems, this relationship might be referred to as a FlashCopy®, snapshot, or point-in-time copy relationship. A volume can have one of the following properties:

Source

The volume is the source of the relationship.

Target

The volume is the target of the relationship.

Source and Target

The volume is a target for one copy pair and a source for a different copy pair.

blank

The volume is not part of any copy relationship.

Unavailable

Information about a copy relationship on this volume is not available.

Deduplicated

Shows whether a storage volume is deduplicated.

Availability: FlashSystem A9000, FlashSystem A9000R, and resources that run IBM Spectrum Virtualize version 8.1.3 or later.

Easy Tier®

The Easy Tier value determines whether Easy Tier is enabled and the Easy Tier Status determines how tiering is managed. For example, Easy Tier can be configured to tier all pools, single-tier pools (pools with one class drive), or multitier pools (pools with multiple class drives).

You can configure Easy Tier for DS8000 and storage systems that run IBM Spectrum Virtualize.

The following table shows the possible Easy Tier and related Easy Tier Status values:

Number of Tiers	Easy Tier	Easy Tier Status
One	Off	Inactive
Two or more	Off	Inactive
One	Measure	Measured
Two or more	Measure	Measured
One	Auto	Balanced
Two or more	Auto	Active
One	On	Balanced
Two or More	On	Active

Enterprise HDD Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Enterprise hard disk drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Enterprise HDD Capacity (%)

The percentage of volume capacity that Easy Tier has placed on Enterprise hard disk drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Fast Write State

Shows the cache state for a volume, such as empty, not empty, corrupted, and repairing. The corrupted state indicates that you must recover the volume by using one of the **recovervdisk** commands for the storage system. The repairing state indicates that repairs initiated by a **recovervdisk** command are in progress. Available only for volumes in SAN Volume Controller storage systems and Storwize® family storage systems.

File System Pool

The name of the storage pool in which a volume is a member.

Format

The format of the volumes that are allocated from a pool, such as FB (fixed block) or CKD (count key data). Available only for DS8000 volumes.

Formatted

Shows whether a volume is formatted. Available only for volumes in storage systems that run IBM Spectrum Virtualize.

Grain Size (KiB)

The grain size with which a thin-provisioned volume was created. This value is typically 32, 64, 128, or 256 KiB. Larger grain sizes maximize performance, whereas smaller grain sizes maximize space efficiency. Grain sizes also limit the maximum provisioned capacity of the volume. Available only for volumes in storage systems that run IBM Spectrum Virtualize.

Hosts

The name of the host to which a volume is assigned. This name is the host name as defined on the storage system. If more than one host is assigned, the number of hosts is displayed. For storage systems that are managed by a CIM agent, the host name in this column might not match the configured host name on the storage system. Instead, the host name might be replaced by the WWPN of the host port or text that is generated by the CIM agent.

I/O Group

The name of the I/O Group to which a volume is assigned. Available only for volumes in storage systems that run IBM Spectrum Virtualize.

LSS or LCU

The logical subsystem (LSS) for fixed block volumes, or the logical control unit (LCU) for count key data volumes. Available only for DS8000 volumes.

Nearline HDD Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Nearline hard disk drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Nearline HDD Capacity (%)

The percentage of volume capacity that Easy Tier placed on Nearline hard disk drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Node

For DS8000, this value represents the name of the node to which a volume is associated.

For SAN Volume Controller storage systems and Storwize family storage systems that are configured with block storage, this value represents the name of the preferred node within the I/O Group to which a volume is assigned.

Provisioned Capacity (%)

(Previously known as Virtual Allocation) The percentage of the volume capacity that is written by the assigned host. The used capacity and provisioned capacity percentages are different when data reduction reduces the physical capacity that is required to store the written data.

The following formula is used to determine the provisioned capacity:

`(written capacity ÷ total capacity) × 100`

For example, if the space that is written to the volume is 50 GiB for a volume size of 200 GiB, the provisioned capacity is 25%.

Available for: FlashSystem A9000, FlashSystem A9000R, XIV storage systems, and resources that run IBM Spectrum Virtualize.

RAID Level

The RAID level of a volume, such as RAID 5 and RAID 10. The RAID level affects the performance and fault tolerance of the volume.

The value **None** indicates that the volume is on a single disk and performance or fault tolerance is not improved.

Reserved Volume Capacity

(Previously known as Unused Space) The amount of pool capacity that is reserved but has not been used yet to store data on the thin-provisioned volume.

Available only for resources that run IBM Spectrum Virtualize and are configured with block storage.

Safeguarded

Shows whether the volume is protected by the Safeguarded Copy feature in DS8000.

Safeguarded Capacity (GiB)

The amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000.

Safeguarded Location

The pool that backup copies of a volume are written to by the Safeguarded Copy feature in DS8000.

SCM Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Storage Class Memory (SCM) drives.

Availability: IBM Spectrum Virtualize systems, such as FlashSystem 9100, FlashSystem 7200, and Storwize family storage systems that are configured with block storage.

SCM Capacity (%)

The percentage of volume capacity that Easy Tier has placed on Storage Class Memory (SCM) drives.

Availability: IBM Spectrum Virtualize systems, such as FlashSystem 9100, FlashSystem 7200, and Storwize family storage systems that are configured with block storage.

Shortfall (%)

The difference between the remaining unused volume capacity and the available capacity of the pool that the volume is in, expressed as a percentage of the remaining unused volume capacity. The shortfall represents the relative risk of running out of space for an overallocated thin-provisioned volume. If the pool has sufficient available capacity to satisfy the remaining unused volume capacity, no shortfall exists. As the remaining unused volume capacity grows, or as the available pool capacity decreases, the shortfall increases and the risk of running out of space becomes higher. If the available capacity of the pool is exhausted, the shortfall is 100% and any volumes that are not yet fully allocated have run out of space.

The following formula is used to calculate the shortfall percentage: $\text{Overprovisioned Capacity} \div \text{Unused Volume Capacity} \times 100$.

When the shortfall exceeds 100%, a warning icon is shown.

Availability: Volumes on DS8000, FlashSystem storage systems, Hitachi Virtual Storage Platform, SAN Volume Controller, and Storwize family storage systems.

Status

The status of a volume. Statuses include Normal, Warning, Error, Unknown, Online, Offline, Syncing, Degraded, Excluded, and Unreachable. Use the status to determine the condition of the volume, and if any actions must be taken. For example, if a volume has an Error status, take immediate action to correct the problem. Syncing status indicates that a SAN Volume Controller or Storwize V7000 volume is part of a mirrored pair and is in the process of synchronizing with the primary volume. Syncing status will change when a subsequent probe detects a status change in the volume.

Storage Virtualizer

The name of the storage virtualizer that is managing a volume. A storage virtualizer is a storage system that virtualizes storage space from internal storage or from another storage system. Examples of storage virtualizers include SAN Volume Controller and Storwize V7000. A value is shown in this column only if the volume is managed by a storage virtualizer and data is collected for the storage virtualizer.

Storage Virtual Machine

The storage virtual machine (SVM) to which the volume belongs. An SVM is a logical entity that is used to serve data to clients and hosts.

Availability: NetApp ONTAP 9 storage systems.

Thin Provisioned

Shows whether a volume is a thin-provisioned volume, and the type of thin-provisioning that is used for the volume. A thin-provisioned volume is a volume with a provisioned capacity that is different from its real capacity. Not all the storage capacity of the volume is allocated when the volume is created, but is allocated over time as needed. Thin-provisioned volumes on a DS8000 storage system can be defined as Extent Space-Efficient (ESE) or as Track Space-Efficient (TSE).

Tier 0 Flash Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Tier 0 flash drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 0 Flash Capacity (%)

The percentage of volume capacity that Easy Tier has placed on Tier 0 flash drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 1 Flash Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Tier 1 flash, read-intensive drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 1 Flash Capacity (%)

The percentage of volume capacity that Easy Tier has placed on Tier 1 flash, read-intensive drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 2 Flash Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Tier 2 flash, high-capacity drives.

Availability: DS8000 storage systems.

Tier 2 Flash Capacity (%)

The percentage of volume capacity that Easy Tier has placed on Tier 2 flash, high-capacity drives.

Availability: DS8000 storage systems.

Tier Distribution

The distribution of volume extents across the Easy Tier drive classes, such as the percentage of the volume's extents on SCM drives, Tier 0, Tier 1, and Tier 2 flash drives, Enterprise hard disk drives, and Nearline hard disk drives.

Used Capacity (%)

(Previously known as Physical Allocation) The percentage of the capacity of the volume that is used. The space that is used by a thin-provisioned volume might be less than the capacity of the volume.

This value is determined by the formula, $\text{Used Capacity} \div \text{Capacity} \times 100$. For example, if the capacity that is used by volumes is 50 GiB for a volume size of 200 GiB, used capacity is 25%.

Remark: If the volume is stored at self-compressing drives, the used capacity does not reflect the inline disk compression savings.

Availability: All storage systems, and Volumes from SpecV Data Reduction Pools, except FlashSystem A9000 and FlashSystem A9000R.

Used Capacity (GiB)

(Previously known as Allocated Space) The amount of space that is used by the volume. For thin-provisioned volumes, the space that is used by the volume might be less than the provisioned capacity of the volume.

Remark: If the volume is stored at self-compressing drives, the used capacity does not reflect the inline disk compression savings.

Availability: All storage systems, and Volumes from SpecV Data Reduction Pools, except FlashSystem A9000 and FlashSystem A9000R.

VDisk Mirror Role

For mirrored volumes, the mirror role identifies the primary and secondary volume copies. If the volume is not a mirrored volume, the column is blank.

Availability: Volumes on storage systems that run IBM Spectrum Virtualize.

Virtual Disk Type

The type of virtual disk with which a volume was created, such as sequential, striped, image, and many. Available only for volumes in SAN Volume Controller storage systems and Storwize family storage systems that are configured with block storage.

Virtualizer Disk

The managed disk for the virtualizer that corresponds to a volume.

VOLSER

The volume serial number for DS8000 count-key-data (CKD) volumes.

Volume Number

The volume number of the volume within the LSS or LCU. Available only for DS8000 volumes.

Warning Level (%)

The warning level that was defined when a thin-provisioned volume was created. This value is measured either in MiB (10^20 bytes) or a percentage of the total, provisioned capacity of the volume. The storage system generates a warning if the used capacity of a volume grows enough to exceed the specified threshold. Available only for volumes in storage systems that run IBM Spectrum Virtualize.

Written Capacity (GiB)

(Previously known as Written Space) The amount of data that is written from the assigned hosts to the volume before compression or data deduplication are used to reduce the size of the data. For example, the written capacity for a volume is 40 GiB. After compression, the volume used space, which reflects the size of compressed data that is written to disk, is just 10 GiB.

Information about disk mappings

To view the disks that are mapped to a volume, right-click the volume and click View Properties. The Disk Mappings tab shows the servers that contain disks to which the volume is mapped. A volume can contribute to multiple disks, although each volume is associated with a single LUN.

The following information is available for each disk-to-volume relationship:

Disk

The identifier of the disk on the host, to which the volume is mapped.

Host Type

The type of host, such as Windows or AIX®, as defined on the storage system host connection.

Hosts

The name of the host, as defined on the storage system host connection.

Pool

The name of the pool that contains the volume from the storage system that is mapped to the disk.

Thin Provisioned

The type of thin-provisioning on a volume, if any. The following types might be displayed for a volume:

ESE

The volume is an Extent Space-Efficient (ESE) thin-provisioned volume on a DS8000 storage system.

No

The volume is not a thin-provisioned volume.

TSE

The volume is a Track Space-Efficient (TSE) thin-provisioned volume on a DS8000 storage system.

Yes

The volume is a thin-provisioned volume.

Used Volume Capacity (GiB)

The capacity on a storage system that is taken up for this volume.

Volume

The name or label of the volume, if available. This value uniquely identifies the volume within the storage system.

Volume Capacity (GiB)

The total amount of storage space that is committed to a volume. For thin-provisioned volumes, this value represents the provisioned capacity of the volume. In an XIV or IBM Spectrum Accelerate, this value represents the physical ("hard") capacity of the volume, not the provisioned ("soft") capacity.

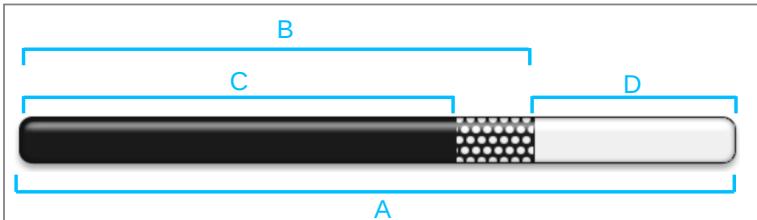
Volume ID

The identifier for the volume as defined on the storage system. The volume ID might be a serial number or internal ID.

Learn more about key storage values

The relationship between capacity and space values and how they are calculated is illustrated.

The following diagram shows the relationships between the key storage values for volumes:



The following table describes the values on the diagram and how they are calculated:

Storage value	Formula	Description
Capacity	A	The total amount of storage space that is committed to a volume.
Used Capacity	B	The amount of space that is reserved for a volume.
Available Capacity	D = A - B	The amount of space that is not allocated to the volume.
Used Capacity %	B ÷ A	The percentage of physical space that is reserved for a volume. This value cannot be greater than 100% because it is not possible to reserve more physical space than is available.
Reserved Volume Capacity	B - C	The amount of space that is allocated to a volume and is not yet used. The value is shown for SAN Volume Controller, Storwize family storage systems that are configured with block storage, and Storwize V7000 Unified volumes.
Shortfall %	((E ÷ (D + E)) × 100 E = Overprovisioned Capacity)	The percentage of the remaining unused volume capacity in a pool that is not available to be used by a volume. The higher the percentage, the more critical the shortfall of capacity. This value is available only for thin-provisioned volumes.

Block storage copy data resources

See information about the capacity, space usage, and relationships of block storage systems and how the copy data resources are used for primary and copied data.

The detailed information on the different ways a storage system is involved in remote relationships and how copying data uses resources is shown in the following tabs:

Summary

The summary tab shows how much storage is used for primary and copied data. It also shows the data on the source storage server that is not copied to a target storage server.

Remote Relationships

Detailed information on remote relationships includes the type of relationship that exists between the source and target storage systems.

→ Synchronous relationship
Host writes are delayed until the source receives confirmation that the data is written to the target volume.

→ Asynchronous relationship
Host writes can continue while data is being written to the target volume.

Where the type of volume is known, one of the following icons appears beside the volume in question.

Standard volume
A volume that is not thin-provisioned, compressed, encrypted, or encryptable.

Thin provisioned volume
The volume is only allocated the required amount of server space as required.



Compressed VDisk volume

Data is compressed as it is written to the VDisk.

Consistency Groups

Details the status and type of the consistency group, and the number of relationships that exist in the group.

FlashCopy

Details the information on the last FlashCopy® operation between each source and target storage system.

VDisk Mirrors

Details the information on the volumes, pools, tiers, and synchronization status of the VDisk mirrors.

Safeguarded Copy

The Safeguarded Copy tab shows the volumes that are protected by the Safeguarded Copy feature in DS8000®. You can view the pool that the backup copies of a volume are written to and the amount of capacity that is used to store volume backups.

HyperSwap

Details the information on the status of the master and auxiliary volumes, pools, and tiers of the HyperSwap® relationships.

Unprotected Volumes

Details the information on the volumes that are not backed up.

File storage systems

Use the File Storage Systems page to administer and monitor the status, configuration, capacity, and information that is collected about the file storage systems in your environment. For IBM Spectrum Scale, you can also monitor the performance of clusters, nodes, and file systems.

Information about file storage systems

File storage consists of file systems that are provisioned to one or more servers in a NAS environment. A file system is attached to servers with protocols such as Network File Systems (NFS) or Common Internet File System (CIFS) over ethernet. I/O access on a storage system is accomplished through reading or writing individual files of data.

Use the File Storage Systems page to view the following information for each storage system that is monitored:

Acknowledged

Shows whether a user marked the status of a storage system as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Available File System Capacity (GiB)

The amount of unused storage space on all the file systems on the storage system or filer.

Cluster

The name of the IBM Spectrum Scale cluster.

Condition

The overall operational condition of a storage system. This condition represents the most critical status that was detected on the internal resources of a storage system. For example, if an error was detected on a storage system pool, an error icon is shown for the storage system's condition. If no errors, warnings, or unreachable statuses were detected on its internal resources, then a green symbol is shown for the storage system's condition. To view the individual statuses of internal resources, right-click the storage system and select View Details.

Custom Tag 1, 2, and 3

Any user-defined text that is associated with a storage system. This text can be included as a report column when you generate reports for the storage system. To edit the custom tags for a storage system, right-click the storage system in the list and select View

Properties. On the properties notebook, click Edit.

External Pool Used Capacity (GiB)

The capacity that is migrated to external pools for all of the file systems that are associated with the storage system. This value represents the capacity that is used by active data (migrated and pre-migrated) only. Active data is data that has corresponding stub files on the GPFS file system.

Tip: To view information about the *inactive data* in external pools, go the details page for an IBM Spectrum Scale storage system and click File System Pools. The value for External Used Capacity includes active and inactive data.

Availability: IBM Spectrum Scale.

File System Capacity (GiB)

The total amount of storage space on all the file systems on the storage system.

IP Address

The IP address of the storage system. For IBM Spectrum Scale, the IP address of the cluster node that IBM® Storage Insights Pro uses to communicate with the IBM Spectrum Scale cluster is shown.

Last Successful Probe

The most recent date and time when the probe successfully completed the collection of asset and status data.

Name

A user-defined name of the storage system. If a name was not defined, IBM Storage Insights Pro shows the name that was defined when the storage system was added for monitoring.

Performance Monitor Status

The status value indicates whether the performance monitor was successful, or unsuccessful, or generated warning messages during the collection of node and file system performance metadata for the resource. One of the following status values might be displayed:

Restriction: Applies only to IBM Spectrum Scale v4.1.1 and later storage systems that are configured to collect performance metrics.

Canceled

The performance monitor was stopped and is no longer collecting performance metadata.

Completed

The performance monitor completed the collection of metadata.

Completed with warnings

The performance monitor completed, but encountered warning conditions during processing. Check the log to view the warning messages.

Disabled

To enable the performance monitor, go to the list page for the resource.

Failed

The performance monitor encountered error conditions during processing and is no longer running. Check the log for the performance monitor.

Not running

The performance monitor is not running.

Not supported

The collection of performance metrics is only supported for IBM Spectrum Scale v4.1.1 and later.

Running

The performance monitor is running.

Running with problems

The performance monitor is running, but encountered warning conditions during processing. Check the log to view the warning messages.

Starting

The performance monitor is starting.

Stopping

The performance monitor is stopping.

Probe Status

The status of the most recent run of a probe. Use this value to quickly identify a probe that failed or generated warning messages during processing. One of the following status values might be displayed:

Failed

The probe encountered error conditions during processing and did not complete the monitoring action. Check the log to view the error messages.

Warning

The probe encountered warning conditions during processing, but still completed the monitoring action. Check the log to view the warning messages.

Running

The probe is running.

Successful

The probe completed the monitoring action and encountered no warning or error conditions.

Never probed

The resource was never probed.

If a probe is run while a resource is unreachable, the status of the probe is not shown in the column. Instead, the status of the previous probe is shown.

Raw Capacity (GB)

(Previously known as Raw Disk Capacity) Total raw (unformatted) disk capacity of a storage system. When this value is calculated, IBM Storage Insights Pro does not include the capacity of storage system disks that become missing after data collection.

Used File System Capacity (GiB)

The amount of file system capacity on the storage system or filer that is used by files and directories. For IBM Spectrum Scale, the capacity that is used by all of the snapshots of the file systems is included in the Used File System Capacity value.

- [**Capacity and capacity usage charts**](#)

View charts that show the total file system capacity for the storage system, the number of inodes by file system, and the capacity that is used by specific resources.

- [**Viewing the capacity of external storage**](#)

View the used capacity and capacity of external pool storage that is used by file systems in IBM Spectrum Scale. External pools can include storage that is provided by IBM Cloud Object Storage, Amazon Simple Storage Service (S3), OpenStack Swift, IBM Spectrum Archive, IBM Spectrum Protect, and other storage providers.

- [**File internal resources**](#)

See information about the status, capacity and space usage of the internal resources for file storage systems.

Related tasks

- [Configuring the collection of performance data for IBM Spectrum Scale](#)
-

Capacity and capacity usage charts

View charts that show the total file system capacity for the storage system, the number of inodes by file system, and the capacity that is used by specific resources.

Capacity and usage charts

See the following charts that show the capacity and trends in capacity usage for the file storage systems and their internal resources:

- [Total File System Capacity](#)
- [Capacity by File System](#)
- [Capacity by Pool and Capacity by File System Pool](#)
- [Inodes by File System](#)
- [Inodes by Independent Fileset](#)

Total File System Capacity

The Total File System Capacity chart shows information about available and used capacity for the file systems on the storage system.

Tip: For an IBM Spectrum Scale storage system, the available and used capacity information applies to file storage and object storage, if both file and object storage are monitored. For example, the available capacity value is the capacity that is available for use by either the file storage system or the object storage system.

The following information is shown:

Available Capacity

The total amount of available capacity on all of the file systems on the storage system or filer.

Used Capacity

The total amount of used capacity on all of the file systems on the storage system or filer.

Capacity by File System

The Capacity by File System chart shows information about the fullest and largest file systems on the storage system.

The following charts are shown:

Fullest File Systems

A chart that shows up to six file systems with the least amount of available capacity.

Largest File Systems

A chart that shows up to six file systems with the largest storage capacity.

Each file system is represented by a bar on the charts. To view the following information about the file system, move the mouse pointer over the bar:

Capacity

The total amount of capacity on the file system, which includes the used and available capacity.

Available Capacity

The total amount of unused storage capacity on the file system.

Used Capacity

The total amount of used storage capacity on the file system.

Capacity by Pool and Capacity by File System Pool

The Capacity by Pool chart and the Capacity by File System Pool chart show capacity information about the pools in storage systems that are configured for file storage such as IBM Spectrum Scale and Storwize® V7000 Unified.

Tip: For Storwize V7000 Unified, the chart label Capacity by File System Pool is shown. For IBM Spectrum Scale, the chart label Capacity by Pool is shown.

Largest Pools

A chart that shows up to six pools with the largest storage capacity in the storage system.

Fullest Pools

A chart that shows up to six pools with the least amount of available capacity in the storage system.

Each pool is represented by a bar on the charts. To uniquely identify the pool, the pool name is prefixed with the file system name. To view the following information about the pool, move the mouse pointer over a bar:

Capacity

The total amount of file system capacity on all of the Network Shared Disks (NSDs) in the pool, which includes both the total amount of used and free capacity.

Available Capacity

The capacity on all of the free NSDs in the pool. The amount that is shown is the capacity that is available for provisioning new NAS shares.

Used Capacity

The capacity that is being used for file storage on all of the NSDs in the pool.

Inodes by File System

The Inodes by File System charts show inode information for file systems on storage systems that are configured for file storage such as IBM Spectrum Scale and Storwize V7000 Unified.

Fewest Available Inodes

A chart that shows up to six file systems with the fewest number of available inodes.

Most Inodes

A chart that shows up to six files systems that have the largest number of inodes.

Each file system is represented by a bar on the charts. Move the mouse pointer over a bar to view the following information for the file system:

Maximum Inodes

The total number of inodes on the file system. This value consists of the available inodes and the used inodes for the file system.

Available Inodes

The number of inodes that are available within the file system.

Used Inodes

The number of inodes that are already used on the file system. Each time that you create a file or directory on the file system, an inode is allocated to the file or directory.

Inodes by Independent Fileset

Use the following charts to view inode information about the independent filesets that are associated with the storage system. An independent fileset has its own inode space. Other filesets might share the inode space and use inodes from the inode space. These charts are shown only for IBM Spectrum Scale storage systems.

Fewest Available Inodes

A chart that shows up to six filesets with the fewest number of available inodes.

Most Inodes

A chart that shows up to six filesets with the largest number of inodes.

Each fileset is represented by a bar on the charts. Move the mouse pointer over a bar to view the following information for the fileset:

Maximum Inodes

The total number of inodes in the inode space. This value consists of the available inodes and the used inodes.

Available Inodes

The number of inodes that are available in the inode space.

Used Inodes

The number of inodes that are already used in the inode space. This value consists of inodes that are used by this fileset and all dependent filesets. A dependent fileset shares the inode space of an independent fileset.

The number of inodes that are used by this fileset are represented by the blue section of the bar. The inodes that are used by dependent filesets are represented by the dark gray section of the bar.

Related tasks

- [Investigating capacity trends for file storage systems](#)

Related reference

- [Viewing capacity charts](#)

Viewing the capacity of external storage

View the used capacity and capacity of external pool storage that is used by file systems in IBM Spectrum Scale. External pools can include storage that is provided by IBM® Cloud Object Storage, Amazon Simple Storage Service (S3), OpenStack Swift, IBM Spectrum Archive, IBM Spectrum Protect, and other storage providers.

About this task

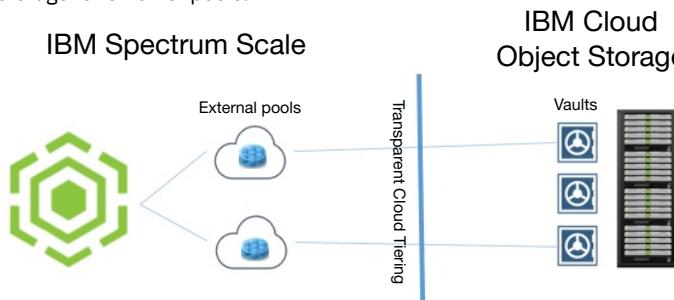
For all external storage that is being used by IBM Spectrum Scale file systems, you can complete the following tasks:

- View used capacity to understand how much data is being migrated from those file systems to external storage.
- Charge back storage costs to the departments within your organization.
- Gauge shortfall in case you need to recall data from external pools.

For external storage that is provided by IBM Cloud Object Storage, you can also view capacity information, including the percentage of space (active and inactive) that is being used. Use this information to complete the following tasks:

- View how storage space is distributed between internal and external storage tiers.
- Identify the external pools that are running out of space.
- Determine when you need to reconcile files between an IBM Spectrum Scale and an external storage tier. For example, when you remove files from a file system, no policy is available to automatically remove the cloud objects that are created. This situation might cause orphan objects (inactive data) on the cloud. To clean up inactive data and keep the cloud in sync with the file system, you can reconcile files.

The following figure illustrates the relationship between IBM Spectrum Scale and the IBM Cloud Object Storage system that provides storage for external pools:



Procedure

To view the used capacity and capacity of external storage, complete the following steps:

1. From the Resources menu, click File Storage Systems.
2. Right-click a IBM Spectrum Scale storage system and click View Details.
3. In the navigation pane, click Pools.
4. View the following columns for information about the used capacity and capacity of external pools:

Capacity (%)

The percentage of used capacity in the file system pool. Hover over the bar for a specific pool to view statistics about its used and available capacity.

For external pools that are connected to cloud services or storage providers, only the amount of used capacity is shown.

Cloud services and other storage providers might include IBM Spectrum Protect, IBM Spectrum Archive, Amazon Simple Storage Service (S3), or OpenStack Swift.

For external pools that are connected to vaults in IBM Cloud Object Storage, the percentage of used capacity includes active and inactive data. Space values are determined from the usable vault capacity that is associated with the cloud account and the hard quota value (if a hard quota is configured). Hover over the bar for a specific pool to view statistics about its used active space, used inactive space, and available capacity.

Active and inactive data in external pools

Active data is data that has corresponding stub files on the GPFS file system. Inactive data is data that exists in the external pool but is not accessible in the GPFS file system. Data is classified as inactive under these conditions:

- When you migrate a file off a GPFS file system, its data is still visible and accessible through its stub file. When the stub file is deleted, the data in the external pool is no longer accessible and is considered inactive.
- When you modify a migrated file, it's recalled from the external pool and modified locally. The previous data for the file remains in the external pool but is no longer accessible through the GPFS file system and is considered inactive.

Tip: To keep the files in sync between an external pool and a GPFS file system and clean up inactive data, you can run the IBM Spectrum Scale `mmcloudgateway files reconcile` command. For more information, see [Reconciling files between IBM Spectrum Scale file system and cloud storage tier](#).

External Used Capacity (GiB)

The amount of used capacity on an external pool. This value includes active data and inactive data. Active data is data that has corresponding stub files on the GPFS file system. Inactive data is data that exists in the external pool but is not accessible in the GPFS file system.

Availability: External pools that are provided by IBM Cloud Object Storage.

Inactive Used Capacity

The amount of inactive used capacity on an external pool. Inactive data is data that exists in the external pool but is not accessible in the GPFS file system. Available for external pools that are provided by Cloud Object Storage only.

Availability: External pools that are provided by IBM Cloud Object Storage.

Used Capacity

The amount of capacity in the file system pool that is being used. For external pools, used capacity includes active data only.

Active data is data that has corresponding stub files on the GPFS file system.

Availability: All storage systems.

- [Identifying shortfall before data is recalled from external storage](#)

View the percentage of migrated data in external pools that does not fit into the available capacity on an IBM Spectrum Scale file system.

Related information

- [Introduction to Transparent Cloud Tiering for IBM Spectrum Scale](#)

Identifying shortfall before data is recalled from external storage

View the percentage of migrated data in external pools that does not fit into the available capacity on an IBM Spectrum Scale file system.

About this task

This percentage, called *shortfall*, represents the relative risk of not having enough internal file system space if you recall all data from the associated external pools. The higher the percentage, the higher the amount of migrated data that does not fit.

Procedure

To view the potential shortfall for a file system, complete the following steps:

1. From the Resources menu, click File Storage Systems.
2. Right-click a IBM Spectrum Scale storage system and click View Details.
3. Under Internal Resources, click File Systems.
4. Locate the file system that you want to check and view the value in the Shortfall column.

To calculate shortfall, the following formula is used:

$$[(\text{External Pool Migrated Data} - \text{Available Capacity}) \div \text{External Pool Migrated Data}] \times 100$$

For example, if the available capacity on a file system is 200 GiB, but the used capacity of migrated data on external pools is 500 GiB, the shortfall percentage is 60% (300 GiB). In this case, consider adding capacity to the file system before recalling data.

$$[(500 - 200) \div 500] \times 100 = 60\%$$

If the file system has sufficient available capacity to contain all the migrated data in external pools, no shortfall exists. For example, if the available capacity on a file system is 500 GiB, and the used capacity in external pools is only 200 GiB, the shortfall is 0%.

Tip: Only the space that is used by migrated data in external pools is included in the calculation for shortfall. Pre-migrated data is not included because it exists in both the internal and external pools.

File internal resources

See information about the status, capacity and space usage of the internal resources for file storage systems.

- [**Clusters and nodes**](#)
View the information that is shown about clusters and nodes in file storage systems.
- [**Disk controllers**](#)
View the information that is shown about disk controllers in file storage systems.
- [**Filesets**](#)
View the information that is shown about filesets in file storage systems.
- [**File systems and file provisioning groups**](#)
View the information that is shown about file systems and file provisioning groups in file storage systems.
- [**Network Shared Disks**](#)
View the information that is shown about Network Shared Disks (NSDs) in file storage systems.
- [**Nodes**](#)
View the information that is shown about nodes in file storage systems.
- [**File system pools**](#)
View the information that is shown about pools in file storage systems.
- [**Quotas for IBM Spectrum Scale clusters**](#)
View the information that is shown about quotas in file storage systems.
- [**Shares**](#)
View the information that is shown about shares in file storage systems.
- [**Snapshots of GPFS file systems or filesets**](#)
View the information that is shown about snapshots in file storage systems.

Clusters and nodes

View the information that is shown about clusters and nodes in file storage systems.

A cluster is a group of redundant servers that provide uninterrupted service with component failures within the cluster.

A node is an individual server that is configured within a cluster.

The following information is shown about the clusters and the nodes:

Type

The type of a cluster such as an interface cluster or storage cluster, or both.

The following information is provided about nodes:

Cache Gateway Node

Shows whether the interface node is enabled to work as a caching gateway node that can exchange data with other systems.
Cluster
The name of the cluster that the node belongs to or is a member of. A cluster is a group of application servers or nodes that collaborate for workload balancing and failover. A failover is an automatic operation that switches to a redundant or standby system in the event of a software, hardware, or network interruption.
Name
The unique name of the node.
Role
The server can have multiple roles, such as management, interface, and storage.
Status
The status of the node. Statuses include Normal, Warning, Error, and Unknown. Use the status to determine the condition of a node, and if any actions must be taken. For example, if a node has an Error status, take immediate action to correct the problem.

Disk controllers

View the information that is shown about disk controllers in file storage systems.

A disk controller is the hardware component that controls access to disk drives. A disk controller communicates with one or more disk drives to initiate and end connections to clients.

The following information is shown about the disk controllers:

Associated Disks	The number of the disks that are controlled by the disk controller. A disk might be controlled by more than one controller.
HBA WWN	The World Wide Name (WWN) of the disk controller. The WWN is a 64-bit string that uniquely identifies the controller. The value is only available for host bus adapters (HBAs).
Type	The type of disk controller, such as IDE, SCSI, floppy, or RAID. The type of disk controller that Host Bus Adapters (HBAs) use is FCAL (Fibre Channel Arbitrated Loop).

Filesets

View the information that is shown about filesets in file storage systems.

A fileset is a collection of files and directories on a physical or logical storage resource.

The following information is shown about the filesets:

More information: Definitions are only provided if additional information is required to understand the information that is shown in the table.

Cache Role	Specifies whether the cached fileset is a Cache target or a Cache source. Cache target is shown when the fileset contains the cached data of the source filesets. Cache source is shown for filesets that have copies of target filesets. If the cached fileset is neither a cache target nor a cache source, the field is left blank.
Home System Name	
Shows the name of the share or export on the home fileset that is enabled for caching.	
Independent	
This information is available only for IBM Spectrum Scale storage systems. If the column is marked, the fileset is an independent fileset that has its own inode space. If the column is blank, the fileset is a dependent fileset.	
An inode space is a collection of inode number ranges that are reserved for an independent fileset. A dependent fileset shares the inode space of an independent fileset.	
Path	The path for the fileset. The path is displayed only if Linked is displayed in the State field.
Snapshots	
The snapshots of the fileset. If there is only one snapshot of the fileset, the name of the snapshot is shown. If there is more than one snapshot of the fileset, the number of snapshots is shown.	
State	The state of the fileset. Valid values are listed.
Linked	

The fileset is linked to the file system that is displayed in the File System field.

Unlinked

The fileset is not linked to the file system that is displayed in the File System field.

Used Inodes

For IBM Spectrum Scale, the number of inodes that are used by the fileset. An inode is the internal structure that describes the individual files in the file system metadata. An inode contains the node, type, owner, and location of a file.

Used Inodes (%)

For IBM Spectrum Scale, the percentage of the total inodes in the inode space that is already used by the fileset.

The total number of inodes in the inode space is represented by a bar. The percentage of inodes that is used by the fileset are represented by the blue section of the bar and as a percentage figure on the bar. The inodes that are used by other filesets that share the inode space are represented by the dark gray section of the bar. The available inodes in the inode space are represented by the light gray section of the bar.

Used Capacity (GiB)

The amount of storage capacity that is used by the fileset. Used capacity is not provided for filesets that are cache targets.

Availability: All storage systems.

File systems and file provisioning groups

View the information that is shown about file systems and file provisioning groups in file storage systems.

To view information about the file systems or file provisioning groups that are associated with a storage system, click File Systems or File Provisioning Groups. The type of the storage system determines which of these components can be viewed.

A file provisioning group is a logical container on a HPE 3PAR StoreServ Storage system that holds a virtual file server. Each file provisioning group holds one virtual file server, and in this way provides the file system resources on a storage system.

The following information is shown about the file systems:

Available Inodes

The number of inodes that are available in a file system.

Available Capacity (GiB)

The amount of storage capacity that is available (not allocated) on a file system.

Custom Tag 1, 2, and 3

Any user-defined text that is associated with the file system. This text can be included as a report column when you generate reports for the file system. To edit the custom tags for a file system, right-click the file system in the list and select View Properties. On the properties notebook, click Edit.

Creation Name

The file system name on the IBM Spectrum Scale cluster that owns the file system. If the file system is mounted from the current cluster, no value is shown. This information is available only for IBM Spectrum Scale storage systems.

To view information about the file system, such as NSDs, quotas, filesets, and pools, click the name of the file system.

External Pool Used Capacity (GiB)

The capacity that is migrated from the file system to external pools. This value represents the capacity that is used by active data (migrated and pre-migrated) only. Active data is data that has corresponding stub files on the GPFS file system.

Tip: To view information about the *inactive data* in external pools, go the details page for an IBM Spectrum Scale storage system and click File System Pools. The value for External Used Capacity includes active and inactive data.

Availability: IBM Spectrum Scale.

Filesets

The filesets that are contained in a file system. A fileset is a hierarchical grouping of files that is managed as a unit for balancing workload across a cluster. If a file system contains only one fileset, the unique name of the fileset is provided. If a file system contains more than one fileset, the number of filesets is provided.

For IBM Spectrum Scale, no value is shown if the file system is mounted from an IBM Spectrum Scale cluster that is not monitored.

File System Type

The type of file system.

Internal Used Capacity (%)

(Previously known as Used Space) The percentage of capacity that is used on the file systems that are associated with the resource.

The following formula is used to calculate this value:

$$[(\text{File System Used Capacity} \div \text{File System Capacity}) \times 100]$$

For IBM Spectrum Scale, the capacity that is used by the snapshots of the file system is included in the Internal Used Capacity value.

Internal Used Capacity (GiB)

The amount of storage space that is unavailable (allocated) on a file system. For IBM Spectrum Scale, this value does not include the space that is used by migrated data on external pools.

NSDs

The name of the Network Shared Disk (NSD) that contains the file system. If the file system is on one NSD, the unique name of the NSD is shown. If the file system is on two or more NSDs, the number of NSDs is shown.

Owning Cluster

The name of the IBM Spectrum Scale cluster that owns the file system. This information is available only for IBM Spectrum Scale storage systems.

The file system can be mounted from the current IBM Spectrum Scale cluster or a related cluster. If the related cluster is monitored, click the name of the cluster to view information about the IBM Spectrum Scale cluster.

Physical Capacity (GiB)

The raw capacity of the partition where a file system resides.

Pools

The storage pool that contains the file system. If a file system is on only one storage pool, the unique name of the storage pool is shown. If the file system is on two or more storage pools, the number of storage pools is shown.

For IBM Spectrum Scale, no value is shown if the file system is mounted from an IBM Spectrum Scale cluster that is not monitored.

Quotas

The quotas that are associated with the file system. Quotas restrict the number of files that are created and the amount of file system space that is used. If only one quota is associated with the file system, the name of the quota is shown. If there is more than one quota, the number of quotas is shown.

For IBM Spectrum Scale, no value is shown if the file system is mounted from a related IBM Spectrum Scale cluster that is not monitored.

Shortfall (%)

The percentage of migrated data in external pools that does not fit into the available capacity on the file system. The shortfall represents the relative risk of not having enough internal file system capacity if you recall all data from the associated external pools. The higher the percentage, the higher the amount of migrated data that does not fit.

Tip: Only the capacity that is used by migrated data in external pools is included in the calculation for shortfall. Pre-migrated data is not included because it exists in both the internal and external pools.

To calculate shortfall, the following formula is used:

$$\frac{[(\text{External Pool Migrated Data} - \text{Available Capacity})]}{\text{External Pool Migrated Data}} \times 100$$

For example, if the available capacity on a file system is 200 GiB, but the used capacity of migrated data on external pools is 500 GiB, the shortfall percentage is 60% (300 GiB).

$$[(500 - 200) / 500] \times 100 = 60\%$$

If the file system has sufficient available capacity to contain all the migrated data in external pools, no shortfall exists. For example, if the available capacity on a file system is 500 GiB, and the used capacity in external pools is only 200 GiB, the shortfall is 0%.

Availability: IBM Spectrum Scale.

Snapshot Space (GiB)

The amount of space that is used by all of the snapshots of the file system. This value includes the snapshot space for filesets within the file system.

Snapshots

The snapshots of the file system. If there is only one snapshot of the file system, the name of the snapshot is shown. If there is more than one snapshot of the file system, the number of snapshots is shown.

For IBM Spectrum Scale, no value is shown if the file system is mounted from an IBM Spectrum Scale cluster that is not monitored.

Storage Virtual Machine

The storage virtual machine (SVM) to which the file system belongs. An SVM is a logical entity that is used to serve data to clients and hosts.

Availability: NetApp ONTAP 9 storage systems.

Used Inodes

The number of used inodes on a file system. An inode is the internal structure that describes the individual files or directories in the file system metadata. An inode contains the node, type, owner, and location of a file or directory.

Availability: All storage systems.

Network Shared Disks

View the information that is shown about Network Shared Disks (NSDs) in file storage systems.

A Network Shared Disk (NSD) is a logical grouping of storage disks in a network on file storage systems.

View the hover help for information about the values that are shown about quotas. Additional information is provided about the following column headings:

Acknowledged

Shows whether a user marked the status of an NSD as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when the status of related, higher-level resources is determined.

For example, if the status of the NSD is Error, then the status of the related storage system is also Error. If the Error status of the NSD is acknowledged, then its status is not used to determine the overall status of the related storage system. In this case, if the other internal resources of the storage system are Normal, then the status of the storage system is also Normal.

Available Capacity (GiB)

The amount of storage capacity that is available, but not allocated, on the NSD.

Correlated Storage Systems

Correlated storage systems are storage volumes that are configured to use the information that is contained on an NSD. If only one storage system is correlated to an NSD, the name of the storage volume is provided. If multiple storage volumes are correlated, the number of storage volumes is provided.

Correlated Storage Volume

The name of the volume that provides storage to the NSD. For IBM Spectrum Scale, the correlated volume is on a back-end storage system.

Custom Tags 1,2, 3

Any user-defined text that is associated with the NSD. The text that is added can be included in reports that are generated about the NSD. To edit the custom tags for the NSD, right-click the NSD in the list and click View Properties. In the properties notebook, click Edit.

Failure Group

The failure group ID for NSDs that share a common point of failure.

File System

The name of the file system on the NSD or the number of file systems on the NSD.

NSD Servers

This information is available only for IBM Spectrum Scale storage systems. An NSD server is a cluster node that is physically connected to the NSD and provides access to the NSD for other cluster nodes.

The number of cluster nodes that are configured as NSD servers for the NSD is shown. If only one NSD server is configured, the name of the cluster node is shown. If the column is blank, the NSD does not have an NSD server and all the cluster nodes must be physically connected to the NSD.

If the NSD server is disconnected from the NSD, the cluster nodes that access the NSD through the NSD server might lose their connection unless redundant NSD servers are configured.

Status

The status of the NSD such as normal, warning, error, or unknown. Use the status to determine the condition of the NSD, and if any actions must be taken. For example, if the NSD has an error status, take immediate action to correct the problem.

For IBM Spectrum Scale, an Error or Warning status might be due to a connection problem between one of the NSD servers and the NSD. To check the status of the NSD server connections, click the NSD row, select View Properties, and click the NSD Servers tab.

The Connectivity column shows the status of the connection. Alternatively, if the NSD does not have an NSD server, the Error or Warning status might be due to a connection problem between the NSD and one of the cluster nodes.

Type

The type of information that is stored on the NSD. The following values might be shown:

- Data
- Metadata
- Data, Metadata. The NSD contains both data and metadata.
- File System Descriptor. The NSD contains only a copy of the file system descriptor.
- Local Cache. The NSD is used by the cluster node as a local cache to enable efficient access to data.

Nodes

View the information that is shown about nodes in file storage systems.

A node is an individual server that is configured within a cluster.

View the hover help for information about the values that are shown about nodes. Additional information is provided about the following column headings:

Acknowledged

Shows whether a user marked the status of a node as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Cache Gateway Node

The interface node is enabled or is not enabled as a cache gateway node that can exchange data with other systems.

Cloud Gateway

For IBM Spectrum Scale, the file system that is managed by the node as a cloud gateway service. If the node is a cloud gateway but a file system is not available, one of the following statuses is shown:

Disconnected

The node is a cloud gateway, the gateway service is running, and a cloud account is configured, but the connection to the cloud provider failed.

No Cloud Account

The node is a cloud gateway for a file system and the gateway service is running, but no cloud account is configured.

No File System

The node is a cloud gateway and the gateway service is running, but the node is not yet assigned to a file system.

Stopped

The node is a cloud gateway for a file system, but the gateway service is stopped.

Cluster

The node is a member of the specified cluster. A cluster is a group of application servers or nodes that work together to provide workload balancing and failover services.

Manager, Quorum, NSD Server

For IBM Spectrum Scale, the roles that are assigned to a node. If the values for Manager, Quorum, and NSD Server are blank, the node is a GPFS client node.

NSDs Served

This information is available only for IBM Spectrum Scale storage systems. An NSD server is a cluster node that is physically connected to the NSD and provides access to the NSD for other cluster nodes.

The number of NSDs for which this node is an NSD Server is shown. If the cluster node is configured as an NSD Server for only one NSD, the name of the NSD is shown. If the column is blank, the cluster node is not configured as an NSD Server.

If the NSD server is disconnected from the NSD, the cluster nodes that access the NSD through the NSD Server might lose their connection unless redundant NSD Servers are configured.

Protocols

For IBM Spectrum Scale, the protocols that are configured in Cluster Export Services (CES) to access data on file systems in the IBM Spectrum Scale cluster. If the protocols are not available because of network or other issues, the status of the node is shown.

No values are shown if the node is not designated as a CES node, the IBM Spectrum Scale version is earlier than 4.1.1, or the node was never probed.

Nodes in an IBM Spectrum Scale cluster are designated as CES nodes so that computers that do not run IBM Spectrum Scale software can access data on the cluster. To ensure high availability, multiple nodes in a cluster are designated as CES nodes.

CES supports the following protocols:

- Network File System (NFS)
- Common Internet File System (CIFS)
- Object

If the protocols are not available on the node, one of the following statuses might be shown:

Network unavailable

The node can't access the IP addresses in the CES address pool.

Root unavailable

The node can't access the shared root directory for CES.

Failed

One of the protocol servers isn't available.

Suspended

The node is suspended.

Role

The role that a server can participate in. A server can have multiple roles, for example, Management, Interface, and Storage.

Server

The name of the monitored server that is associated with the node. If the server is not monitored, go to Resources > Servers to add the server for monitoring.

Status

The status of the node, including the spare node status. The Online Spare status indicates that the node is a spare node and it is being used as a spare for another node in the I/O group.

File system pools

View the information that is shown about pools in file storage systems.

The internal resource for IBM Spectrum Scale storage systems is called Pools. For all other file storage systems, the internal resource is called File System Pools.

For Dell EMC VNX file storage systems, a file system pool might be associated with multiple file systems. To view the file systems, right-click the pool and select View Properties. The File Systems tab shows the file systems that are associated with the file systems pool.

View the hover help for information about the values that are shown about pools in files systems.

The following additional information is provided about the values that are shown for pools:

Available Capacity (GiB)

The amount of unallocated storage capacity in the pool. Available capacity usually comprises the space that can be used for storage.

However, if the pool is not formatted, the amount of overhead capacity might also be included in the calculation.

Availability: All storage systems.

Capacity (%)

The percentage of used capacity in the file system pool. Hover over the bar for a specific pool to view statistics about its used and available capacity.

For external pools that are connected to cloud services or storage providers, only the amount of used capacity is shown. Cloud services and other storage providers might include IBM Spectrum Protect, IBM Spectrum Archive, Amazon Simple Storage Service (S3), or OpenStack Swift.

For external pools that are connected to vaults in IBM® Cloud Object Storage, the percentage of used capacity includes active and inactive data. Space values are determined from the usable vault capacity that is associated with the cloud account and the hard quota value (if a hard quota is configured). Hover over the bar for a specific pool to view statistics about its used active space, used inactive space, and available capacity.

Active and inactive data in external pools

Active data is data that has corresponding stub files on the GPFS file system. Inactive data is data that exists in the external pool but is not accessible in the GPFS file system. Data is classified as inactive under these conditions:

- When you migrate a file off a GPFS file system, its data is still visible and accessible through its stub file. When the stub file is deleted, the data in the external pool is no longer accessible and is considered inactive.
- When you modify a migrated file, it's recalled from the external pool and modified locally. The previous data for the file remains in the external pool but is no longer accessible through the GPFS file system and is considered inactive.

Tip: To keep the files in sync between an external pool and a GPFS file system and clean up inactive data, you can run the IBM Spectrum Scale `mmcloudgateway files reconcile` command. For more information, see [Reconciling files between IBM Spectrum Scale file system and cloud storage tier](#).

Capacity (GiB)

(Previously known as Total Capacity) The total amount of storage space in the storage pool.

For external pools that are provided by IBM Cloud Object Storage, this value represents External Used Capacity + Available Capacity.

External Used Capacity (GiB)

The amount of used capacity on an external pool. This value includes active data and inactive data. Active data is data that has corresponding stub files on the GPFS file system. Inactive data is data that exists in the external pool but is not accessible in the GPFS file system.

Availability: External pools that are provided by IBM Cloud Object Storage.

Inactive Used Capacity

The amount of inactive used capacity on an external pool. Inactive data is data that exists in the external pool but is not accessible in the GPFS file system. Available for external pools that are provided by Cloud Object Storage only.

Availability: External pools that are provided by IBM Cloud Object Storage.

Name

The name of a pool that uniquely identifies it within a storage system. The icon that is displayed next to the name of the pool indicates the type of pool:

Icon	Type of pool	Description
	Internal	A pool that is internal to a storage system.
	External	A pool that is external to a storage system but its provider cannot be determined.
	IBM Spectrum Archive	A pool that is external to an IBM Spectrum Scale cluster and is provided by IBM Spectrum Archive. Applies only to IBM Spectrum Scale.

Icon	Type of pool	Description
	IBM Spectrum Protect	A pool that is external to an IBM Spectrum Scale cluster and is provided by IBM Spectrum Protect. Applies only to IBM Spectrum Scale.
	IBM Cloud Object Storage	A pool that is external to an IBM Spectrum Scale cluster and is provided by IBM Cloud Object Storage. Applies only to IBM Spectrum Scale.
	Amazon Simple Storage Service (S3)	A pool that is external to an IBM Spectrum Scale cluster and represents cloud storage from Amazon S3. Applies only to IBM Spectrum Scale.
	OpenStack Swift	A pool that is external to an IBM Spectrum Scale cluster and represents cloud storage from OpenStack Swift. Applies only to IBM Spectrum Scale.
	Other cloud	A pool that is external to an IBM Spectrum Scale cluster and represents cloud storage from a provider that cannot be determined.

NSDs

The unique names of the Network Shared Disks (NSDs) that the pool is on.

Used Capacity

The amount of capacity in the file system pool that is being used. For external pools, used capacity includes active data only. Active data is data that has corresponding stub files on the GPFS file system.

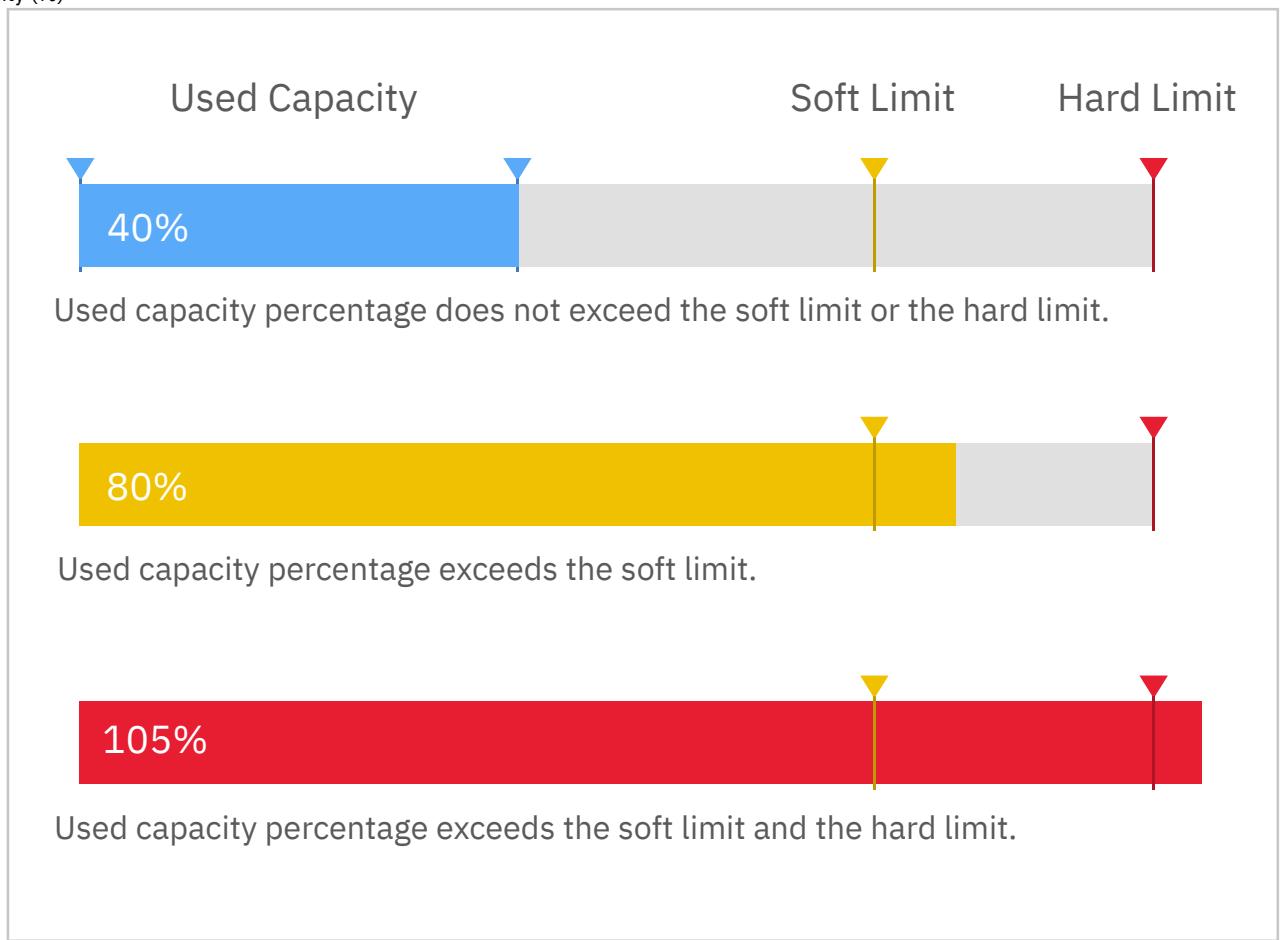
Availability: All storage systems.

Quotas for IBM Spectrum Scale clusters

View the information that is shown about quotas in file storage systems.

Quotas are used to restrict the number of files that are created on a file system and the amount of file system space that is used. A quota specifies the amount of disk space and the number of inodes that are assigned to a specified user, group of users, or fileset.

Capacity (%)



The percentage of the disk space quota that is already used by the user, group of users, or fileset.

Type

The type of quota on the IBM Spectrum® Scale cluster such as user, group, or fileset quota. For group quotas, the capacity and inode usage values for all of the users of the operating system group are calculated. For fileset quotas, the capacity and inode usage values

for the users who use the fileset are calculated.

Used Inodes (%)

The percentage of the inode quota that is already used by the user, group of users, or fileset.

The capacity of the quota is represented by a bar, and the Inodes Soft Limit and Inodes Hard Limit values are shown as lines on the bar.

If the Used Inodes value is less than the soft limit, the percentage of the quota that is used is shown in blue on the capacity bar.

If the Used Inodes value exceeds the soft limit, the percentage that is used is shown in yellow. If the Used Inodes value reaches or exceeds the hard limit, the percentage that is used is shown in red.

Shares

View the information that is shown about shares in file storage systems.

You can use the following actions to administer shares:

Add to Application

Adds the selected resource within the context of the application to enhance your monitoring and management tasks. This action is available from an eligible resource page.

Remove from Application

Removes the selected resource within the context of the application. This action is available from an eligible resource page.

Once the resources are selected for removal from the application, you receive a confirmation message. Once the selected resources are removed, the resource page on the details page for the application reflects the removal of the resources.

View Properties

View the key properties of the share, including the exporting server, the file path to the directory or file system, and the protocol that is used to access the share.

The following information is shown about the shares:

Cluster

The unique name of the cluster that a share comes from.

Path

The file path that is exported.

Protocol

The protocols that a share supports. Examples of protocols include NFS, CIFS, HTTP, and FTP. A share can support multiple protocols.

Shared Servers

The servers that have access to a share. If only one server has access to a share, the server name is provided. If multiple servers have access, "multiple" is displayed.

State

Shows whether a share is active or inactive. An inactive share is the same as a deleted share, with the exception that the data in an inactive share remains intact and can be viewed when the share is reactivated.

Storage Virtual Machine

The storage virtual machine (SVM) to which the share belongs. An SVM is a logical entity that is used to serve data to clients and hosts.

Availability: NetApp ONTAP 9 storage systems.

Ticket

A ticket identifier that was associated with the share for tracking purposes. The ticket identifier was specified when the share was created.

Snapshots of GPFS file systems or filesets

View the information that is shown about snapshots in file storage systems.

A snapshot is a copy of the changed data in the active files and directories of a GPFS file system or fileset. By default, IBM® Storage Insights Pro does not collect information about the size of GPFS snapshots. To enable IBM Storage Insights Pro to collect that information, open a case with [IBM Support](#).

Important: Collecting size information about GPFS snapshots might put a significant load on the IBM Spectrum Scale cluster, and might affect other applications that use the same cluster.

The snapshot can consist of a snapshot of the file system or a fileset in the file system. If the snapshot is a snapshot of a fileset, the name of the file system and the name of the fileset is shown. Otherwise, only the name of the file system is shown.

Valid

The status of the snapshot. A value of Yes indicates that the snapshot is valid. A value of No indicates that the snapshot is invalid. The snapshot might be invalid because, for example, it is being deleted. Use the status to determine the condition of a snapshot, and if any actions must be taken.

Object storage systems

Use the Object Storage Systems page to administer and monitor the configuration and capacity information about the object storage systems in your environment.

Information about object storage systems

In an object storage system, data is stored in a flat namespace that scales to trillions of objects and is optimized to store unstructured data, such as documents, images, audio, and video files. Object storage simplifies how users access data, supporting new types of applications and allowing users to access data by various methods, including mobile devices and web applications.

OpenStack Swift is an open source object storage system that is widely used for cloud storage. IBM Spectrum Scale storage systems that are configured for object storage combine OpenStack Swift with the file storage capabilities of the GPFS file system. All object data is stored as files on the GPFS file system.

Use the Object Storage Systems page to view the following information for each object storage system that is monitored:

Accounts

The number of accounts in the object storage system. This information is collected only for IBM Spectrum Scale.

An account is the top-level element in the storage hierarchy for OpenStack Swift-compliant object storage systems. An account can contain a set of containers.

The accounts and the containers that you can monitor in the GUI are determined by the role that is associated with your login account for the storage system.

To monitor all of the accounts and the containers in IBM Spectrum Scale, you must be assigned the role that is defined in the reseller_admin_role configuration option in the Swift proxy server. The default value for the reseller_admin_role option is ResellerAdmin.

Tip: To change the credentials for monitoring the storage system, go to Resources > Object Storage Systems, right-click the storage system, and then click Connections > Modify Connection.

Acknowledged

Shows whether a user marked the status of a storage system as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Available Capacity (GiB)

The storage capacity that is available for object data.

For IBM Spectrum Scale, this value is the amount of file system capacity that is available.

For IBM® Cloud Object Storage, this value is the amount of raw storage capacity in all the storage pools that is available and includes capacity that is reserved for overheads, such as formatting, disk overhead, and dispersal overhead.

Capacity (%)

The percentage of the total object capacity that is used.

For IBM Cloud Object Storage, this value is the percentage of the total raw capacity of all the storage pools that is used and includes space that is reserved for overheads, such as formatting, disk overhead, and dispersal overhead.

Capacity (GiB)

(Previously known as Total Capacity) The capacity that can be used by the object storage system.

For IBM Spectrum Scale, this value is the amount of file system capacity that can be used. The total capacity includes the capacity that is used for object storage and the capacity that is available on the file system.

For example, the capacity of a GPFS file system is 500 GiB. If 100 GiB is used for file storage and 200 GiB is used for object storage, then the total capacity value is 400[®] GiB.

For IBM Cloud Object Storage, this value is the total amount of raw storage capacity in all the storage pools and includes capacity that is reserved for overheads, such as formatting, disk overhead, and dispersal overhead.

Condition

The overall operational condition of a storage system. This condition represents the most critical status that was detected on the internal resources of a storage system. For example, if an error was detected on a storage system pool, an error icon  is shown for the storage system's condition. If no errors, warnings, or unreachable statuses were detected on its internal resources, then a

green symbol is shown for the storage system's condition. To view the individual statuses of internal resources, right-click the storage system and select View Details.

If the condition is Not Monitored, you can use the Connections...>Modify Connection action on the Object Storage Systems page to add the object storage system for monitoring.

Containers

The total number of containers in all the accounts in the object storage system. A container can contain a set of objects. This information is collected only for IBM Spectrum Scale.

A container is the second-level element, under accounts, in the storage hierarchy for OpenStack Swift-compliant object storage systems, such as IBM Spectrum Scale. A container is equivalent to a directory or folder in a file system and is used to store and manage objects.

Custom Tag 1, 2, and 3

Any user-defined text that is associated with a storage system. This text can be included as a report column when you generate reports for the storage system. To edit the custom tags for a storage system, right-click the storage system in the list and select View Properties. On the properties notebook, click Edit.

Last Successful Probe

The most recent date and time when the probe successfully completed the collection of asset and status data.

Name

A user-defined name of the storage system. If a name was not defined, IBM Storage Insights Pro shows the name that was defined when the storage system was added for monitoring.

Probe Status

The status of the most recent run of a probe. Use this value to quickly identify a probe that failed or generated warning messages during processing. One of the following status values might be displayed:

Failed

The probe encountered error conditions during processing and did not complete the monitoring action. Check the log to view the error messages.

Warning

The probe encountered warning conditions during processing, but still completed the monitoring action. Check the log to view the warning messages.

Running

The probe is running.

Successful

The probe completed the monitoring action and encountered no warning or error conditions.

Never probed

The resource was never probed.

If a probe is run while a resource is unreachable, the status of the probe is not shown in the column. Instead, the status of the previous probe is shown.

Objects

The total number of objects that are stored in the object storage system. This information is collected only for IBM Spectrum Scale. An object stores data, such as files, videos, images, virtual machine snapshots, and other unstructured data. In IBM Spectrum Scale, objects are stored as files on the GPFS file system.

Used Capacity (GiB)

For IBM Spectrum Scale, this value is the amount of file system capacity that is used by the objects in the storage system.

If a probe is run immediately after objects or containers are added to an IBM Spectrum Scale account, the used capacity value might not reflect the updates until after the next scheduled probe run. If you want to view the updated used capacity value sooner, wait at least 10 minutes and then use the Start Probe action to start a probe immediately for the storage system.

Tip: The used capacity value applies only to the accounts that the user that is used to monitor the object storage system has admin access to.

For IBM Cloud Object Storage, this value is the amount of raw storage capacity in all the storage pools that is used and includes capacity that is reserved for overheads, such as formatting, disk overhead, and dispersal overhead.

Vaults

The total number of COS Vaults in all the storage pools in the object storage system. This information is collected only for IBM Cloud Object Storage.

- **Capacity and failure tolerance charts**

View charts that show the capacity information for object storage systems, the number and consolidated status of the COS Accesser® and COS Slicestor® nodes at each location, the access risk for COS Vaults, and the storage risk for COS Vaults and COS Slicestor nodes.

- **Object internal resources**

View information about the status, capacity, and space usage of the internal resources for object storage systems.

- **Object resources**

View information about the resources that are associated with object storage systems. Object resources are resources in an IBM Spectrum Scale cluster, such as accounts and containers, that enable the cluster to be used as an object storage system.

Related tasks

- [Configuring OpenStack access to monitor the object storage system](#)
-

Capacity and failure tolerance charts

View charts that show the capacity information for object storage systems, the number and consolidated status of the COS Accesser® and COS Slicestor® nodes at each location, the access risk for COS Vaults, and the storage risk for COS Vaults and COS Slicestor nodes.

Object Capacity

The Object Capacity chart shows information about the available and used file system capacity for the object storage system. This chart is shown only for IBM Spectrum Scale.

The following information is shown:

Available Capacity

The file system capacity that is available for object data.

Used Capacity

The amount of file system capacity that is used by the objects in the storage system.

Tip: The chart shows information only for the accounts that the user that is used to monitor the object storage system has admin access to. To view the amount of capacity that is used by all accounts in the object storage system, the user must also be assigned the ResellerAdmin role.

Sites

This chart shows information about the capacity and geographical distribution of COS Slicestor and COS Accesser nodes in an object storage system. This chart is shown only for IBM® Cloud Object Storage.

For each site, the following information is shown:

- A capacity bar that shows the used capacity and available capacity for the site.
Hover over the bar to view the total capacity, used capacity, and available capacity on all of the COS Slicestor nodes at the site. The values include capacity that is reserved for overheads, such as formatting, disk overhead, and dispersal overhead.
- The number and consolidated status of the COS Accesser and the COS Slicestor nodes at the site. For example, if a site has 16 COS Slicestor nodes and one of the COS Slicestor nodes has an Error status, a consolidated status of Error is shown for the COS Slicestor nodes at the site.

Capacity by IDA

This chart shows the total used capacity of all the COS Vaults that are configured with each Information Dispersal Algorithm. The five IDAs that consume the most storage space are shown and each IDA is represented by a bar on the chart.

The used capacity values do not include capacity that is reserved for overheads, such as formatting, disk overhead, and dispersal overhead. This chart is shown only for IBM Cloud Object Storage.

Tip: In the manager applications for IBM Cloud Object Storage, storage capacity is represented in decimal (base 10) units, such as kilobyte (KB), megabyte (MB), and gigabyte (GB). In IBM Storage Insights Pro, storage capacity is represented in binary (base 2) units such as kibibyte (KiB), mebibyte (MiB), and gibibyte (GiB). For more information, see [Units of measurement for storage data](#).

Vaults by Accessers

This chart shows the vaults that are currently inaccessible from their access pools and the tolerance of the remaining vaults to COS Accesser node failures.

Tip: Only COS Accesser nodes that are configured as dedicated access servers for IBM Cloud Object Storage are shown on the chart. Vaults might be inaccessible for the following reasons:

- All the COS Accesser nodes that are configured for the vault are in a failed state. An error icon  is shown on the chart if the number of inaccessible vaults > 0.
- The vault is not deployed to an access pool. An error icon is not shown in this scenario because this configuration is valid.

Use the chart to determine how many COS Accesser node failures that your vaults can tolerate before the vaults lose read and write access. For example, the chart might show the following values on separate lines:

- 1 Failure 10 Vaults at Risk
- 2 Failures 26 Vaults at Risk

These values represent the different tolerance levels of the vaults to COS Accesser node failures. The first line indicates that 10 vaults each depend on a single COS Accesser node for access. If the remaining node fails, that vault will be inaccessible. An additional 26 vaults will be inaccessible if 2 nodes fail.

The chart uses different colors to represent the different levels of tolerance to COS Accesser node failures:

Color	Description
	Vaults will be inaccessible if 1 COS Accesser node fails.
	Vaults will be inaccessible if 2 COS Accesser nodes fail.
	Vaults will be inaccessible if 3 COS Accesser nodes fail.
	Vaults have a high tolerance because at least 4 COS Accesser nodes are available.

Vaults by Drives

This chart shows the vaults that are currently unavailable for write operations and the tolerance of the remaining vaults if more drives fail in the available COS Slicestor nodes. The chart is shown only for IBM Cloud Object Storage with firmware version 3.10.0.117 or later on the manager node.

Use the chart to determine how many drive failures that your vaults can tolerate before the vaults will be unavailable for write operations. For example, the chart might show the following values on separate lines:

- 1 Failure 3 Vaults at Risk
- 2 Failures 17 Vaults at Risk

These values represent the different tolerance levels of the vaults to drive failures across all of the available COS Slicestor nodes in the storage pool that the vault belongs to. The first line indicates that for each of the 3 vaults, 1 drive failure in the available nodes will cause that vault to be unavailable for write operations. An additional 17 vaults will be unavailable for write operations if 2 drives fail. [Learn more about how failure tolerance is calculated for vaults.](#)

The chart uses different colors to represent the different levels of tolerance to drive failures:

Color	Description
	Vaults will be unavailable for write operations if 1 drive fails.
	Vaults will be unavailable for write operations if 2 drives fail.
	Vaults will be unavailable for write operations if 3 drives fail.
	Vaults have a high tolerance because at least 4 drives are available.

Slicestors by Drives

This chart shows the COS Slicestor nodes that are currently unavailable due to drive failures and the tolerance of the remaining nodes if more of their drives fail. The chart is shown only for IBM Cloud Object Storage with firmware version 3.10.0.117 or later on the manager node.

A COS Slicestor node is unavailable to store vault data when the number of failed drives on the node \geq the drive error threshold. You can view the drive error thresholds for your COS Slicestor nodes on the Slicestor Nodes page.

Use the chart to determine how many internal drive failures that your COS Slicestor nodes can tolerate before the nodes will be unavailable. For example, the chart might show the following values on separate lines:

- 1 Failure 4 Slicestors at Risk
- 2 Failures 8 Slicestors at Risk

These values represent the different tolerance levels of the COS Slicestor nodes to internal drive failures. The first line indicates that for four COS Slicestor nodes, if one of their internal drives fail, that node will be unavailable. For an additional eight nodes, if two of their internal drives fail, that node will be unavailable.

The chart uses different colors to represent the different tolerance levels of the COS Slicestor nodes to internal drive failures:

Color	Description
	COS Slicestor nodes will be unavailable if one drive fails.
	COS Slicestor nodes will be unavailable if two drives fail.
	COS Slicestor nodes will be unavailable if three drives fail.

Color	Description
	Nodes have a high tolerance to drive failures. At least four internal drives must fail before the nodes cannot store vault data.

Related tasks

- [Investigating capacity trends for object storage systems](#)

Related reference

- [Calculating the failure tolerance for vaults](#)
 - [Viewing capacity charts](#)
-

Object internal resources

View information about the status, capacity, and space usage of the internal resources for object storage systems.

- [**Access Pools**](#)
View information about the access pools in object storage systems.
 - [**Accesser Nodes**](#)
View information about the COS Accesser® nodes in object storage systems.
 - [**Mirrors**](#)
View information about the mirrors in IBM® Cloud Object Storage, such as the pair of vaults in each of the mirrors and the number of COS Accesser nodes that are configured to access the mirrors. You can also see the related storage pools and sites.
 - [**Sites**](#)
Monitor the capacity and space usage of the sites in IBM Cloud Object Storage. See which COS Slicestor® and COS Accesser nodes are on each site and which sites are protected against COS Accesser node failures.
 - [**Slicestor Nodes**](#)
Monitor the capacity, space usage, and tolerance to drive failures of the COS Slicestor nodes in IBM Cloud Object Storage. See the storage pools that the COS Slicestor nodes belong to and the sites that the nodes are distributed to.
 - [**Storage Pools**](#)
View information about the storage pools in object storage systems.
 - [**Vaults**](#)
View information about the COS Vaults in IBM Cloud Object Storage, such as the amount of storage capacity that is used and the Information Dispersal Algorithm (IDA) that is configured for each vault. See whether any vaults are violating the capacity quota limits and which vaults are protected from COS Accesser and COS Slicestor node failures.
-

Access Pools

View information about the access pools in object storage systems.

An access pool is a logical collection of zero or more COS Accesser® nodes in IBM® Cloud Object Storage. Each COS Accesser node can belong to only one access pool.

Applications such as IBM Spectrum Protect that use IBM Cloud Object Storage, connect to the storage system by using the access pools.

By grouping COS Accesser nodes into access pools, you can quickly deploy vaults to a set of nodes.

Use the information on the Access Pools page to complete the following monitoring tasks:

- View the different sites that the COS Accesser nodes in a pool are distributed to and view the number of nodes at each site.
- View the number of vaults that depend on each of the access pools.

Additional information is provided about the following attributes of access pools:

Acknowledged

Shows whether a user marked the status of an access pool as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Mirrors

The number of mirrors that depend on the access pool.

Protocol

The access protocol that is configured on the access pool for communication between the COS Accesser nodes and the COS Slicestor® nodes. All the COS Accesser nodes in an access pool use the same protocol, for example, OpenStack Object Storage, Simple Object, or Cloud Storage Object.
Site
The location, such as the geographical location or the building, of the COS Accesser nodes in the access pool. To ensure high availability for the vault data in IBM Cloud Object Storage, you can distribute the nodes to multiple sites. The number of site columns that are shown depends on the number of sites that the nodes are distributed to. For example, if the nodes in the access pool are distributed to three sites, then three site columns are shown on the Access Pools page. For each site, the number of COS Accesser nodes that are distributed to that site is shown.
Status
The status of the access pool. Use the status to determine the condition of the access pool, and if any actions must be taken. A Warning status is shown when one or more of the sites that is associated with the access pool is unavailable. An Error status is shown when all the sites are unavailable. To ensure high availability for the vault data in IBM Cloud Object Storage, take immediate action to resolve site failures.
Vaults
The number of vaults that depend on the access pool. A vault is a collection of data that is stored in one logical container, across a set of COS Slicestor nodes. A vault can be deployed to one or more access pools.

Accesser Nodes

View information about the COS Accesser® nodes in object storage systems.

A COS Accesser node is a device, such as a server or a virtual machine, that is used to access the COS Slicestor® nodes in IBM® Cloud Object Storage.

The COS Accesser nodes mediate between the client, for example a music or video application, or a backup application such as IBM Spectrum Protect, and the COS Slicestor nodes. The COS Accesser nodes receive object data, for example, a video or audio file, from the client. The object data is transformed into multiple data slices by the COS Accesser nodes and each slice is stored on a different COS Slicestor node.

Use the information on the Accesser Nodes page to complete the following monitoring tasks:

- View the sites that the COS Accesser nodes are distributed to.
- View the access pools that the COS Accesser nodes belong to.

Additional information is provided about the following attributes of COS Accesser nodes.

Access Pool

The name of the access pool that the COS Accesser node is assigned to. A COS Accesser node can belong to only one access pool. By grouping COS Accesser nodes into access pools, you can quickly deploy vaults to a set of COS Accesser nodes.

Acknowledged

Shows whether a user marked the status of the COS Accesser node as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Model

The model of the COS Accesser node. The model name or number is assigned by the hardware vendor or manufacturer.

Serial Number

The serial number of the COS Accesser node, which is assigned by the vendor or manufacturer.

Site

The location, such as the geographical location or the building, of the COS Accesser node. To ensure high availability for the vault data in IBM Cloud Object Storage, you can distribute the COS Accesser nodes in an access pool to multiple sites.

Software Version

The version of the IBM Cloud Object Storage software on the COS Accesser node.

Status

The status of the COS Accesser node. Use the status to determine the condition of the node, and if any actions must be taken. If multiple nodes in an access pool have an Error status, the vault data might be unavailable.

Mirrors

View information about the mirrors in IBM® Cloud Object Storage, such as the pair of vaults in each of the mirrors and the number of COS Accesser® nodes that are configured to access the mirrors. You can also see the related storage pools and sites.

A mirror combines two standard vaults from separate storage pools at different sites into a mirrored pair of vaults. Data is written to both vaults to maintain availability during a network partition or site outage. In this two-site deployment scenario for IBM Cloud Object Storage, two complete copies of the data are maintained.

Additional information is provided about the following attributes of mirrors:

Accesser Nodes

The number of COS Accesser nodes that are configured to access the mirror.

Acknowledged

Shows whether a user marked the status of the mirror as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Source -> Target Vault

The pair of vaults in the mirror. You can configure a mirrored pair of vaults in separate storage pools and sites to enable a two-site deployment of IBM Cloud Object Storage.

Status

The status of the mirror. The status represents the most critical status that was detected on the vaults in the mirror.

For example, if an error is detected on one of the vaults, an error icon  is shown for the mirror's status. If no errors or warnings are detected on the vaults, then a green symbol is shown.

Related reference

- [Vaults](#)
-

Sites

Monitor the capacity and space usage of the sites in IBM® Cloud Object Storage. See which COS Slicestor® and COS Accesser® nodes are on each site and which sites are protected against COS Accesser node failures.

A site is the location, such as the geographical location or the building, of the nodes in the storage system. IBM Cloud Object Storage can be deployed on a single site or across multiple geographically dispersed locations based on your business requirements.

Additional information is provided about the following attributes of sites:

Accesser Nodes

The number of COS Accesser nodes on the site.

Accessibility

The minimum number of COS Accesser nodes that can fail before one or more vaults become inaccessible from the site.

For example, a value of 5 indicates that all the vaults that are accessed from the site have at least five COS Accesser nodes available to read and write data. A value of 1 represents the highest risk because it indicates that if a COS Accesser node on the site fails, then one or more vaults cannot be accessed.

The following values might be shown:

Accessibility	Description
0	All the vaults in the storage system are inaccessible from the site because no COS Accesser nodes are configured on the site.
 0	Some vaults are inaccessible from the site because the COS Accesser nodes that are configured to access the vaults from the site are not available.
1	All the vaults that are accessed from the site have at least one COS Accesser node available to read and write data.
 1	All the vaults that are accessed from the site have at least one COS Accesser node available to read and write data. Some COS Accesser nodes that are configured on the site are not available.

Acknowledged

Shows whether a user marked the status of the site as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Slicestor Nodes

The number of COS Slicestor nodes on the site.

Status

The overall status of the site. This status represents the most critical status that is detected for the access pools or the storage pools that are associated with the site. The following examples show some of the conditions that determine the overall site status:

- If one of the COS Slicestor nodes is not available, an error icon  is shown.
- If all of the COS Accesser nodes in an access pool are not available, an error icon  is shown.

- If all the COS Slicestor are available but some of the COS Accesser nodes are not available, a warning icon  is shown.

Related reference

- [Vaults](#)
-

Slicestor Nodes

Monitor the capacity, space usage, and tolerance to drive failures of the COS Slicestor® nodes in IBM® Cloud Object Storage. See the storage pools that the COS Slicestor nodes belong to and the sites that the nodes are distributed to.

A COS Slicestor node is a device, such as a server or a virtual machine, that is used to store object data in IBM Cloud Object Storage. Data is stored in vaults on the COS Slicestor nodes.

Tip: In the manager applications for IBM Cloud Object Storage, storage capacity is represented in decimal (base 10) units, such as kilobyte (KB), megabyte (MB), and gigabyte (GB). In IBM Storage Insights Pro, storage capacity is represented in binary (base 2) units such as kibibyte (KiB), mebibyte (MiB), and gibibyte (GiB). For more information, see [Units of measurement for storage data](#).

Additional information is provided about the following attributes of COS Slicestor nodes:

Acknowledged

Shows whether a user marked the status of the COS Slicestor node as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Drives

The number of hard disk drives, solid-state drives, and flash modules in the COS Slicestor node. Click the number to view information about the drives, such as the firmware version and the hardware model.

Drive Failure Tolerance

The tolerance of the COS Slicestor node to drive failures. The lower the value for drive failure tolerance, the greater the storage risk for the node. A value of 0 means that the node can no longer store vault data.

Drive failure tolerance information is shown only for IBM Cloud Object Storage with firmware version 3.10.0.117 or later on the manager node.

The value that is shown for drive failure tolerance depends on the following attributes:

Drive Error Threshold

The error threshold value for the number of failed drives on the node. If the number of failed drives on the node \geq the error threshold, an error status is shown for the node and the node is not used to store vault data.

Drive Warning Threshold

The warning threshold value for the number of failed drives on the node. The node is at risk of storage failure when the number of failed drives \geq the warning threshold.

Drive Failures

The number of failed drives on the node. The node is not used to store vault data when the number of failed drives \geq the error threshold.

The formula that is used to calculate drive failure tolerance is as follows:

Drive Failure Tolerance = Drive Error Threshold - Drive Failures

The following values might be shown:

Drive Failure Tolerance	Description
 0	The node cannot store vault data because the number of failed drives \geq the error threshold.
 1	The node is at risk of storage failure because the number of failed drives \geq the warning threshold. If 1 more drive fails on the node, the drive error threshold is reached and the node will be unavailable to store vault data. For example, the drive error threshold is 4, the drive warning threshold is 3, and the number of failed drives is 3. The drive failure tolerance is calculated as 1 and a warning icon is shown as the number of failed drives = the drive warning threshold.
5	The node has a high tolerance to drive failures. The node will be unavailable to store vault data if 5 drives fail.

Model

The model of the COS Slicestor node. The model name or number is assigned by the hardware vendor or manufacturer.

Serial Number

The serial number of the COS Slicestor node, which is assigned by the vendor or manufacturer.

Set ID

The ID of the device set that the COS Slicestor node belongs to.

Site

The location, such as the geographical location or the building, of the COS Slicestor node. To ensure high availability for the vault data in IBM Cloud Object Storage, you can distribute the nodes to multiple sites.

Software Version

The version of the IBM Cloud Object Storage software on the COS Slicestor node.

Status

The status of the COS Slicestor node. Use the status to determine the condition of the node, and if any actions must be taken. If multiple COS Slicestor nodes have an Error status, the vault data might be unavailable.

The node status is affected by the tolerance of the node to drive failures. A Warning status is shown for the node if the number of failed drives \geq the drive warning threshold. An Error status is shown if the number of failed drives \geq the drive error threshold and the node cannot store vault data.

Storage Pools

View information about the storage pools in object storage systems.

A storage pool is a logical collection of COS Slicestor® nodes that is used to store vault data in IBM® Cloud Object Storage.

Use the information on the Storage Pools page to complete the following monitoring tasks:

- View the different sites that the COS Slicestor nodes in a pool are distributed to and view the number of nodes at each site.
- Monitor the used and available raw storage space on the storage pools.
- View the number of vaults that depend on each of the storage pools.

Tip: In the manager applications for IBM Cloud Object Storage, storage capacity is represented in decimal (base 10) units, such as kilobyte (KB), megabyte (MB), and gigabyte (GB). In IBM Storage Insights Pro, storage capacity is represented in binary (base 2) units such as kibibyte (KiB), mebibyte (MiB), and gibibyte (GiB). For more information, see [Units of measurement for storage data](#).

Additional information is provided about the following attributes of storage pools:

Acknowledged

Shows whether a user marked the status of a storage pool as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Sets

The number of device sets in the storage pool and the number of COS Slicestor nodes in each of the device sets. For example, a value of 3(6) indicates that the storage pool has three device sets, with six nodes in each set.

Site

The location, such as the geographical location or the building, of the COS Slicestor nodes in the storage pool. To ensure high availability for the vault data in IBM Cloud Object Storage, you can distribute the nodes to multiple sites.

The number of site columns that are shown depends on the number of sites that the COS Slicestor nodes are distributed to. For example, if the nodes in the storage pool are distributed to four sites, then four site columns will be shown. For each site, the number of nodes that are distributed to that site is shown.

Status

The status of the storage pool. Use the status to determine the condition of the storage pool, and if any actions must be taken.

A Warning status is shown when one or more of the sites that is associated with the storage pool is unavailable. An Error status is shown when all the sites are unavailable. To ensure high availability for the vault data in IBM Cloud Object Storage, take immediate action to resolve site failures.

Storage Risk

The number of COS Slicestor nodes that can fail before one or more vaults in the storage pool become unavailable. The number of COS Slicestor nodes that can fail before read and write operations cannot be completed on one or more vaults in the storage pool.

The status of the Slicestor nodes is determined by the health of the disk drives in the Slicestor node.

Vaults

The number of vaults that store data on COS Slicestor nodes in the storage pool.

Multiple vaults can be created on a single storage pool.

Vaults

View information about the COS Vaults in IBM® Cloud Object Storage, such as the amount of storage capacity that is used and the Information Dispersal Algorithm (IDA) that is configured for each vault. See whether any vaults are violating the capacity quota limits and which vaults are protected from COS Accesser® and COS Slicestor® node failures.

A vault is a defined collection of data that is stored in one logical container, across a defined set of COS Slicestor nodes in IBM Cloud Object Storage. The vault is where you can grant permissions and configure data storage options such as encryption, compression, and the IDA.

Additional information is provided about the following attributes of vaults:

Access Pools

The number of access pools that are configured to access the vault.

Accessibility

The number of COS Accesser nodes that can fail before the vault data becomes inaccessible.

For example, if five COS Accesser nodes are configured for a vault and the nodes are all operating normally, then the value is five. If five COS Accesser nodes fail, then you cannot read or write the vault data.

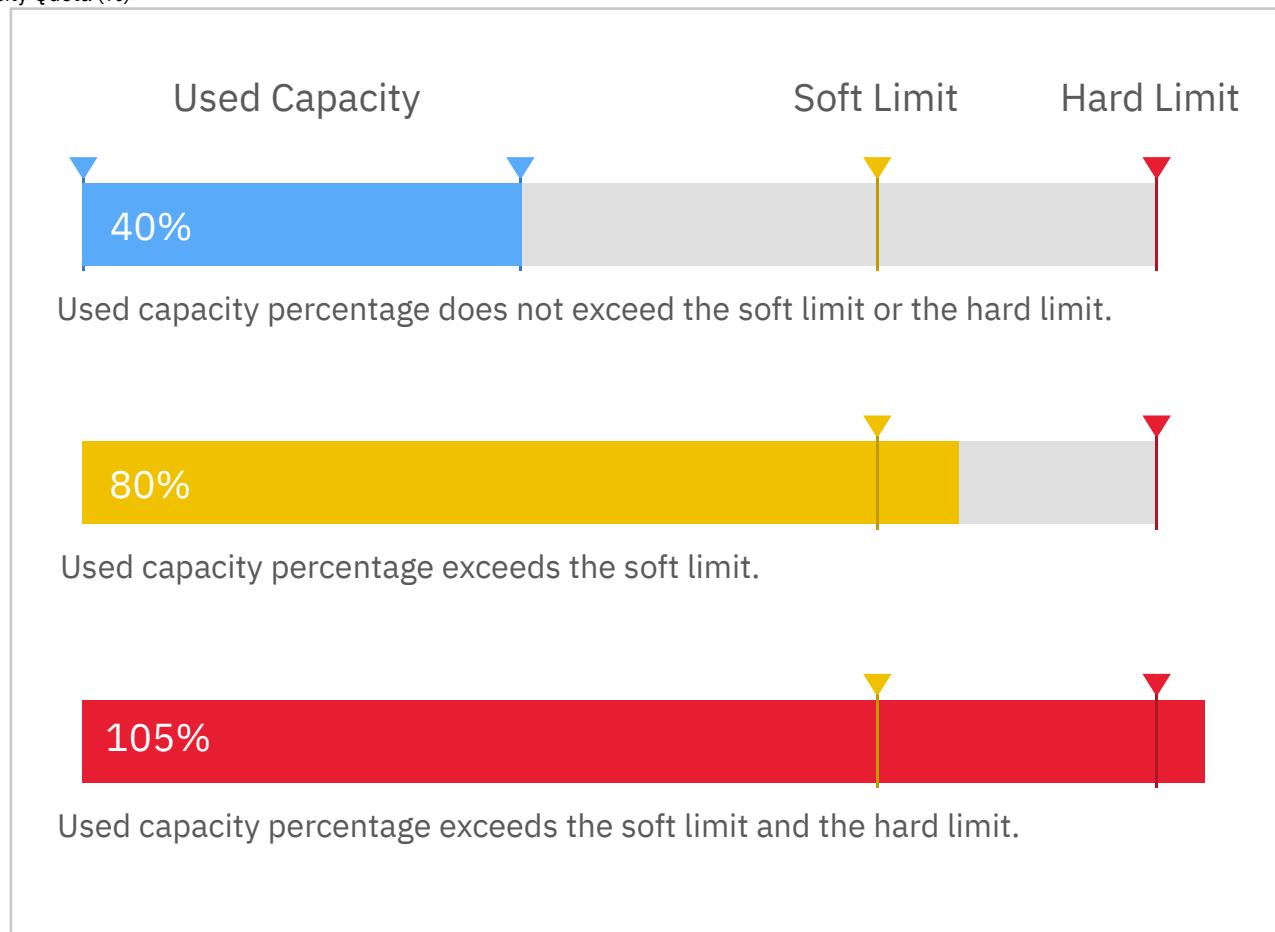
The following values might be shown:

Accessibility	Description
0	The vault is inaccessible because no COS Accesser nodes are configured.
✖ 0	The vault is inaccessible because none of the COS Accesser nodes that are configured for the vault are available.
1	One COS Accesser node is configured for the vault and the node is available.
⚠ 1	More than one COS Accesser node is configured for the vault, but only one node is available.

Acknowledged

Shows whether a user marked the status of the vault as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

Capacity Quota (%)



The percentage of the capacity quota for the vault that is already used. A value is shown only if a nonzero hard quota is defined for the vault.

The used capacity, soft limit, and hard limit values represent usable capacity, and not raw capacity. The values do not include capacity that is reserved for disk overhead and dispersal overhead.

Drive Failure Tolerance

The tolerance of the vault to drive failures across all of the available COS Slicestor nodes in the storage pool that the vault belongs to. The lower the value for failure tolerance, the greater the risk that write operations can no longer be completed for the vault. A value of 0 means that write operations cannot be completed. [Learn more about how failure tolerance is calculated for vaults.](#)

The following values might be shown:

Drive Failure Tolerance	Description

Drive Failure Tolerance	Description
✗ 0	The vault is not available for write operations because the number of available COS Slicestor nodes in the storage pool < the IDA write threshold value.
⚠ 3	The vault is at risk of write failure because the number of available COS Slicestor nodes in the storage pool = the IDA write threshold value. If one more node fails, the vault will not be available for write operations. The value 3 indicates that the node with the least tolerance to drive failures will not be able to store vault data if 3 drives fail in the node.
24	The vault is available for write operations and has a high tolerance to drive failures across the COS Slicestor nodes in the storage pool. The value 24 indicates that the vault will not be available for write operations if 24 drives fail in the nodes with the least tolerance to drive failures.

IDA

The Information Dispersal Algorithm (IDA) that is configured for the vault. The IDA value determines the number of COS Slicestor nodes that are used to store vault data and the number of COS Slicestor that are required for read and write operations on the vault. The IDA uses the following format: *width-threshold-write threshold*.

The width of the vault is the number of COS Slicestor nodes into which all data in the vault is split. The threshold is the minimum number of COS Slicestor nodes that must be available to complete read operations on the vault. The write threshold is the minimum number of COS Slicestor nodes that must be available to complete write operations on the vault.

Sites

The number of locations that the COS Accesser and COS Slicestor nodes for the vault are distributed to. To ensure high availability for the vault data in IBM Cloud Object Storage, you can distribute the nodes to multiple locations.

Status

The status of the vault. Use the status to determine the condition of the vault, and if any actions must be taken.

A Warning status is shown if one or more of the access pools fail or the number of operational COS Slicestor nodes in the storage pool falls below the alert level. The alert level is configured in IBM Cloud Object Storage and is normally set slightly higher than the IDA write threshold value.

An Error status is shown if all of the access pools fail or the number of operational COS Slicestor nodes in the storage pool falls below the IDA threshold value.

Storage Pool

The name of the storage pool that the vault belongs to.

Used Capacity (GiB)

The capacity on the COS Slicestor nodes that is used to store the vault data. This value does not include capacity that is reserved for disk overhead and dispersal overhead.

The used capacity can exceed the hard quota if quota checking is not activated or is activated after the objects are stored in the vault.

- [Calculating the failure tolerance for vaults](#)

The failure tolerance value for vaults represents the tolerance of a vault to drive failures across all of the COS Slicestor nodes in its storage pool. The lower the value for drive failure tolerance, the greater the risk that write operations can no longer be completed for the vault.

Related reference

- [Mirrors](#)
- [Calculating the failure tolerance for vaults](#)

Calculating the failure tolerance for vaults

The failure tolerance value for vaults represents the tolerance of a vault to drive failures across all of the COS Slicestor® nodes in its storage pool. The lower the value for drive failure tolerance, the greater the risk that write operations can no longer be completed for the vault.

The calculation of drive failure tolerance is based on the following values:

- The write threshold value in the IDA that is configured for the vault. The write threshold is the minimum number of COS Slicestor nodes that must be available to complete write operations for the vault.
- The number of available COS Slicestor nodes in the storage pool that the vault belongs to.
- The value for drive failure tolerance for each of the available COS Slicestor nodes in the storage pool. This value represents the tolerance of the node to drive failures and is based on the number of failed drives in the node and the drive error threshold. A value

of 2 means that the node will be unavailable to store vault data if 2 drives fail in the node.

For example, a vault in your IBM® Cloud Object Storage environment is configured with an IDA of 8-4-6. The IDA determines that the vault data is stored across 8 COS Slicestor nodes and a minimum of 6 nodes must be available to complete write operations for the vault. The nodes have the following values for drive failure tolerance:

Node	Drive Failure Tolerance
node_1	3
node_2	4
node_3	0*
node_4	2
node_5	4
node_6	1
node_7	3
node_8	3

* A failure tolerance value of 0 means that node_3 is not available to store vault data.

7 COS Slicestor nodes are available in the storage pool and a minimum of 6 nodes must be available to complete write operations. Therefore, if 2 more nodes fail, the write threshold value is exceeded and write operations can no longer be completed for the vault.

Use the following steps to calculate the value for drive failure tolerance for a vault:

1. Use the IDA column on the Vaults page to identify the write threshold value for the vault. In the example, the write threshold value is 6.
2. Use the Slicestor Nodes page to determine the number of available COS Slicestor nodes in the storage pool that the vault belongs to. A value > 0 in the Drive Failure Tolerance column means that the node is available. In the example, 7 nodes are available.
3. Calculate how many nodes must fail for the number of available nodes to fall below the write threshold value. In the example, $(7 - 6) + 1 = 2$. When 2 nodes fail, the vault is not available for write operations.
4. Use the Drive Failure Tolerance column on the Slicestor Nodes page to identify the 2 available nodes in the storage pool that have the lowest tolerance to drive failures.

In the example, the 2 nodes are as follows:

Node	Drive Failure Tolerance
node_4	2
node_6	1

5. To calculate the overall failure tolerance for the vault, sum the failure tolerance values for the 2 nodes. $2 + 1 = 3$.

The drive failure tolerance for the vault is 3. If 3 drives fail, write operations can no longer be completed for the vault.

Object resources

View information about the resources that are associated with object storage systems. Object resources are resources in an IBM Spectrum Scale cluster, such as accounts and containers, that enable the cluster to be used as an object storage system.

- [**Accounts**](#)
View the information that is shown about accounts in object storage systems.
 - [**Containers**](#)
View the information that is shown about containers in object storage systems.
-

Accounts

View the information that is shown about accounts in object storage systems.

An account is the top-level element in the storage hierarchy for OpenStack Swift-compliant object storage systems, such as IBM Spectrum Scale.

OpenStack Swift organizes data in a hierarchy of accounts, containers, and objects. An account can contain a set of containers and each container can contain a set of objects.

The accounts and the containers that you can monitor in the GUI are determined by the role that is associated with your login account for the storage system.

To monitor all of the accounts and the containers, you must be assigned the role that is defined in the reseller_admin_role configuration option in the Swift proxy server. The default value for the reseller_admin_role option is ResellerAdmin.

Tip: To change the credentials for monitoring the storage system, go to Resources > Object Storage Systems, right click the storage system, and then click Connections > Modify Connection.

Additional information is provided about the following column headings:

Capacity Quota (%)

The percentage of the capacity quota for the account that was used when data was collected for the storage system. The quota limits the amount of file system capacity that can be used by the account. This column contains a value only if a quota is defined for the account on the OpenStack Swift object storage system.

The capacity quota is represented by a bar. The percentage of the quota that is used by the account is represented by the blue section of the bar and as a percentage figure on the bar. The available capacity for the account is represented by the light gray section of the bar.

If the used capacity value exceeds the capacity quota, the bar is shown in red and the quota value is represented by a vertical line on the bar. In this case, the percentage figure on the bar exceeds 100%.

In the following cases, the used capacity can exceed the capacity quota:

- When the capacity quota is set after the object files are uploaded to the file system
- When an object file without size information is uploaded to the file system

If a capacity quota value of zero is defined, the capacity quota bar is shown in red and a usage percentage value is not shown.

Capacity Quota (GiB)

The amount of file system capacity that can be used to store object data for all the containers in the account. This column contains a value only if a quota is defined for the account on the OpenStack Swift object storage system.

Containers

The number of containers in the account. A container can contain a set of objects.

Objects

The total number of objects in all the containers in the account.

An object stores data, such as files, videos, images, virtual machine snapshots, and other unstructured data. In IBM Spectrum Scale, objects are stored as files on the GPFS file system.

Containers

View the information that is shown about containers in object storage systems.

A container is the second-level element, under accounts, in the object hierarchy for OpenStack Swift-compliant object storage systems, such as IBM Spectrum Scale. A container is equivalent to a directory or folder in a file system and is used to store and manage objects.

The accounts and the containers that you can monitor in the GUI are determined by the role that is associated with your login account for the storage system.

To monitor all of the accounts and the containers, you must be assigned the role that is defined in the reseller_admin_role configuration option in the Swift proxy server. The default value for the reseller_admin_role option is ResellerAdmin.

Tip: To change the credentials for monitoring the storage system, go to Resources > Object Storage Systems, right click the storage system, and then click Connections > Modify Connection.

Additional information is provided about the following column headings:

Capacity Quota (%)

The percentage of the capacity quota for the container that was used when data was collected for the storage system. The quota limits the amount of file system capacity that can be used by the container. This column contains a value only if a capacity quota is defined for the container on the OpenStack Swift object storage system.

The capacity quota is represented by a bar. The percentage of the quota that is used by the container is represented by the blue section of the bar and as a percentage figure on the bar. The available capacity for the container is represented by the light gray section of the bar.

If the used capacity value exceeds the capacity quota, the bar is shown in red and the quota value is represented by a vertical line on the bar. In this case, the percentage figure on the bar exceeds 100%.

The used capacity can exceed the capacity quota in the following cases:

- When the capacity quota is set after the object files are uploaded to the file system
- When an object file without size information is uploaded to the file system

If a capacity quota value of zero is defined, the capacity quota bar is shown in red and a usage percentage value is not shown.

Capacity Quota (GiB)

The amount of file system capacity that can be used to store object data for the container. This column contains a value only if a capacity quota is defined for the container on the OpenStack Swift object storage system.

Fileset

The top-level GPFS fileset that is associated with the object storage system.

Objects

The number of objects in the container.

An object stores data content, such as files, videos, images, virtual machine snapshots, and other unstructured data. In IBM Spectrum Scale, objects are stored as files on the GPFS file system.

Objects Quota

The number of objects that can be stored in the container. This column contains a value only if an objects quota is defined for the container on the OpenStack Swift object storage system.

Objects Quota (%)

The percentage of the objects quota for the container that was used when data was collected for the storage system. The quota limits the number of objects that can be stored in the container. This column contains a value only if an objects quota is defined for the container on the OpenStack Swift object storage system.

The objects quota is represented by a bar. The percentage of the quota that is used by the container is represented by the blue section of the bar and as a percentage figure on the bar. The number of available objects for the container is represented by the light gray section of the bar.

If the number of objects that are used exceeds the objects quota, the bar is shown in red and the quota value is represented by a vertical line on the bar. In this case, the percentage figure on the bar exceeds 100%.

The number of objects that are used can exceed the objects quota if the quota is configured after the object files are stored on the file system.

If an objects quota value of zero is defined, the quota bar is shown in red and a usage percentage value is not shown.

Storage system related resources

Related resources are resources that are connected to the storage system or are assigned storage from its volumes. Related resources that you can view include file systems, back-end storage systems for storage virtualizers, and object storage systems for IBM Spectrum Scale.

Servers

To view information about the servers that are related to the storage system, click Servers in the Related Resources section.

The server is shown as a related resource to the storage system when the following conditions are met:

- The server is assigned storage from a storage system. For example, a volume from the storage system is assigned to a file system (disk) on the server.
- The assigned storage from the storage system is visible to the server.
- Data was collected for the server.
- The server has storage that is mounted from a network-attached storage (NAS) device.

Back-end storage systems

To view information about the back-end storage systems that are associated with the storage virtualizer, click Back-end Storage Systems in the Related Resources section.

Examples of storage virtualizers include Storwize® V7000 and SAN Volume Controller.

Tip: The list of back-end storage systems includes storage systems that are not being monitored by IBM® Storage Insights Pro. These back-end storage systems are detected because they provide storage to the managed disks on the storage virtualizer.

Only basic information is provided for the back-end storage systems that are not being monitored. If you want to view more detailed information about these storage systems, you can add the storage systems for monitoring so that data can be collected.

The name that is shown for the back-end storage systems that were not added might comprise:

- The serial number of the back-end storage system
- The node worldwide name (WWN) of a controller on the back-end storage system
- The port or set of ports on the back-end storage system

The name that is shown is determined by the information that is available about the back-end storage system. If the back-end storage system name is a list of back-end storage system ports, the ports are comma-separated.

Depending on the masking configuration of the port on the back-end storage system, the back-end storage system ports might be shown in multiple rows. For example, the first row might contain Name=" [10000002323AE1EE, 10000002323AE1EA, 10000002323AE1EB]" and the second row might contain Name=" [10000002323AE1EE, 10000002323AE1EA]".

GPFS clusters

To view information about the GPFS clusters that are associated with the storage system, click GPFS Clusters.

Information is shown about GPFS Clusters when the following conditions are met:

- One or more file systems are shared between the IBM Spectrum Scale storage system and a GPFS cluster.
- The storage system assigns storage to a GPFS cluster. The NSDs on the GPFS cluster are mapped to volumes on the back-end storage system.

Navigation tip: To open the GPFS clusters page, open the Overview page for the storage system, and then click GPFS Clusters in the Related Resources section.

Viewing GPFS clusters as related resources to an IBM Spectrum Scale storage system

On the GPFS Clusters page, click the value in the Shared File Systems column to view the GPFS file systems that are shared between the storage system and the related GPFS cluster.

On the File Systems page, you can view the file systems that the storage system mounts from the related cluster and the file systems on the storage system that are mounted by the related cluster.

Viewing GPFS clusters as related resources to a back-end storage system

Storage systems that provide storage to GPFS clusters are considered to be back-end storage systems.

Navigation tip: To view information about the NSDs on the GPFS cluster that are mapped to volumes on the back-end storage system, click the Volume Mappings tab on the GPFS Clusters page.

On the Volume Mappings tab, you can check the performance of the volumes. Before you can view the performance information, data must be collected for the storage system that contains the volume.

Tip: To view the performance of a volume, right-click a volume on the Volume Mappings tab, and select View Performance. You can view the performance of multiple volumes at the same time. Each volume is represented by a separate line in the performance chart and a separate row in the table view.

Block Storage Systems

To view information about the block storage systems that are related to IBM Spectrum Scale, click Block Storage Systems. Information is shown about block storage systems when the following conditions are met:

- Volumes on the block storage system are mapped to Network Shared Disks (NSDs) on the IBM Spectrum Scale cluster.
- The block storage system is being monitored.

The number in parentheses shows the number of block storage systems that are related to IBM Spectrum Scale. For example, if two XIV® systems provide storage to IBM Spectrum Scale, the following entry is shown: Block Storage Systems (2).

You can view the following information about the related block storage systems:

- Total storage capacity
- Allocated, reserved, and available capacity
- Volume mappings

For a detailed list of all the information that is available for block storage systems, see [tpch_r_storagesystem_block.html#tpch_r_storagesystem_block_blockstorage_storagesystems](#).

Object Storage Systems

To view information about the object storage systems that are related to IBM Spectrum Scale, click Object Storage Systems. Information is shown about object storage systems when the following conditions are met:

- An external pool is being used by a file system in a IBM Spectrum Scale cluster and is connected to a vault on an object storage system, such as IBM Cloud Object Storage.
- The object storage system is being monitored.

The number in parentheses shows the number of object storage systems that are related to a IBM Spectrum Scale storage system. For example, if two dsNets (Cloud Object Storage Systems) provide vaults to IBM Spectrum Scale, the following entry is displayed: **Object Storage Systems (2)**.

You can view the following information about the related object storage systems:

- Total storage capacity
- Available capacity
- Vaults
- Access pools and storage pools

For a detailed list of all the information that is available for object storage systems, see [Object Storage Systems](#).

Virtualizer storage systems

To view information about the storage virtualizers that are assigned storage from the storage system, click Virtualizer Storage Systems.

Storage systems that provide storage to virtualizers such as SAN Volume Controller and Storwize V7000 are considered to be back-end storage systems.

To view the virtualizer disks, such as managed disks or external disks, that are mapped to volumes on the back-end storage system, click Disk Mappings. The following information is available for each disk:

Mode

The allocation mode of the managed disk. The value `Unmanaged` indicates that an external volume is virtualized as a managed disk but is not being used. The value `Managed` indicates that an external volume is virtualized as a managed disk and is assigned to a pool or managed disk group. The value `Image` indicates that an external volume is not virtualized and that the associated volume provides a direct block-for-block translation of the external volume. The Mode column shows values only for storage systems that run IBM Spectrum Virtualize.

Pool

The name of the pool in which a mapped volume from the back-end storage system is a member.

Thin Provisioned

Shows whether a volume is a thin-provisioned volume, and the type of thin-provisioning that is used for the volume. A thin-provisioned volume is a volume with a provisioned capacity that is different from its real capacity. Not all the storage capacity of the volume is allocated when the volume is created, but is allocated over time as needed. Thin-provisioned volumes on a DS8000® storage system can be defined as Extent Space-Efficient (ESE) or as Track Space-Efficient (TSE).

Virtualizer

The name of the storage virtualizer that is assigned storage from the storage system.

Virtualizer Disk

The name of the disk on the storage virtualizer that is assigned storage from the storage system. For storage systems that run IBM Spectrum Virtualize, the name represents a managed disk.

Virtualizer Disk Status

The status of a virtualizer disk that determines the condition of the disk and if actions must be taken.

Error status

Take immediate action to correct the problem.

Operational status

No action is required because the status of the operations is normal.

Virtualizer Pool

The name of the pool for the disks on the storage virtualizer.

Volume

The name or label of a volume that is mapped to the storage virtualizer.

Volume ID

The identifier of the volume, such as a serial number or internal ID.

Related tasks

- [Adding storage systems](#)

Applications

Monitor the capacity, the space usage, and the performance of the applications and the application subcomponents in your data center.

To monitor the capacity, space usage, and performance of applications and their subcomponents, you create applications and application subcomponents and then add filters to associate storage resources with the applications and the application subcomponents.

Information about applications

The following information is available for each monitored application and application subcomponent:

Tip: You can add or edit some of the properties of the application after you create it such as the name, type, and subtype. Right-click the application and click View Properties. Click Edit and make your changes.

Block Capacity (GiB)

The total amount of block storage space that is allocated to the volumes for the application. For example, if the filter associates a volume resource and a server resource with the application, the block capacity includes the capacity of the volume and the capacity of the volumes that are assigned to the server. The capacity of the mirror copies and replication targets for the volumes is also included.

Custom tag 1, 2, and 3

Any user-defined text that is associated with an application. This text can be included as a report column when you generate a report for applications. To edit the custom tags for an application or add a custom tag, right-click it and select View Properties and click Edit.

Departments

The name of the department that the application belongs to. If the application belongs to more than one department, the number of departments is displayed.

File Capacity (GiB)

The total amount of file-level storage space that is allocated to file systems that belong to the application, either directly or through related resources. The space is exported space, which is the space on the file systems that is made available to remote clients over a network. For example, if the application contains a file system and a server, the file capacity includes the capacity of the file system of the export and the capacity of the file systems that are mounted by the server.

If the application contains a fileset and the fileset has a quota that is defined, the file capacity is the hard limit of the quota. If the fileset does not have a defined quota, then the file capacity is the capacity of the file system on which the fileset is based.

Name

The user-defined name that was assigned to the application when it was created.

Object Capacity (GiB)

The total amount of storage space that is used by all the vaults in the application and, if applicable, in the application's subcomponents. This value does not include space that is reserved for disk overhead and dispersal overhead.

This column applies only to IBM® Cloud Object Storage.

Servers

The IP address or fully qualified domain name of the server in the application. If there is more than one server in the application, the number of servers is displayed.

Subtype

An extra category that you can use to distinguish the application from other applications. For example, you can organize your database applications by the environment that they use such as test, preproduction, and production.

Type

The categorization of the application to distinguish it from the other applications that you create. For database applications, for example, you can organize your applications by the database vendor such as IBM for Db2®.

Vaults

The number of vaults from IBM Cloud Object Storage that are included in the application. For more information about the vaults, click the number.

Volumes

The number of storage volumes that are used by the application. For more information about the volumes, click the number.

View performance

View the aggregated performance information for all of the volumes that are associated with an application in the performance view. By default, the Total I/O Rate and the Total Data Rate are displayed in the performance chart. You can also select to display the read and write I/O rates, and the read and write data rates in the chart.

Tip: To add or change the metrics that are displayed for a resource, click the select metrics icon  and select the metrics to display.

Note: The application performance feature isn't available to all IBM Storage Insights users. Look for news from IBM about when this feature will be available to you.

Performance troubleshooting

View the charts that are provided and access the resources that provide storage to the applications and application subcomponents in the General section.

- [Administering applications](#)

Go to the pages for creating and administering the applications and application subcomponents that you want to monitor.

- [Application details](#)

View detailed information and charts about the capacity and space usage of applications and application subcomponents. You can also view and access charts and information about the performance of the applications and the application subcomponents.

- [Application Related Resources](#)

Related resources are resources in the storage environment that the application is using or is connected to.

Related concepts

- [Application models](#)

Related tasks

- [Creating applications](#)

Related reference

- [Administering applications](#)
- [Application Related Resources](#)

Administering applications

Go to the pages for creating and administering the applications and application subcomponents that you want to monitor.

Table 1. Create and administer applications and subcomponents

Actions	Navigation
Add and assign storage resources to applications.	1. From the Groups menu, click Applications. 2. Click Create Application.
Add and assign storage resources to subcomponents.	1. From the Groups menu, click Applications. 2. Right-click the application, and then click View Details. 3. In the General section, click Subcomponents. 4. Click Create Subcomponent.
Add applications as subcomponents to applications.	1. From the Groups menu, click Applications. 2. Right-click the applications that you want to add as subcomponents, and then click Add to Application. 3. Select the application or applications that you want to add the applications as subcomponents to. 4. Click Save.
Add applications to departments.	1. From the Groups menu, click Applications. 2. Right-click the applications that you want to add to departments, and then click Add to Department. 3. Select the departments. 4. Click Save.
Add selected resources to applications and subcomponents	1. From the Groups menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. 2. Right-click a storage system and click View Details. 3. In the Internal Resources section, click the storage resource. 4. Optional: In the Members section, click the storage resource that is part of the application. 5. Right-click the resources that you want to add and click Add to Application. 6. Click the application or subcomponent and then click Save.
Assign storage resources to applications. ¹	1. From the Groups menu, click Applications. 2. Right-click the application, and then click View Details. 3. In the Members section, click Filters. 4. Click Create Filter. Tip: When the filter is created, you can edit or remove it.

Actions	Navigation
Assign storage resources to subcomponents. ¹	<p>1. From the Groups menu, click Applications. 2. Right-click the application, and then click View Details. 3. In the General section, click Subcomponents. 4. Right-click the subcomponent, and click View Details. 5. In the Members section, click Filters. 6. Click Create Filter.</p> <p>Tip: When the filter is created, you can edit or remove it.</p>
Add subcomponents to departments	<p>1. From the Groups menu, click Applications. 2. Right-click the application, and then click View Details. 3. In the General section, click Subcomponents. 4. Right-click the subcomponents, and click Add to Department. 5. Select the departments. 6. Click Save.</p>
Remove the applications that you do not want to monitor.	<p>1. From the Groups menu, click Applications. 2. Right-click the applications that you want to remove, and then click Remove.</p>
Remove application subcomponents from an application.	<p>1. From the Groups menu, click Applications. 2. Right-click the application, and then click View Details. 3. In the General section, click Subcomponents. 4. Right-click the subcomponents, and click Remove.</p>
Remove selected resources from applications and subcomponents ²	<p>1. From the Groups menu, click Block Storage Systems, or File Storage Systems, or Object Storage Systems. 2. Right-click a storage system and click View Details. 3. In the Internal Resources section, click the storage resource. 4. Optional: In the Members section, click the storage resource that is part of the application. 5. Right-click the resources that you want to remove and click Remove from Application. 6. Click the application or subcomponent and then click Save.</p>
Troubleshoot applications	<p>1. From the Groups menu, click Applications. 2. Right-click the application, and then click View Details.</p> <p>Investigate the performance of the storage resources that are associated with the application by viewing the charts on the Overview page. You can investigate the performance of related resources by clicking the resource in the General section, and clicking the Performance tab.</p>
Troubleshoot subcomponents.	<p>1. From the Groups menu, click Applications. 2. Right-click the application, and then click View Details. 3. In the General section, click Subcomponents. 4. Right-click the subcomponent, and click View Details.</p> <p>Investigate the performance of the storage resources that are associated with the subcomponent by viewing the charts on the Overview page. You can investigate the performance of related resources by clicking the resource in the General section, and clicking the Performance tab.</p>

1. When you add a volume to an application, the performance information for that volume, including historical information, is aggregated with the information for the existing volumes.
2. When you remove a member volume from an application, the performance information for that volume, including historical information, is no longer aggregated with the information for the existing volumes.

Note: The View Performance feature for applications isn't available to all IBM® Storage Insights users. Look for news from IBM about when this feature will be available to you.

Related tasks

- [Investigating the performance of storage resources](#)

Related reference

- [Viewing capacity charts](#)

Application details

View detailed information and charts about the capacity and space usage of applications and application subcomponents. You can also view and access charts and information about the performance of the applications and the application subcomponents.

The Overview page also contains a list of all the top level applications. Click the application name from the list to go directly to the details for that application. The application list enables you to quickly navigate from application to application and add resources and subcomponents.

View the following charts to see the capacity trends, the space usage, and the performance of the storage resources that are assigned to the application:

- [Capacity](#)
- [Capacity by Tier](#)
- [Most Active Volumes](#)
- [Aggregated Workload](#)

Capacity

Historical charts that show capacity information for resources that currently belong to the application:

Block Capacity

The block capacity chart shows the capacity of volumes from block storage systems that currently belong to the application. It includes data that was collected over the previous 30 days.

Object Capacity

The object capacity chart shows the amount of storage space that used by all the vaults that currently belong to the application. It includes data that was collected over the previous 30 days.

Capacity by Tier

Use the capacity by tier chart to view the used and available space by tier.

For each tier of storage, the following information is shown:

Available Capacity

The unallocated capacity remaining in the pools.

Used Capacity

(Previously known as Allocated Space) The capacity that is allocated to the volumes that belong to the application.

Most Active Volumes

A historical performance chart that shows the top volumes that are related to the application:

Response Time

A historical performance chart that shows the response rate of the volumes with the largest overall response time. The response rate represents the average number of milliseconds that was required to service each I/O operation (read and write) for a volume.

I/O Rate

A historical performance chart that shows the total I/O rates of the most active volumes. The I/O rate represents the average number of I/O operations per second for nonsequential read and write operations on the volume.

Data Rate

A historical performance chart that shows the data rate of the most active volumes. The data rate represents the average number of mebibytes per second that were transferred for read and write operations on a volume.

Read Cache Hits

A historical performance chart that shows the volumes with the smallest read cache hit percentage when the I/O rate is greater than 0. The read cache hit percentage represents the percentage of cache hits for sequential and nonsequential read operations on a volume. Each volume is represented by a line on the chart.

Volume Utilization

A historical performance chart that shows the approximate utilization percentage of a volume over a specified time interval (the average percent of time that the volume was busy).

Aggregated Workload

A historical performance chart that shows the aggregated I/O or data rates from the perspective of the application, specifically, the throughput of the primary volumes that are members of the application. The data is aggregated in real time for the member volumes that are part of the application at the time the chart is run. The criteria for including or excluding volumes for aggregation is as follows:

- Member volumes are included.
 - The target copy of member volumes in a remote copy relationship is excluded.
 - VDisk mirrors are excluded.
- Related resources volumes are excluded.
- Volumes that are part of multiple subcomponents are counted only once.

The volume data is aggregated to the largest interval of the participating volumes. For example, if Volume A is set to record at 5-minute intervals and Volume B is set to record at 15-minute intervals, the chart displays the data at 15-minute intervals. The data from Volume A is recalculated to match the 15-minute interval requirement.

The metrics available in the chart are as follows:

I/O Rate

A historical performance chart that shows the aggregated I/O Read Rate and the I/O Write Rate for the application represented by two lines on the chart.

Data Rate

A historical performance chart that shows the aggregated Read Data Rate and the Write Data Rate for the application represented by two lines on the chart.

Note: This feature isn't available to all IBM® Storage Insights users. Look for news from IBM about when this feature will be available to you.

Alerts and Alert Definitions

You can define application alerts for the following resource types:

- Servers
- Volumes
- Filesets
- Shares

View the alerts that were generated when certain conditions were detected in an application on the Alerts page. Alerts are generated when the conditions that are specified on the Alert Definitions page are detected. To edit the alert definitions, click Alerts Definitions in the General section.

[Learn more about alerts](#)

Members

View the resource types that were added to the application or subcomponent. The number next to the resource type, for example, Servers (2), shows the number of resources of that type in the application. To view information about the resources, click the resource type, for example, **Volumes (10)**.

Related concepts

- [Application models](#)

Related tasks

- [Creating applications](#)

Related reference

- [Administering applications](#)
- [Application Related Resources](#)

Application Related Resources

Related resources are resources in the storage environment that the application is using or is connected to.

Use the [application details page](#) to view information about the following resources that are related to the monitored applications:

- [Storage systems](#)
- [Servers](#)

Storage Systems

Entries for the storage systems and their internal resources that provide storage to the application are displayed in Related Resources. The number in parentheses next to each entry shows the number of those storage systems or internal resources that provide storage. For example, Block Storage Systems (2) means that two block storage systems provide storage to the application; Volumes (5) means that five volumes on the storage system are providing that storage.

A storage system is shown as a related resource for the application when any of the following conditions are met:

- A server that was added to the application is assigned storage from the storage system.
- A hypervisor that was added to the application is assigned storage from the storage system.
- A volume that was added to the application belongs to the storage system.
- A file system that was added to the application is using storage from the storage system.
- A filespace that was added to the application belongs to the storage system.
- A share that was added to the application is using storage from the storage system.
- A data store that was added to the application is using storage from the storage system.
- A volume group that was added to the application is using storage from the storage system.
- A vault that was added to the application contains storage from the object storage system.

To view information about the storage systems or internal resources that provide storage, click its entry. The following information is displayed for the different types of storage systems:

- [Block Storage Systems](#)
- [File Storage Systems](#)
- [Object Storage Systems](#)

Servers

An entry for servers is displayed for an application when any of the following conditions are met:

- The server was added to the application.
- A volume that was added to the application is assigned to the server.
- A share that was added to the application is mounted on the server.
- A share that was added to the application is exported by the server.
- A file system that was added to the application belongs to the server.
- A file system that was added to the application uses storage that is exported by the server.
- A volume group that was added to the application belongs to the server.

The number next to Servers shows the number of servers used by the application that were added to one or more applications, or inferred as a result of adding other resources such as volumes or shares, for example, Servers (2).

To view [asset information](#) about the related servers, click Servers.

Departments

Monitor the capacity and space usage of departments and subdepartments and the performance of the applications and the application subcomponents that are added to departments and subdepartments.

To monitor the capacity and space usage of departments and subdepartments and the performance of the applications and application subcomponents, you create the departments and subdepartments and then add the applications and application subcomponents to the departments and subdepartments.

You can view the performance of the applications that are associated with all of the subdepartments on the Overview page for the department. You can view the performance of applications that are associated with a subdepartment on the Overview page for that subdepartment.

Information about departments

The following information is shown for each department and subdepartment that is monitored by IBM® Storage Insights Pro:

Tip: You can add or edit some of the properties of the application after you create it such as the name, type, and subtype. Right-click the application and click View Properties. Click Edit and make your changes.

Applications

The name of the application that belongs to a particular department. If there is more than one application, the number of applications is displayed.

Block Capacity (GiB)

The total amount of block-level storage space that is allocated to applications and subdepartments in the department.

Custom tag 1, 2, and 3

Any user-defined text that is associated with a department. This text can be included as a report column when you generate reports for departments. To edit the custom tags for a department or add a custom tag, right-click it, select View Properties and click Edit.

File Capacity (GiB)

The total amount of file-level storage space that is allocated to applications and subdepartments in the department.

Name

The user-defined name that was assigned to the department when it was created. For example, Investments. To edit the name for a department, right-click it, select View Properties and click Edit.

Object Capacity (GiB)

The total amount of storage space that is used by all the vaults in the department and, if applicable, in the department's subcomponents. This value does not include space that is reserved for disk overhead and dispersal overhead.

Available for IBM Cloud Object Storage.

Subdepartments

The name of the subdepartment that belongs to the department. If there is more than one subdepartment, the number of subdepartments is displayed.

Subtype

An extra category that you can use to distinguish the department from other departments. For example, you can organize your regional sales departments for North America by states.

Type

The categorization of the department to distinguish it from the other departments that you create. For example, you can organize your departments by region such as North America.

- [**Administering departments**](#)

Go to the pages for creating and administering the departments that you want to monitor.

- [**Viewing information and charts about departments**](#)

Go to the pages that show capacity, space usage, and charts about the departments and the subdepartments that you created.

- [**Department details**](#)

View detailed information and charts about the capacity and space usage of departments and subdepartments. You can also access charts and information about the performance of the applications and the application subcomponents that are added to departments and subdepartments.

Related concepts

- [Department models](#)

Related tasks

- [Modifying applications and departments](#)
- [Creating departments](#)

Related reference

- [**Administering departments**](#)
- [**Viewing information and charts about departments**](#)

Administering departments

Go to the pages for creating and administering the departments that you want to monitor.

Table 1. Create and administer departments and subdepartments

Actions	Navigation
Add departments as subdepartments to a department.	1. From the Groups menu, click Departments. 2. Right-click the departments that you want to add as subdepartments, and then click Add to Department.
Add applications to departments.	1. From the Groups menu, click Departments. 2. Right-click the department, and then click View Details. 3. In the General section, click Applications. 4. Click Create Application.
Add applications to subdepartments.	1. From the Groups menu, click Departments. 2. Right-click the department, and then click View Details. 3. In the General section, click Subdepartments. 4. Right-click the subdepartment, and click View Details. 5. In the General section, click Applications. 6. Click Create Application.
Create the departments and subdepartments, and associate applications and application subcomponents with departments and subdepartments.	1. From the Groups menu, click Departments. 2. Click Create Department.
Remove applications from a department.	1. From the Groups menu, click Departments. 2. Right-click the department, and then click View Details. 3. In the General section, click Applications. 4. Select and right-click the applications, and then click Remove.
Remove applications from a subdepartment.	1. From the Groups menu, click Departments. 2. Right-click the department, and then click View Details. 3. In the General section, click Subdepartments. 4. Right-click the subdepartment, and click View Details. 5. In the General section, click Applications. 6. Select and right-click the applications, and then click Remove.
Remove the departments that you do not want to monitor.	1. From the Groups menu, click Departments. 2. Right-click the departments that you want to remove, and then click Remove Department.
Remove subdepartments that you do not want to monitor.	1. From the Groups menu, click Departments. 2. Right-click a department and click View Details. 3. Right-click the departments that you want to remove, and then click Remove Department.

Viewing information and charts about departments

Go to the pages that show capacity, space usage, and charts about the departments and the subdepartments that you created.

Table 1. View capacity and space information about departments and subdepartments

Actions	Navigation
View charts that show the space usage and the most active resources of the applications and the application subcomponents that are added to the department.	1. From the Groups menu, click Departments. 2. Right-click a department, and then click View Details.

Actions	Navigation
View information about the applications that are added to the department.	<ol style="list-style-type: none"> 1. From the Groups menu, click Departments. 2. Right-click a department, and then click View Details. 3. In the General section, click Applications. <p>Tip: On the Applications page, click Create Application to create the applications and application subcomponents that you want to associate with the department.</p>
View information about the properties, the subdepartments that the department contains, and the applications that are added to the department.	<ol style="list-style-type: none"> 1. From the Groups menu, click Departments. 2. Right-click a department, and then click View Properties.
View information about the subdepartments that are contained in the department.	<ol style="list-style-type: none"> 1. From the Groups menu, click Departments. 2. Right-click a department, and then click View Details. 3. In the General section, click Subdepartments. <p>Tip: On the Subdepartments page, click Create Department to create new subdepartments.</p>
View information and charts about the performance of the applications and application subcomponents that are added to departments.	<ol style="list-style-type: none"> 1. From the Groups menu, click Departments. 2. Right-click a department, and then click View Details. <p>To investigate storage resources that are related to the applications and the application subcomponents, click a resource in the Related Resources section.</p>
View information and charts about the performance of the applications and application subcomponents that are added to subdepartments.	<ol style="list-style-type: none"> 1. From the Groups menu, click Departments. 2. Click the name of the subdepartment or the number that is shown in the Subdepartments column. 3. Right-click the subdepartment, and click View Details or right-click the name of the subdepartment in the list and select the subdepartment and click View Details. <p>To investigate storage resources that are related to the applications and the application subcomponents, click a resource in the Related Resources section.</p>

Department details

View detailed information and charts about the capacity and space usage of departments and subdepartments. You can also access charts and information about the performance of the applications and the application subcomponents that are added to departments and subdepartments.

Tip: In the navigation pane, you can click Actions to add the department as a subdepartment to another department. You can also click the name of the department to go to other departments on the same level.

Block Capacity

A historical performance chart that shows the following information for the department:

Block Capacity

The block capacity chart shows the capacity of volumes from block storage systems that currently belong to the applications in the department. It includes data that was collected over the previous 30 days.

File Capacity

The file capacity chart shows the capacity of file systems and filesets from file storage systems that currently belong to the applications in the department. It includes data that was collected over the previous 30 days.

Object Capacity

The object capacity chart shows the amount of storage space that used by all the vaults that currently belong to the applications in the department. It includes data that was collected over the previous 30 days.

Capacity by Tier

Use the capacity by tier chart to view the capacity usage of the storage tiers that are related to your department.

To view capacity usage for each tier of storage, you must assign tier levels to the storage pools in the storage systems. If the pools are not assigned tier levels, you can click the link that is provided to open the Pools page for the storage system.

Tip: To assign a tier level to one or more pools, right-click the pools that you selected, and then click Set Tier and choose the tier level.

To view capacity usage for each tier of storage, you must assign tier levels to the storage pools in the storage systems. For each tier of storage, the following information is shown:

Used Capacity

(Previously known as Allocated Space) The amount of space that is allocated for all of the volumes in the pools, which include both standard and thin-provisioned volumes.

Available Capacity

The capacity in the pools that is not allocated to the volumes in the pools.

Capacity

The total amount of storage capacity in the pools that are assigned to each tier. For XIV® systems, pool capacity is the physical capacity or hard size of the pool and does not include the provisioned capacity or soft size of the pool.

The formula that is used to calculate the capacity of the pools is as follows:

(Used Capacity + Available Capacity)

Most Active Volumes

A historical performance chart that shows the top volumes that are related to the department:

Response Time

A historical performance chart that shows the response rate of the volumes with the largest overall response time. The response rate represents the average number of milliseconds that was required to service each I/O operation (read and write) for a volume.

I/O Rate

A historical performance chart that shows the total I/O rates of the most active volumes. The I/O rate represents the average number of I/O operations per second for nonsequential read and write operations on the volume.

Data Rate

A historical performance chart that shows the data rate of the most active volumes. The data rate represents the average number of mebibytes per second that were transferred for read and write operations on a volume.

Read Cache Hits

A historical performance chart that shows the volumes with the smallest read cache hit percentage when the I/O rate is greater than 0. The read cache hit percentage represents the percentage of cache hits for sequential and nonsequential read operations on a volume. Each volume is represented by a line on the chart.

Volume Utilization

A historical performance chart that shows the approximate utilization percentage of a volume over a specified time interval (the average percent of time that the volume was busy).

Related concepts

- [Department models](#)

Related tasks

- [Modifying applications and departments](#)
- [Creating departments](#)

Related reference

- [Administering departments](#)
- [Viewing information and charts about departments](#)

General groups

Group your resources, such as the storage systems with lease agreements that end in the current year, so that you can view information about the resources at one location in the GUI.

Organizing your resources into general groups can be helpful in the following situations:

- When you want to receive alert notifications about changes for a subset of the resources of a particular type. For example, you want to detect when the ports that are used for replication on your SAN Volume Controller have insufficient buffer-to-buffer credit. You do not want the alerts to apply to other ports on your SAN Volume Controller. You can group the ports that are used for replication and then define alerts for the group.
- When you want to quickly view information about the resources that are used by your critical business applications. For example, in your environment you have storage systems that are used by production applications and other storage systems that are used by noncritical test applications. You can add all the storage systems that are used by the production applications to a general group.
- When you want to view information about subsets of the resources of a particular type. For example, you have the following groups of ports on your SAN Volume Controller:
 - Ports that are used for inter-node communication
 - Ports that are used for host I/O exchanges

You can create separate general groups for the two sets of ports and quickly view information about the specific ports in each of the groups.

General group hierarchies

Organizing resources into general groups and their subgroups can be helpful when you want to quickly view information about a group of resources, but you also want to view information about subgroups of resources within the group.

Only top-level groups in the general group hierarchy are shown on the General Groups page. If the general group has a subgroup, the name of the subgroup is shown in the Subgroups column. If the general group has more than one subgroup, click the number of groups in the Subgroups column to view the subgroups.

- [**Adding resources to general groups**](#)

Add resources to general groups so that you can quickly view information about resources with common characteristics. You can add resources to one or more existing groups or you can create a new group.

- [**Viewing and administering general groups**](#)

View and administer the general groups that you use to organize storage resources with common characteristics.

- [**General Group details**](#)

View detailed information about the resources that are members of a general group and any alerts that were generated for the group.

Related reference

- [General group hierarchies](#)
-

General group hierarchies

Organizing resources into general groups and their subgroups can be helpful when you want to quickly view information about a group of resources, but you also want to view information about subgroups of resources within the group.

A general group hierarchy can contain up to five group levels and comprises these main elements:

- The general group.
- The subgroups. A general group can have child general groups, called subgroups. Each of the subgroups can also contain subgroups. The hierarchy can be up to five group levels deep.
- The storage resources. Group storage resources that share common characteristics.

The following examples demonstrate some of the ways that you can use general group hierarchies in your business environment:

- You can group the resources that are used by your production applications so that you can monitor all the resources and also monitor the specific subgroups of storage systems and ports.
Add the storage systems to one group and the ports to another group. Then, add the groups as subgroups of a parent general group.
- You can group the ports on your SAN Volume Controller so that you can monitor all the ports and also monitor the subgroups of ports that are used for inter-node communication and host I/O exchanges.
Add the ports that are used for inter-node communication to one group and the ports that are used for host I/O exchanges to another group. Then, add the groups as subgroups of a parent general group.

To view information about the resources in a group hierarchy, click Groups > General Groups. Then, right-click a general group and select View Details. The Members section lists all the resources that are members of the general group or members of its subgroups.

Adding resources to general groups

Add resources to general groups so that you can quickly view information about resources with common characteristics. You can add resources to one or more existing groups or you can create a new group.

About this task

The following resources and their internal resources can be added to a general group:

- Storage systems*
- Servers
- Other general groups

Tip: * For IBM® Cloud Object Storage, only vaults can be added to general groups.

Only resources that you specifically add to a group are included as members of the group. For example, if you add a SAN Volume Controller, the internal resources of the SAN Volume Controller, such as volumes and pools, are not automatically added to the group. To add the volumes and pools, you must specifically select those resources and add them to the group.

You can create a general group hierarchy by adding one or more general groups as subgroups of a general group.

Procedure

To add resources to a general group, complete these steps:

1. Take one of the following actions to go to the list page for the resource or group that you want to add:
 - To add top-level resources such as storage systems or servers, go to the appropriate resource page. For example, to add servers, in the menu bar, click Resources > Servers.
 - To add internal resources of top-level resources, complete the following steps:
 - Go to the resource list page for the top-level resource. For example, to add internal resources of a SAN Volume Controller, in the menu bar, click Resources > Block Storage Systems.
 - Right-click the resource and click View Details.
 - In the Internal Resources section, click the type of resource that you want to add, for example, volumes or pools.
 - To add general groups, in the menu bar, click Groups > General Groups.
2. Right-click one or more resources or groups and click Add to General Group.
3. Take one of the following actions:
 - To add the resources or groups to a new group, click Add to new group and specify a name and description for the new group.
 - To add the resources or groups to one or more existing groups, click Add to existing groups and click the appropriate groups in the list.
4. Optional: Customize the icon for a new group by clicking the existing icon and selecting another icon.
5. Click Save.

What to do next

To view the resources and subgroups that are members of the group, complete the following steps:

1. Go to Groups > General Groups.
2. Right-click the general group and select View Details.

On the general group details page, all the different resource types, such as volumes or pools, that are members of the group or members of its subgroups are shown in the Members section.
3. Click the resource type to view the specific resources. For example, click Volumes to view all the volumes that are in the general group or in its subgroups.
4. Click Subgroups to view the child groups.

To define alerts for the general group, use the View Alert Definitions action on the General Groups page.

Viewing and administering general groups

View and administer the general groups that you use to organize storage resources with common characteristics.

Administering general groups

Table 1. Administering general groups

Actions	Navigation
---------	------------

Actions	Navigation
Create a general group and add resources.	<ol style="list-style-type: none"> In the menu bar, click the resource list page for the resources that you want to add. For example, if you want to add file storage systems, click Resources > File Storage Systems. Right-click one or more resources and click Add to General Group. Click Add to new group, specify a name and description for the new group, and click Save.
Add resources to general groups.	<ol style="list-style-type: none"> In the menu bar, click the resource list page for the resources that you want to add. For example, if you want to add block storage systems, click Resources > Block Storage Systems Right-click one or more resources and click Add to General Group. Take one of the following actions: <ol style="list-style-type: none"> To add the resources to one or more existing groups, click Add to existing groups, click the appropriate groups in the list, and click Save. To add the resources to a new group, click Add to new group, specify a name and description for the new group, and click Save.
Set which alert policy manages a general group Learn more	<ol style="list-style-type: none"> Go to the details page for the general group for which you want to set the policy. In the menu bar, click Groups > General Groups. Right-click one of the general groups, then click View Details. Click Alerts in the General section. Click Set Policy from the Policy Actions menu. <p>To set the alert policy for multiple general groups, go to Settings > Alert Policies. Double-click the policy, click the resources tab, then click Edit Resources.</p>
Create an alert policy from the alert definitions and notification settings in a general group	<ol style="list-style-type: none"> Go to the details page for the general group from which you want to create the policy. In the menu bar, click Groups > General Groups. Right-click one of the general groups, then click View Details. Click Alerts Definitions in the General section. Click Create Policy from the Policy Actions menu.
View or modify the alert policy that manages a general group Learn more about defining alerts and notification settings	<ol style="list-style-type: none"> Go to the details page for the general group whose policy you want to view. In the menu bar, click Groups > General Groups. Right-click one of the general groups, then click View Details. Click Alerts in the General section. Click View Policy from the Policy Actions menu.
Delete general groups.	<ol style="list-style-type: none"> In the menu bar, click Groups > General Groups. Right-click one or more general groups and click Delete. To delete subgroups, ensure that the Delete subgroups? check box is selected. <p>When a group is deleted, the resources that were members of the group are removed from the group but are still monitored by the product.</p>
Remove resources from a general group.	<ol style="list-style-type: none"> In the menu bar, click Groups > General Groups. Right-click a general group and click View Details. In the Members section, click the type of resource that you want to remove. For example, if you want to remove some of the volumes from the group, click Volumes. Right-click the resources that you want to remove and click Remove from General Group. Click OK to confirm that you want to remove the resources from the general group and from all of its subgroups.
Add general groups as subgroups.	<ol style="list-style-type: none"> In the menu bar, click Groups > General Groups. Right-click one or more general groups and click Add to General Group. Take one of the following actions: <ol style="list-style-type: none"> To add the groups as subgroups of existing groups, click Add to existing groups, click one or more groups in the list, and click Save. To add the groups as subgroups of a new group, click Add to new group, specify a name and description for the new group, and click Save.

Actions	Navigation
Remove subgroups from a group hierarchy.	<p>1. In the menu bar, click Groups > General Groups. 2. Right-click a general group and click View Details. 3. Click Subgroups in the General section. 4. Right-click the general groups that you want to remove and click Remove from General Group.</p> <p>When you remove a subgroup from its parent group, the subgroup is moved to the same level in the hierarchy as the parent group. The subgroup is still monitored by the product.</p>
Create a subgroup.	<p>1. In the menu bar, click Groups > General Groups. 2. Right-click the general group that you want to create a subgroup for and click View Details. 3. Click Subgroups in the General section. 4. Click Create Subgroup. 5. Specify a name and description for the new group. 6. Customize the icon for the group by clicking the existing icon and selecting another icon. 7. Click Create.</p>
Delete subgroups.	<p>1. In the menu bar, click Groups > General Groups. 2. Right-click the general group that contains the subgroups that you want to delete and click View Details. 3. Click Subgroups in the General section. 4. Right-click one or more subgroups and click Delete. 5. To delete further subgroups, ensure that the Delete subgroups? check box is selected.</p> <p>When a group is deleted, the resources that were members of the group are removed from the group but are still monitored by the product.</p>

Viewing general groups

Table 2. Viewing general groups

Actions	Navigation
View a list of general groups.	<p>In the menu bar, click Groups > General Groups. The following general groups are shown:</p> <ul style="list-style-type: none"> The top-level groups in general group hierarchies All general groups that are not part of a general group hierarchy
View subgroups in a general group hierarchy.	<p>1. In the menu bar, click Groups > General Groups. 2. Click the number of groups or the group name that is shown in the subgroups column. 3. Click the Subgroups tab.</p>
View details about a general group, including the alert notifications, the resources that are members of the group, and the subgroups.	<p>1. In the menu bar, click Groups > General Groups. 2. Right-click a general group and select View Details.</p>
View the alert definitions and notification settings for a general group.	<p>1. In the menu bar, click Groups > General Groups. 2. Right-click a general group and select View Alert Definitions.</p>
View the alerts that were triggered for a general group.	<p>1. In the menu bar, click Groups > General Groups. 2. Right-click a general group and select View Details. 3. Click Alerts in the General section.</p>
View reports about general groups.	<p>In the menu bar, click Cognos. The Cognos® Analytics reporting tool is included in Tivoli® Common Reporting. To view reports about general groups, view reports about storage resource groups in the Cognos Analytics reporting tool.</p>

General Group details

View detailed information about the resources that are members of a general group and any alerts that were generated for the group.

To access the details page for a group, complete these steps:

- 1.
2. Right-click a group in the list and select View Details.

On the details page, you can complete the following tasks:

- [View information about the alerts for the general group](#)
- [View the subgroups of the general group](#)
- [View the members of the general group](#)
- [Remove resources from the general group](#)
- [Create a subgroup of the general group](#)
- [Delete subgroups of the general group](#)

Actions

Remove resources from the general group

To remove one or more resources from the general group, complete the following steps:

1. In the Members section, click the type of resource that you want to remove. For example, if you want to remove some of the volumes from the group, click Volumes.
2. Right-click the resources that you want to remove and click Remove from General Group.
3. Click OK to confirm that you want to remove the resources from the general group and from all of its subgroups.

Create a subgroup of the general group

To create a subgroup of the general group, complete the following steps:

1. Click Subgroups in the General section.
2. Click Create Subgroup.
3. Specify a name and description for the new group.
4. Customize the icon for the group by clicking the existing icon and selecting another icon.
5. Click Create.

Delete subgroups of the general group

To delete subgroups, complete the following steps:

1. Click Subgroups in the General section.
2. Right-click one or more subgroups and click Delete.
3. To delete further subgroups, ensure that the Delete subgroups? check box is selected.

Information about general groups

Alerts and Alert Definitions

View the alerts that were generated when certain conditions were detected in a general group on the Alerts page. Alerts are generated when the conditions that are specified on the Alert Definitions page are detected. To edit the alert definitions, click Alerts Definitions in the General section.

[Learn more about alerts](#)

Subgroups

The number next to Subgroups, for example, Subgroups (3), shows the number of subgroups in the general group. To view information about the subgroups, click Subgroups.

You can organize your resources into a general group hierarchy that can contain up to five group levels. A subgroup in the hierarchy can also be a parent to other general groups.

The Subgroups page shows only the subgroups that are direct children of the general group. If the subgroup is also a parent group, the name of its subgroup is shown in the Subgroups column. If the group has more than one subgroup, click the number of groups in the Subgroups column to view the subgroups.

Members

The Members section lists the resource types that are members of the general group or members of its subgroups. The number next to the resource type, for example, Block Storage Systems (2), shows the number of resources of that type in the general group or in its subgroups.

To view information about the resources, click the resource type, for example, Volumes (27).

Servers

Use IBM® Storage Insights Pro to collect asset and space usage information about the servers in your environment. These servers are automatically created based on the host connections of monitored storage systems. Each host connection is represented as an agentless server.

The Servers page shows information about the servers that are monitored and the actions that you can use to manage them. Before you can monitor a server, the server must be added for monitoring by IBM Storage Insights Pro. [Learn more](#)

Important: IBM Storage Insights Pro doesn't monitor the direct-attached (SAS) storage or local disks on servers. Instead, it displays information about the host connections on monitored storage systems, where each connection is shown as an agentless server on the Servers page.

Before you can monitor a server, the server must be added for monitoring by IBM Storage Insights Pro. [Learn more](#)

Alerts

Use this tab to view, evaluate, and manage the alert conditions that were detected on all the monitored servers in your environment.

- To manage the alerts that are shown in the list, see [alert actions](#).
- To view descriptions of the information that is shown for alerts, see [information about alerts](#).

For information about how to set up alert policies or alert definitions to notify you of certain conditions on servers, see [Alerting](#).

Information about servers

The following information is available for each server that is monitored.

Custom tag 1, 2, and 3

Any user-defined text that is associated with a server. This text can be included as a report column when you generate reports for the server. To edit the custom tags for a server or add a custom tag, right-click it and select View Properties. On the properties notebook, click Edit.

Domain Name

The fully qualified domain name of a server.

Drive Capacity (GiB)

(Previously known as Total Disk Space) The total capacity that is accessible on a hypervisor.

File System Capacity from *cluster_name* (GiB)

The total capacity of all the file systems that are mounted on the server from the IBM Spectrum Scale cluster. A value is shown in this column only when the following conditions are met:

- The server is managed by a Storage Resource agent.
- The server is viewed as a related resource of an IBM Spectrum Scale storage system.

IP Address

The IP address of a server.

Location

The physical location of a server. The location is defined when a server is added. If a location was not defined, no value is displayed.

To edit the location of a server or add a location, right-click the server in the list and select View Properties. On the properties notebook, click Edit.

Mapped SAN Capacity

The SAN disk capacity that is assigned to a server from storage systems. For information about the storage systems, right-click the server and click View Details. Then, view Related Resources and click a storage system for more details.

Name

The IP address or fully qualified domain name of a server. If the hosts file for the operating system of the server is not set up, the IP address of the server is shown.

The icon that is displayed next to the name of the server indicates whether the server is physical or virtual, and other details about the server:

Icon	Description
	Physical server.
	Virtual server or virtual machine (VM).

Icon	Description
	Storage resource agent is deployed for the physical server.
	Storage resource agent is deployed for the virtual server.
	Cluster server.

OS Type

The operating system that is installed on a server.

- **[Administering servers](#)**

Administer the servers that are monitored by IBM Storage Insights Pro.

- **[Server details](#)**

View detailed information about the components and resources that are related to a server.

- **[Server internal resources](#)**

Internal resources are the components that exist on a server. Components that you can view include controllers and disks.

- **[Server related resources](#)**

Related resources are resources that are external to a server, but are related to it through assigned storage, a network connection, or virtual hosting. Related resources that you can view include storage systems and servers.

Administering servers

Administer the servers that are monitored by IBM® Storage Insights Pro.

You can monitor and administer servers on the following pages in the GUI:

Table 1. Locations where you can administer servers

Location in GUI	Steps
Servers page	1. From the Resources menu, click Servers. 2. Right-click a server in the list and select an action.
Servers properties page	1. From the Resources menu, click Servers. 2. Right-click a server in the list and select View Properties. 3. On the General or Storage tab, click Edit to modify the properties.
Overview page for the server	1. From the Resources menu, click Servers. 2. Right-click a server in the list and select an View Details. 3. Click the Actions button and select an action.

Use the following right-click actions to monitor and administer servers:

Table 2. Actions for administering servers

Action	Description
View Properties	View general and storage capacity information about the server.
View Details	View charts that show the space that is assigned to a server from storage systems and performance information, such as the most active storage system volumes. From the Overview page, you can access internal and related resources, and other information about the server.
View Capacity	View a chart that shows the capacity trends for one or more servers over the previous month. Use this information to monitor the amount of disk capacity from storage systems that is assigned to servers and how much of that capacity is being used. You can change the time range of the chart and the metrics that are shown. The default metrics are Mapped SAN Capacity and Used SAN Capacity.
View Alert Policy and Definitions	View, set, or create the alert policy for a server. Use alert policies to manage the alert definitions and notification settings that apply to servers. The tasks that you can do depend on whether the server is managed by an alert policy. <ul style="list-style-type: none"> Managed by an alert policy: View the policy or set a different policy to manage the server. Click View Policy or Set Policy from the Policy Actions menu. Not managed by an alert policy: Set a policy to manage the server or create a policy from the existing alert definitions. Click Set Policy or Create Policy from the Policy Actions menu. If you don't want to use a policy, you can edit the alert definitions. Click Alerts Definitions in the General section. Learn more about alerts
Add to Application	Add the server to a new or existing application. Use applications to monitor the capacity and performance of the storage resources that your critical applications use in one place. Learn more .
Add to General Group	Add the server to a new or existing general group. Organizing servers into general groups and their subgroups can be helpful when you want to quickly view information about a group of resources, but you also want to view information about subgroups of resources within the group. Learn more

Action	Description
Separate Server, Merge Servers The Merge Servers action is available when you select multiple servers.	IBM Storage Insights Pro creates and updates agentless servers automatically after data is collected for the storage systems. Depending on your storage environment, IBM Storage Insights Pro might not model all of the servers in your environment correctly. For example, IBM Storage Insights Pro might identify 6 host connections and create an agentless server for each host connection. However, in your environment, these 6 host connections are actually on one server. In this case, you need to merge the six agentless servers into one server. Similarly, IBM Storage Insights Pro might create a server from a group of host connections that appear to be related. In this case, you can separate the servers from the agentless server.
Edit Properties This action is available when you select multiple servers.	Add or change the properties for multiple servers. You can specify the OS type, location, and custom tag properties. You can use the properties to filter or sort the servers in the GUI or in an external application if the data is shared or exported. When you click Edit Properties, the properties in the notebook can have the following values: <ul style="list-style-type: none"> If the property is blank, it means that the servers that were selected have different values assigned to that property. For example, the servers run on different operating systems or the servers have different locations. If the selected servers have the same value for a property, the value is shown.

Server details

View detailed information about the components and resources that are related to a server.

To access the details page for a server, complete these steps:

- From the Resources menu, click Servers.
- Right-click a server in the list and select View Details.

Overview

View the following charts that show space information about the server and performance information about volumes that the server accesses:

Capacity from Storage Systems

The amount of capacity that is assigned to a server from storage systems. The chart can show up to 10 of the storage systems that allocate the most storage to the server. Each storage system that allocates storage to the server is represented by a bar on the chart.

Most Active Storage System Volumes

The performance data for the volumes that are most active on the storage systems. The chart shows performance data that was collected about the most active volumes that the server accesses on the storage systems.

Tip:

- The charts show data that was collected about the server during the last 30 days. If no data was collected, the charts are blank. If data collection was interrupted during the last 30 days, a gap for the missing data is shown.
- Hover over elements in the charts to view additional information.
- To view different charts, click the name of a chart and select the chart that you want to view.
- The selected charts are automatically displayed in the same positions the next time that you log on to the GUI and view the details of the resource.

Properties

View the attributes of the server, including information about its storage space. Use the General tab for server information, such as the server name and IP address. Use the Storage tab for disk space details.

Alerts and Alert Definitions

View the alerts that were generated when certain conditions were detected on a server on the Alerts page. Alerts are generated when the conditions that are specified on the Alert Definitions page are detected.

Use alert policies to manage the alert definitions and notification settings that apply to servers. You can view, set, or create the alert policy for a server from the Alerts or Alert Definitions pages. The tasks that you can do depend on whether the server is managed by an alert policy.

Alert policy status	Tasks that you do
Managed by an alert policy	View the policy or set a different policy to manage the server. Click View Policy or Set Policy from the Policy Actions menu.
Not managed by an alert policy	Set a policy to manage the server or create a policy from the existing alert definitions. Click Set Policy or Create Policy from the Policy Actions menu. If you don't want to use a policy, you can edit the alert definitions. Click Alerts Definitions in the General section.

[Learn more about alerts](#)

Tip: The version of IBM Spectrum Control that detected an alert condition determines where information about the alert is displayed. Alerts that were generated in version 5.1 or later are displayed on the Alerts home page and in the Alerts tab. Alerts that were generated in versions of the product before 5.1, also called migrated alerts, are only displayed on the Alerts home page.

Server internal resources

Internal resources are the components that exist on a server. Components that you can view include controllers and disks.

Overview

Use the server details page to view information about the following internal resources for servers that are monitored:

- [Controllers](#)
- [Disks](#)

Controllers

A disk controller coordinates and controls the operation of one or more input and output devices. The controller synchronizes the operation of such devices with the operation of a server. To view information about the disk controllers that are associated with a server, click Controllers. The number in parentheses shows the number of controllers that are monitored on the server. The following information is available for each controller.

Associated Disks

The number of disks that are controlled by a disk controller. A disk might be assigned to more than one controller.

HBA WWN

The worldwide name (WWN) of a disk controller. A WWN is a 64-bit string that uniquely identifies the controller. The value is only available for host bus adapters (HBAs).

Type

The type of disk controller, such as IDE, SCSI, Floppy, and RAID. Host Bus Adapters (HBAs) have a controller type of FCAL (Fibre Channel Arbitrated Loop).

Disks tab

To view information about the disks that are controlled by the disk controller, right-click the name of the controller, select View Properties, and click the Disks tab. The following information is available for a disk.

Available Drive Capacity (GiB)

(Previously known as Available Disk Space) The capacity that is unused on a drive.

Capacity (GiB), Capacity (GB)

The storage space that is available on a disk, which is measured in gibibytes (GiB) or gigabytes (GB). A GiB is a base-2, binary unit of measurement equal to 1,073,741,824 bytes. A GB is a base-10, decimal unit of measurement equal to 1,000,000,000 bytes.

Firmware

The firmware version of the microcode on a disk.

Multipathing Policy

The multipathing policy that is in effect for a disk. For example, the policy can be **Round Robin, Load Balancing, Failover Only**, or other policies.

Name

The name of the disk that is controlled by a disk controller on a server.

Paths

The number of access paths that are associated with a disk.

Speed (RPM)

The number of revolutions per minute of a disk.

Used Capacity (GiB)

The amount of storage space that is used on a disk.

Ports tab

To view information about the Fibre Channel ports that are associated with a disk controller, right-click the name of the controller, select View Properties, and click the Ports tab. The following information is available for each Fibre Channel port on a controller.

Acknowledged

Shows whether a user marked the status of a port as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored.

IQN

The iSCSI-qualified name of the port.

Name

The name of the disk controller on a server.

Status

The status of a Fibre Channel port. Statuses include Normal, Warning, Error, Unreachable, and Unknown. Use the status to determine the condition of a port, and if any actions must be taken. For example, if a port has an Error status, take immediate action to correct the problem.

WWPN

The World Wide Name (WWPN) that is assigned to a port. A WWPN is the unique 64-bit identifier for a port in a Fibre Channel fabric.

Disks

The number of unique disks that are attached to a server. To view information about the disks that are available on a server, click Disks. The number in parentheses shows the number of disks that are monitored on the server. The following information is available for each disk.

Available Drive Capacity (GiB)

(Previously known as Available Disk Space) The capacity that is unused on a drive.

Capacity (GiB), Capacity (GB)

The storage space that is available on a disk, which is measured in gibibytes (GiB) or gigabytes (GB). A GiB is a base-2, binary unit of measurement equal to 1,073,741,824 bytes. A GB is a base-10, decimal unit of measurement equal to 1,000,000,000 bytes.

Firmware

The firmware version of the microcode on a disk.

Multipathing Policy

The multipathing policy that is in effect for a disk. For example, the policy can be **Round Robin, Load Balancing, Failover Only**, or other policies.

Name

The name of the disk that is controlled by a disk controller on a server.

Paths

The number of access paths that are associated with a disk.

Speed (RPM)

The number of revolutions per minute of a disk.

Used Capacity (GiB)

The amount of storage space that is used on a disk.

Paths tab

You can view information about all the paths that are associated with the disks for a server, or just the paths that are associated with a specific disk.

- To view all the paths for the associated disks, click the Paths tab.
- To view the paths that are associated with a specific disk, right-click the name of the disk, select View Properties, and click the Paths tab.

The following information is available for each path on a disk:

Controller

The name of the controller that manages a disk.

Instance Number

The instance number of a disk.

Logical Unit Number

The logical unit number (LUN) that is associated with a disk.

Name

The name of a path to a server disk. Typically, the multipath driver defines this name.

Storage System

The name of the storage system where a volume is located.

Target Identifier

A hexadecimal value that uniquely identifies a disk.

Thin Provisioned

The type of thin-provisioning on a volume, if any. The following types might be displayed for a volume:

ESE	The volume is an Extent Space-Efficient (ESE) thin-provisioned volume on a DS8000® storage system.
No	The volume is not a thin-provisioned volume.
TSE	The volume is a Track Space-Efficient (TSE) thin-provisioned volume on a DS8000 storage system.
Yes	The volume is a thin-provisioned volume.
Used Volume Space (GiB)	
	The amount of used storage space on a volume.
Volume	
	The name of a volume on a disk.
Volume Capacity (GiB)	
	The total usable storage space on a volume. For thin-provisioned volumes, this value is the provisioned capacity of the volume. In an XIV®, this value is referred to as the provisioned ("soft") size, and not the potentially much smaller real space, or physical ("hard") size, that is allocated.

Server related resources

Related resources are resources that are external to a server, but are related to it through assigned storage, a network connection, or virtual hosting. Related resources that you can view include storage systems and servers.

Storage systems

To view information about the storage systems that are related to the servers, click Storage systems in the Related Resources section. The number next to Storage Systems shows the number of storage systems that provide storage to the server.

The storage system is shown as a related resource to the server when the following conditions are met:

- The server is assigned storage from a storage system. For example, a volume from the storage system is assigned to a file system on the server.
- The assigned storage from the storage system is visible to the server.
- The server is a member of an IBM Spectrum Scale cluster.

Internal resources of block storage systems

You can also view detailed information about the internal resources of related block storage systems. An entry for an internal resource is listed under Storage Systems when the following conditions are met:

- The storage system that contains the internal resource is monitored. If a storage system is not being monitored, information about its internal resources is not available.
- The internal resource is directly associated with the storage that is assigned to the server. For example, if a storage system contains 20 volumes, but only 2 of those volumes are assigned to the server, only those 2 volumes are shown as a related resource.

The type of storage system determines which of the following internal resources are shown:

Volumes

Shows information about the volumes that are assigned to the server. The number next to Volumes shows the number of assigned volumes.

Learn more: Go to [Volumes](#).

Pools

Shows information about the pools that contain volumes that are assigned to the server. The number next to Pools shows the number of pools that contain assigned volumes.

Learn more: Go to [Pools, aggregates, and common provisioning groups](#).

RAID Arrays

Shows information about the RAID arrays that contain volumes that are assigned to the server. The number next to RAID Arrays shows the number of arrays that contain the assigned volumes.

Learn more: Go to [RAID arrays](#).

FC Ports

Shows information about the Fibre Channel storage system ports that are accessible to the volumes that are assigned to the server. The number next to FC Ports shows the number of Fibre Channel ports that are accessible to the assigned volumes. This number represents only the Fibre Channel ports that are associated with the I/O Groups of the assigned volumes. You

can use this information to determine if there is an imbalance of the Fibre Channel ports through which volumes are transferring data.

Learn more: Go to [FC ports](#).

IP Ports

The IP ports that the server is dependent on are determined by the IO Groups that host the volumes that are assigned to the server.

Learn more: Go to [IP ports](#).

Disk

Shows information about the storage system disks that are associated with the volumes that are assigned to the server. These disks are the physical disks that are installed locally in a storage virtualizer. The number next to Disks shows the number of disks that are associated with the assigned volumes.

Learn more: Go to [Drives and disks](#).

External Disks

Shows information about the external disks that are associated with the volumes that are assigned to the server. The number next to External Disks shows the number of disks that are associated with the assigned volumes.

Learn more: Go to [External disks](#).

Managed Disks

Shows information about the managed disks that are associated with the volumes that are assigned to the server. The number next to Managed Disks shows the number of disks that are associated with the assigned volumes.

Learn more: Go to [Managed disks, external volumes, and array LUNs](#).

I/O Groups

Shows information about the I/O groups that are associated with the volumes that are assigned to the server. The number next to I/O Groups shows the number of I/O groups that are associated with the assigned volumes.

Learn more: Go to [I/O groups](#).

Controllers

Shows information about the controllers that are associated with the volumes that are assigned to the server. The number next to Controllers shows the number of controllers that are associated with the assigned volumes.

Learn more: Go to [Nodes, modules, and directors](#).

Nodes

Shows information about the nodes that are associated with the volumes that are assigned to the server. The number next to Nodes shows the number of nodes in the I/O Groups that are associated with the assigned volumes.

Learn more: Go to [Nodes, modules, and directors](#).

Modules

Shows information about the modules that are associated with the volumes that are assigned to the server.

The number next to Modules shows the number of modules in the storage systems that are associated with the assigned volumes.

Learn more: Go to [Nodes, modules, and directors](#).

Host Connections

Shows information about the storage system host connections that are associated with the server. The number next to Host Connections shows the number of host connections that are associated with the server.

Learn more: Go to [Host connections](#).

Servers

To view information about the servers that are related to the servers, click Servers in the Related Resources section.

An entry for servers is displayed when the following conditions are met:

- The current server is exporting a file system to another server.
- A file system is being exported from another server to the current server.

The number next to Servers shows the number of servers that are sharing storage with the current server.

Related reference

- [Block storage systems](#)
- [File storage systems](#)

Tiers

Use the charts and the table to review the capacity, storage growth rates, and the distribution of pools across tiers.

Use the charts on the Tiers page to complete these actions:

- Hover the mouse pointer over each column in the Capacity by Tier chart to review the total capacity for each tier and the total capacity of the pools that aren't tiered.
- Hover the mouse pointer over the ring chart to find out how many pools are tiered and how many pools aren't tiered. You can click the Untiered pools link to review the list of pools that aren't tiered and assign them to tiers.

You can also complete these actions:

- Click Rename Tiers to change the names of the tiers.
- Click Actions, and then click Export, and choose the format of the report that you want to create.
- Click Create Report to generate a report about your tiered storage that you can send by email to your colleagues.

Try it out: Click Configuration > Tiers and view the information that is shown about the distribution and capacity of your tiered storage. Review the following information about the capacity and growth rates of your tiered storage:

Capacity (TiB)

The total capacity of the tier, which comprises the total capacity of the pools on the tier.

Used Capacity (%)

The percentage of the total capacity of the tier that is used by the pools on the tier.

Used Capacity (TiB)

The amount of capacity that is used by the pools on the tier.

Average Weekly Storage Growth (TiB)

The average amount by which the used capacity of the pools in the tier has increased or decreased over the last seven days. Pools that were added within the last six days are not included in the calculation. If insufficient data is available to specify an average growth amount, **Unavailable** is shown.

Weekly Storage Growth (TiB)

The amount by which the used capacity of the pools in the tier has changed over the last seven days. The amount can increase or decrease. Pools that were added within the last six days are not included. If insufficient data is available to specify a growth amount, **Unavailable** is shown.

Zero Capacity

The date when the capacity of the pools on the tier will run out. The capacity information that is collected over 180 days is analyzed to determine, based on trends in historical storage consumption, when all of the pools on the tier will run out of capacity. If all of the pools have already run out of capacity, the tier's capacity is reported as depleted. If sufficient information isn't available to analyze the storage consumption of the pools on the tier, none is shown as the value for zero capacity. If a capacity limit is set for the pools, the date shown in the Zero Capacity column is the date when the capacity limit is reached.

Discover trends in storage usage for tiers: Select the tiers that you want to investigate and click the Capacity tab. You can compare how much capacity was used by each tier over the last week, month, 6 month, and year.

Related tasks

- [Assigning pools to tiers](#)
- [Investigating capacity trends for tiers](#)
- [Renaming tiers](#)

Related reference

- [Capacity metrics for tiers](#)

Investigating capacity trends

Monitor capacity and investigate trends in storage usage.

- [Investigating capacity trends for block storage systems](#)
Use the capacity charts and the information that is shown in the tables for the block storage systems to check which storage systems have the highest growth rates and which storage systems might need more capacity.
- [»Investigating capacity trends for file storage systems«](#)
Use the capacity charts and the information that is shown in the tables for the file storage systems to check which storage systems have the highest growth rates and which storage systems might need more capacity.
- [»Investigating capacity trends for object storage systems«](#)
Use the capacity charts and the information that is shown in the tables for the object storage systems to check which storage systems have the highest growth rates and which storage systems might need more capacity.

- [Investigating capacity trends for block storage pools](#)

Use the capacity charts and the information that is shown in the tables for the block storage pools to check which storage pools have the highest growth rates, which storage pools might need more capacity, and which storage pools are at risk because too much capacity is committed to the thin-provisioned volumes.

- [Investigating capacity trends for volumes](#)

Use the capacity charts and the information that is shown in the tables to check the rate at which the thin-provisioned volumes consume capacity, the compression savings for the volumes that were converted to compressed volumes, and the changes in the distribution of Easy Tier® volumes across the SSD, Enterprise HDD, and Nearline HDD drives.

- [Investigating capacity trends for file systems](#)

Use the capacity charts and the information that is shown in the tables for the file systems to check which file systems have the highest growth rates and which file systems might require additional capacity.

- [Investigating capacity trends for file system pools](#)

Use the capacity charts and the information that is shown in the tables for the file system pools in your storage systems to check which storage pools have the highest growth rates so that you can plan future storage requirements.

- [Investigating capacity trends for filesets](#)

Use the capacity charts to check which filesets have the highest growth rates in your file storage systems.

- [Investigating capacity trends for containers](#)

Use the capacity charts to check which containers have the highest growth rates in your object storage systems.

- [Investigating capacity trends for tiers](#)

Use the capacity charts and the information that is shown in the tables to check which tiers have the highest growth rates and which tiers might require more capacity.

- [Controls for capacity views](#)

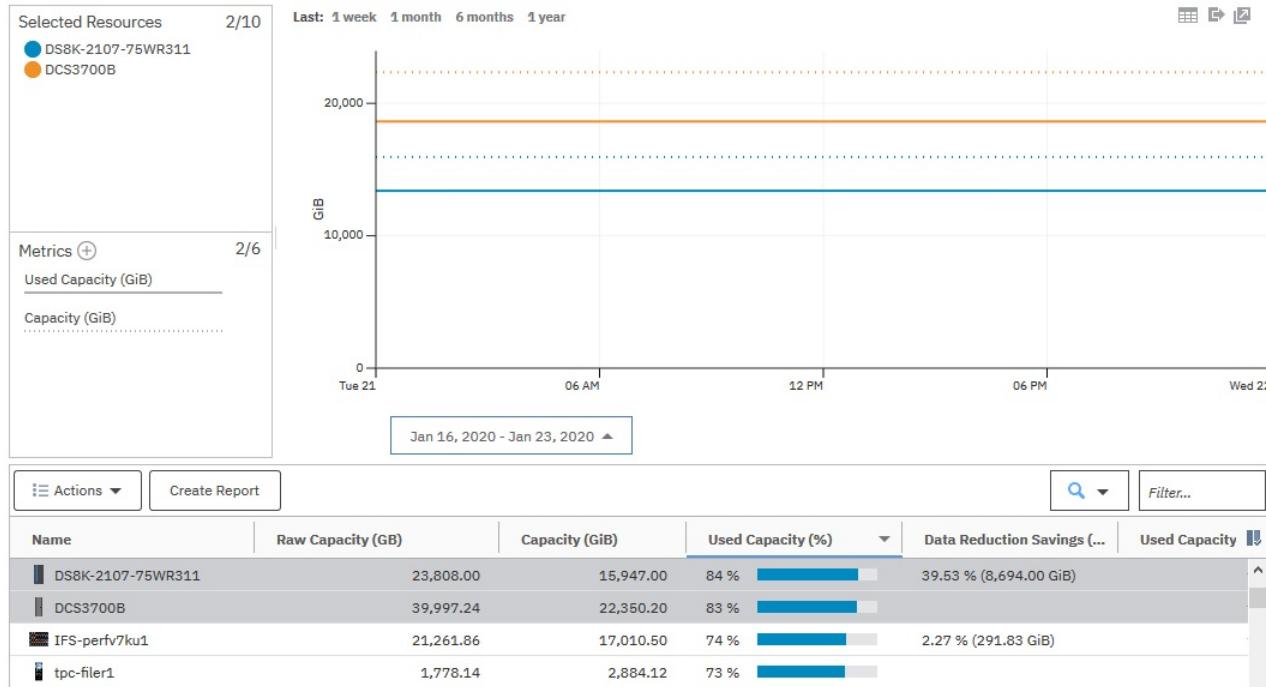
Each capacity view includes controls for customizing how information is displayed. The type of view and the resources that you are viewing determine which controls are available.

Investigating capacity trends for block storage systems

Use the capacity charts and the information that is shown in the tables for the block storage systems to check which storage systems have the highest growth rates and which storage systems might need more capacity.

Procedure

1. From the Resources menu, click Block Storage Systems.
2. Click Capacity and select the storage systems and the capacity metrics that you want to review.



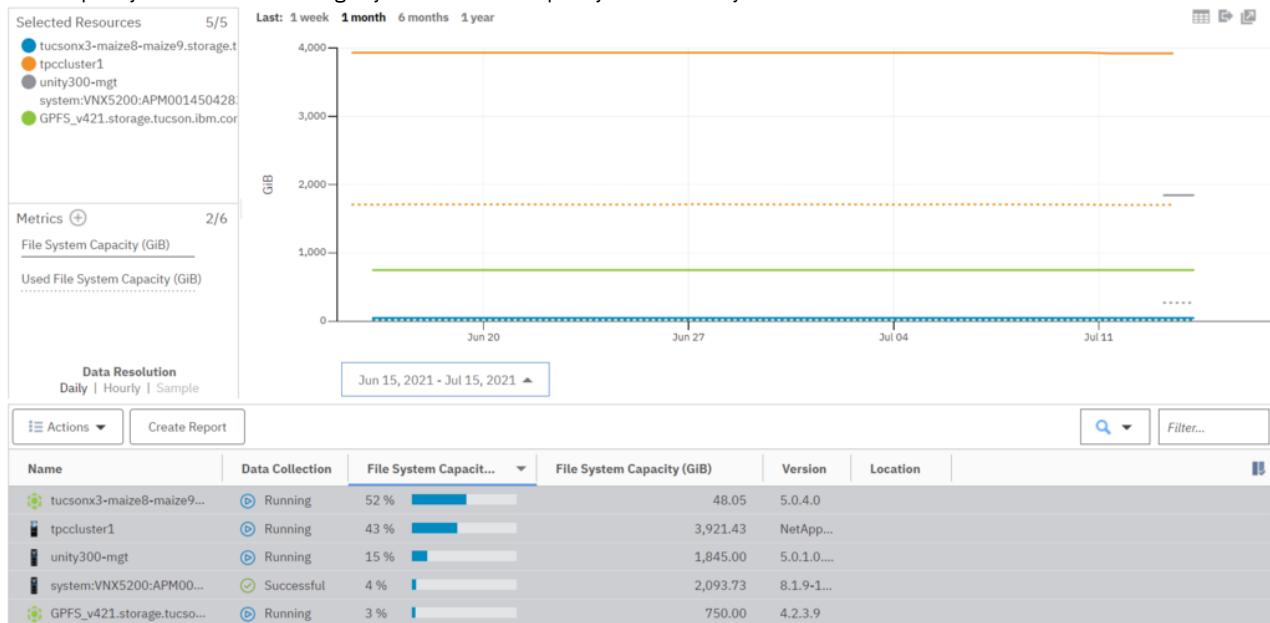
Tip: To check which pools consume the most storage, right-click the storage systems and click Capacity.

Investigating capacity trends for file storage systems

Use the capacity charts and the information that is shown in the tables for the file storage systems to check which storage systems have the highest growth rates and which storage systems might need more capacity.

Procedure

1. From the Resources menu, click File Storage Systems.
2. Click Capacity and select the storage systems and the capacity metrics that you want to review.



Investigating capacity trends for object storage systems

Use the capacity charts and the information that is shown in the tables for the object storage systems to check which storage systems have the highest growth rates and which storage systems might need more capacity.

Procedure

1. From the Resources menu, click Object Storage Systems.
2. Click Capacity and select the storage systems and the capacity metrics that you want to review.

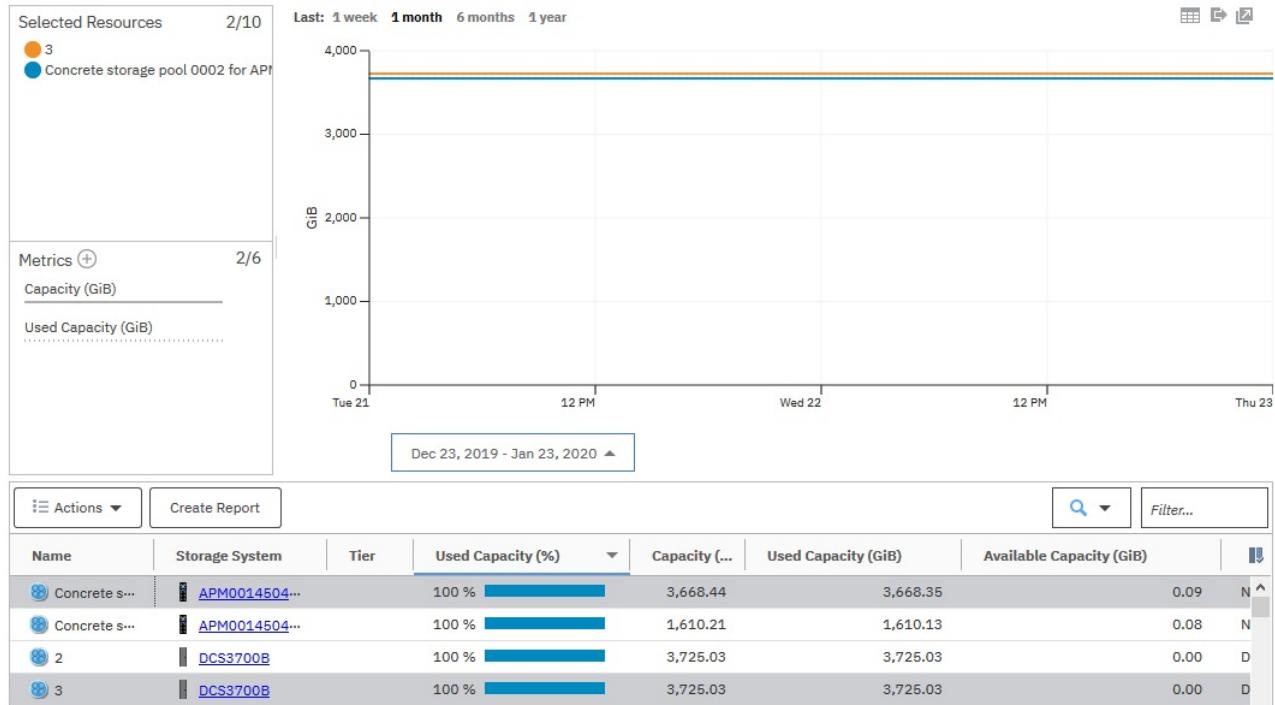


Investigating capacity trends for block storage pools

Use the capacity charts and the information that is shown in the tables for the block storage pools to check which storage pools have the highest growth rates, which storage pools might need more capacity, and which storage pools are at risk because too much capacity is committed to the thin-provisioned volumes.

Procedure

1. From the Resources menu, click Block Storage Systems.
2. Right-click the storage system and click View Details.
3. In the navigation pane, click Pools.
4. Click Capacity and select the pools and the capacity metrics that you want to review.



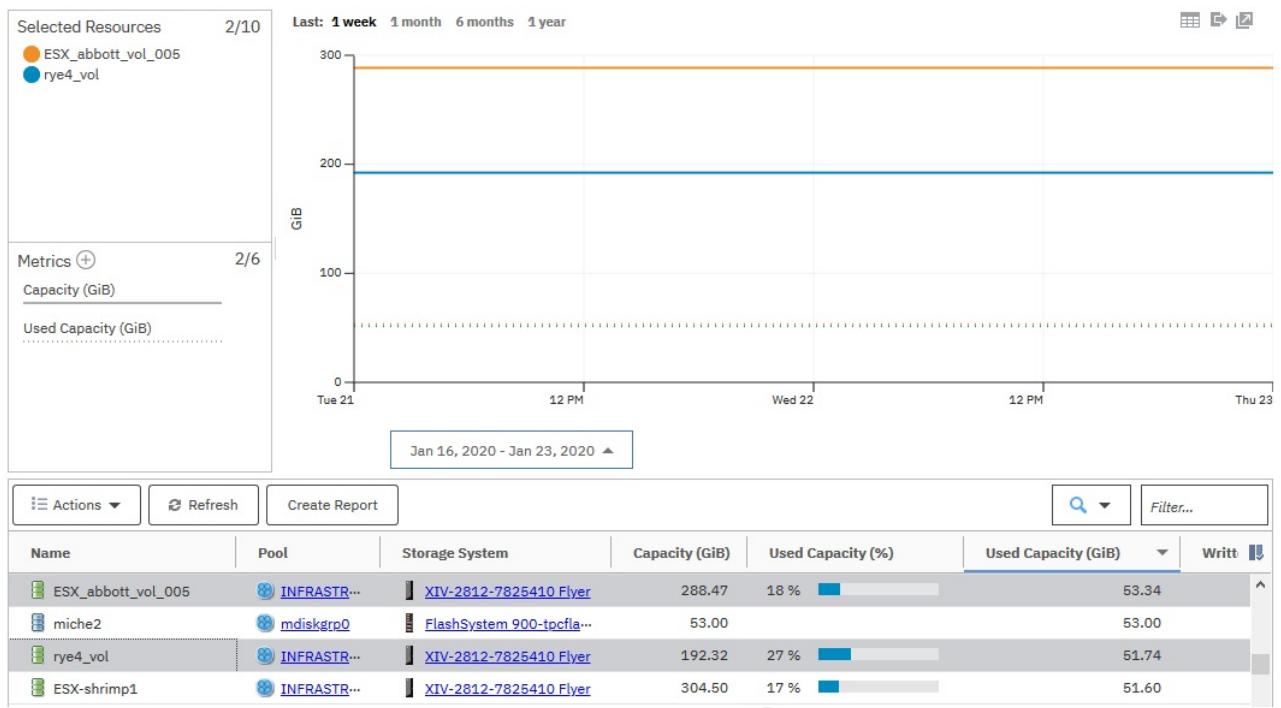
Tip: To investigate the pools with the highest shortfall rates, right-click the pools in the table and click Volume Capacity.

Investigating capacity trends for volumes

Use the capacity charts and the information that is shown in the tables to check the rate at which the thin-provisioned volumes consume capacity, the compression savings for the volumes that were converted to compressed volumes, and the changes in the distribution of Easy Tier® volumes across the SSD, Enterprise HDD, and Nearline HDD drives.

Procedure

1. From the Resources menu, click Block Storage Systems.
2. Right-click the storage system and click View Details.
3. In the navigation pane, click Volumes.
4. Click Capacity and select the volumes and the capacity metrics that you want to review.



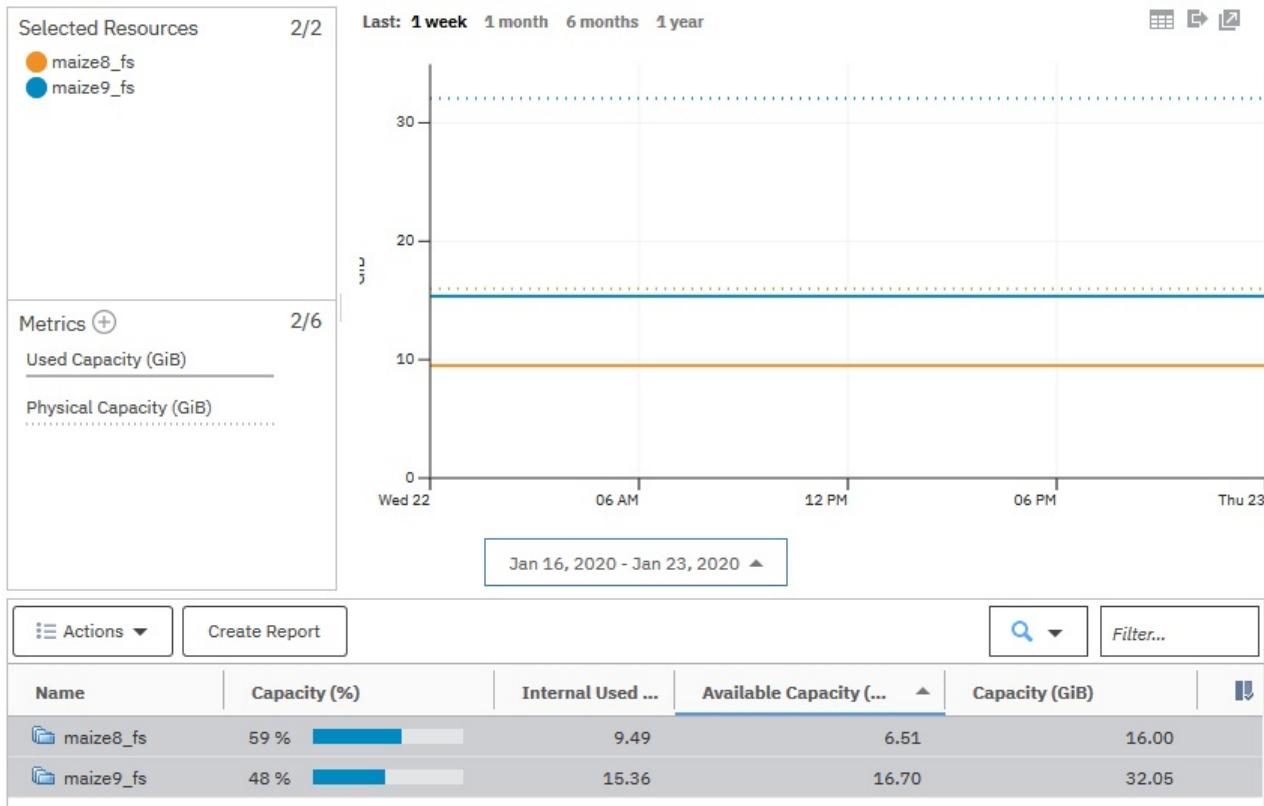
Tip: To check the distribution of Easy Tier volumes, click Select Chart Metrics and add the Easy Tier metrics to the chart.

Investigating capacity trends for file systems

Use the capacity charts and the information that is shown in the tables for the file systems to check which file systems have the highest growth rates and which file systems might require additional capacity.

Procedure

1. From the Resources menu, click File Storage Systems.
2. Right-click the storage system and click View Details.
3. In the navigation menu, click File Systems.
4. Click Capacity and select the file systems and the capacity metrics that you want to review.



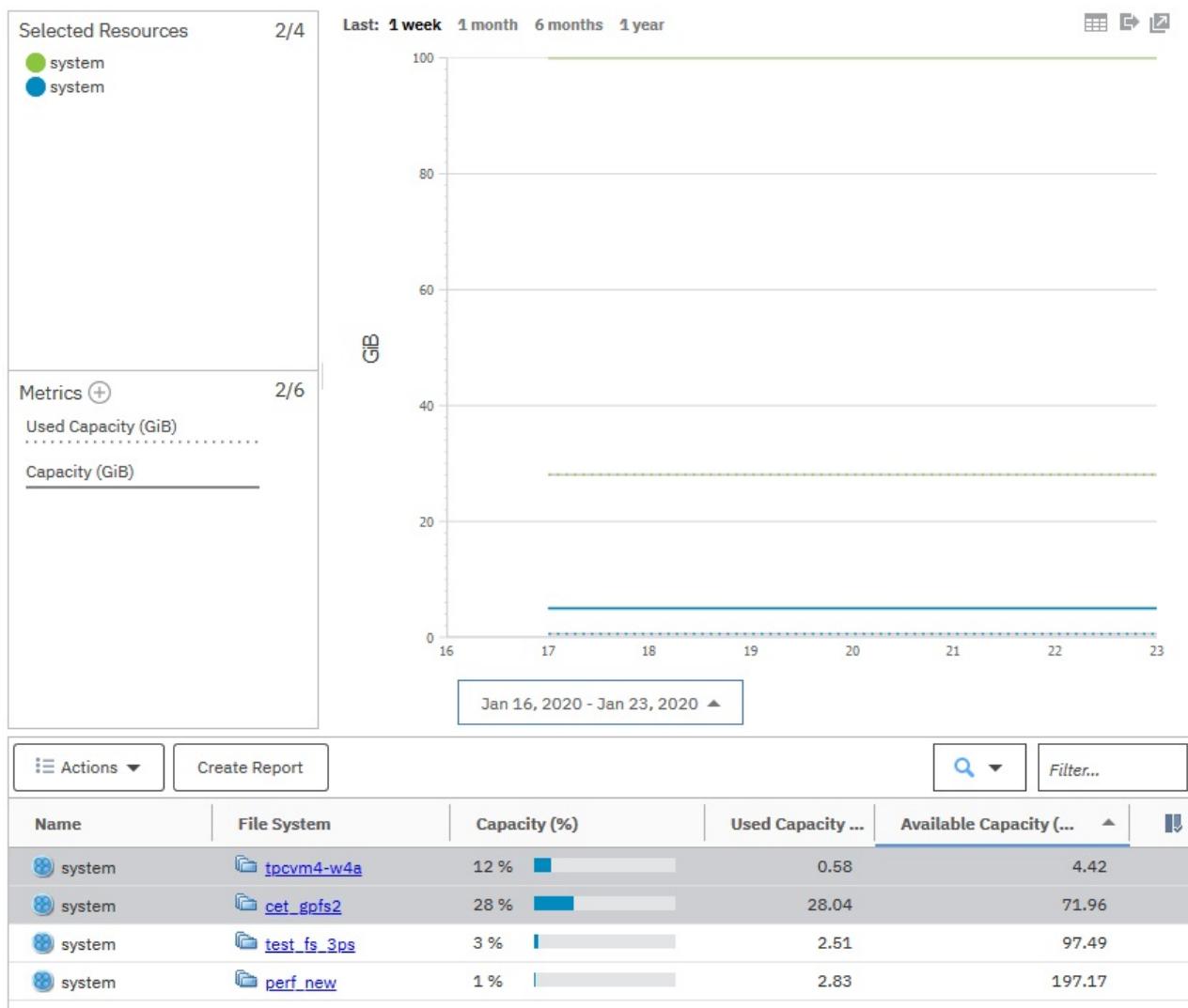
Tip: To check which pools consume the most storage, right-click the file systems and click File System Pool Capacity.

Investigating capacity trends for file system pools

Use the capacity charts and the information that is shown in the tables for the file system pools in your storage systems to check which storage pools have the highest growth rates so that you can plan future storage requirements.

Procedure

1. From the Resources menu, click File Storage Systems.
2. Right-click the storage system and click View Details.
3. In the navigation menu, click File System Pools.
4. Click Capacity and select the pools and the capacity metrics that you want to review.

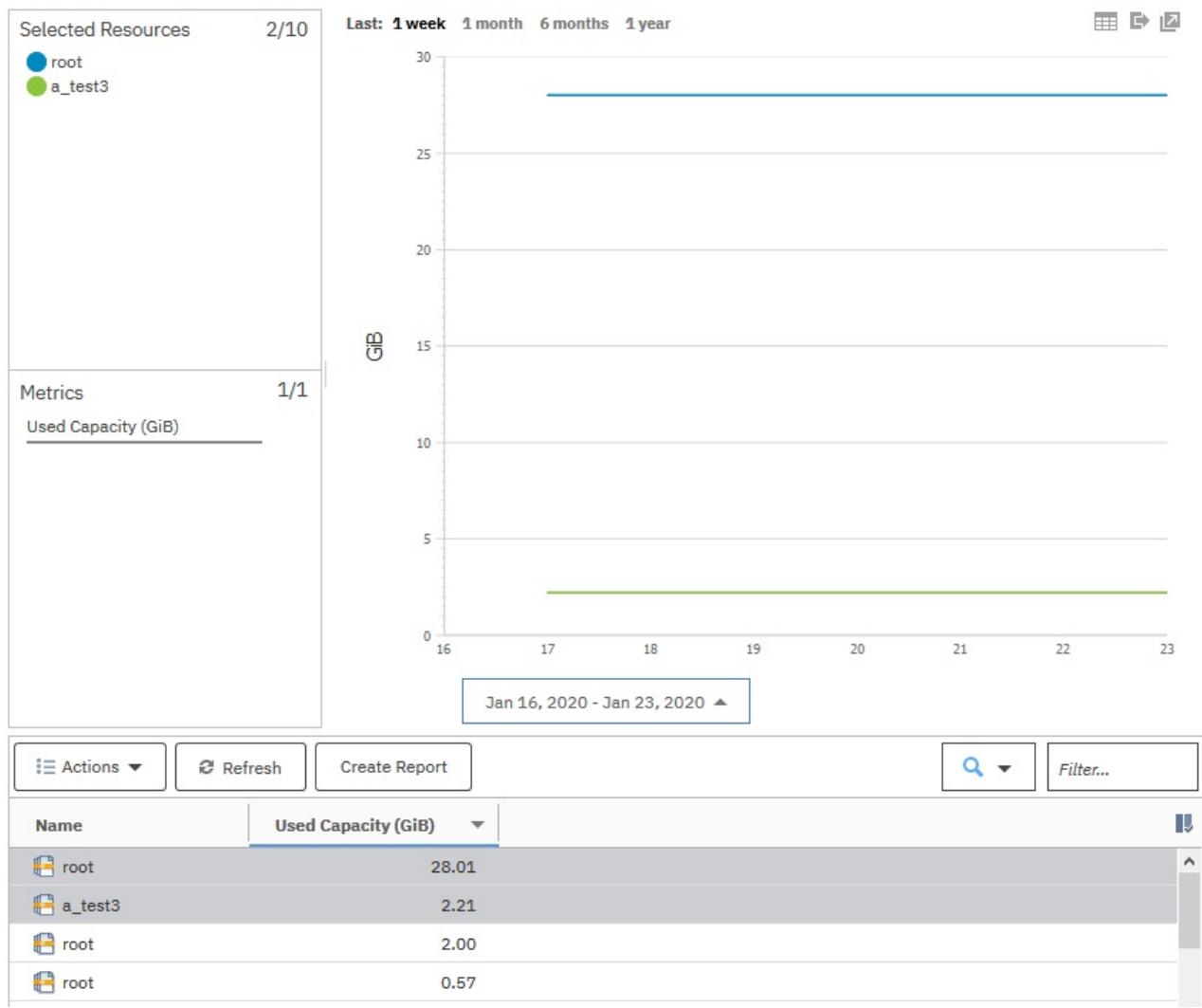


Investigating capacity trends for filesets

Use the capacity charts to check which filesets have the highest growth rates in your file storage systems.

Procedure

1. From the Resources menu, click File Storage Systems.
2. Right-click the storage system and click View Details.
3. In the navigation menu, click Filesets.
4. Click Capacity and select the filesets that you want to review.

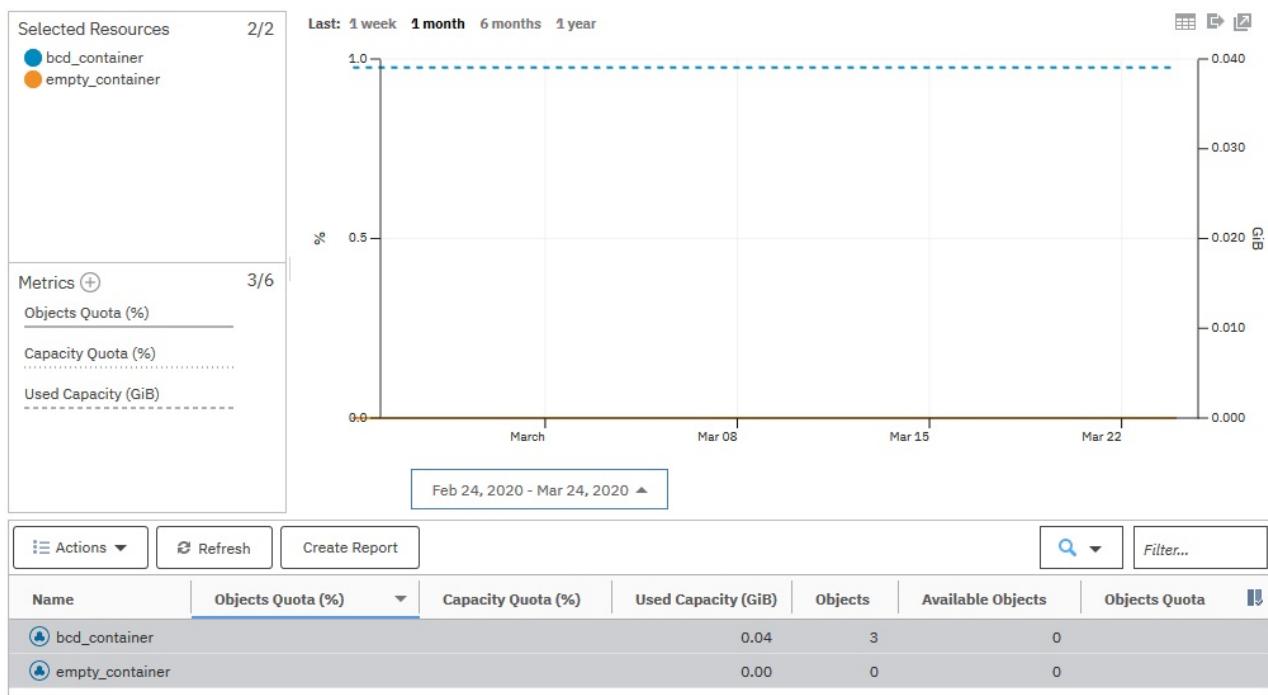


Investigating capacity trends for containers

Use the capacity charts to check which containers have the highest growth rates in your object storage systems.

Procedure

1. From the Resources menu, click Object Storage Systems.
2. Right-click the storage system and click View Details.
3. In the navigation menu, click Containers.
4. Click Capacity and select the objects that you want to review.



Investigating capacity trends for tiers

Use the capacity charts and the information that is shown in the tables to check which tiers have the highest growth rates and which tiers might require more capacity.

Procedure

1. From the Configuration menu, click Tiers.
2. Click Capacity.

Controls for capacity views

Each capacity view includes controls for customizing how information is displayed. The type of view and the resources that you are viewing determine which controls are available.



View chart

View capacity information in a chart format. The chart shows a visual representation of how resource capacity trends over time. Each line on the chart represents a metric and a resource. The y-axis shows the unit of measurement for a metric. If more metrics were selected with a different unit of measurement, an extra y-axis is shown on the right side of the chart window.

Hover the mouse pointer over points on a line to view a snapshot of capacity information at a specific time.



View table

View capacity information in a table format. Each row represents a resource and a time stamp. Each column represents a metric. You can view other metrics and information for a resource by right-clicking anywhere in the header row for the table and selecting more columns. The type of resource determines the metrics and information that are available.



Metrics

Add metrics to the capacity chart. On the Select Chart Metrics dialog, the metrics that are available depend on the type of resource that is being shown in the chart. The number next to the name of the metrics type represents the number of metrics that are currently selected.

You can select multiple metrics at the same time, but you cannot include more than two unit types in the same view. For example, if you select metrics that use % and ops/s as units of measurement, you cannot select more metrics that use different units of measurement such as KiB/op or MiB/s.



Hide and show resources

When the chart includes multiple resources, you can click the icon next to a resource to show only the line for that resource. Each icon is shown in a different color to match the color of line for the resource.

You can also show and hide resources in the chart by selecting resources in the chart legend. To select multiple resources at the same time, press Shift or Ctrl and click those resources. Press Shift and click to select consecutive rows in the legend; press Ctrl and click to select non-consecutive rows.

You can show up to 10 resources in a chart at the same time.

Specify a time range

The time range of the capacity information is shown below the chart. You can change this range to display information for different times when data was collected. When you first access the capacity view, the default time range is the last month.

Ensure that capacity data was collected during the time range that you select. If data was not collected during the time range, the chart and table are blank. If data collection was interrupted during the time range, the chart and table show gaps for the time increments when data was not collected.

For example, if you select a time range for the last 7 days, but data was not collected on days 4 and 5, the lines in the chart do not show data for days 4 and 5.



Export information about the chart to a file

Export information on a capacity view to a CSV file.



Open the capacity view in a separate web browser window

Open a duplicate of the current capacity view in a separate web browser window. You can change the information that is displayed in this separate window while retaining the original capacity view for comparison.

Actions for managing the resources in the chart legend

The chart legend in bottom section of the view shows more information about the selected resources. This information is organized into rows and columns, where each row represents a resource.

When you select one or more resources in the legend, the following actions are available in the Actions menu:

View Properties

View key details about a resource, including asset, status, configuration, and capacity information.

View resource Capacity

View the capacity of resources that are internal or related to a resource in the chart legend. For example, when you view the capacity of a SAN Volume Controller, you can right-click it and view the capacity of its internal resources, such as pools.

Information about an internal or related resource is shown in a separate web browser window. This window uses the same time range as the capacity view in the main window of the GUI.

Capacity and space metrics

To review trends in capacity and space usage for storage, you add metrics to capacity charts. Use the charts to help you decide whether you need more capacity and to get insights into space usage trends.

Time zone determination: The time zone of the browser that you use to access IBM® Storage Insights determines when the data is collected and the date and time that is shown in the chart and table views.

- **Capacity metrics for block storage systems**

To review trends in capacity and space usage for storage, you add metrics to capacity charts. You use the charts to detect capacity shortages and space usage trends.

- **Capacity metrics for file storage systems**

To review trends in capacity and space usage for file storage systems, you add metrics to capacity charts. You use the charts for filesets, file systems, and file system pools to detect capacity shortages and space usage trends.

- **Capacity metrics for object storage systems**

To review trends in capacity and space usage for object storage systems, you add metrics to capacity charts. Use the charts for containers to detect capacity shortages and space usage trends for the containers in your object storage systems.

- **Capacity metrics for tiers**

Review trends in the capacity and space usage for tiers. You use the charts to detect capacity shortages and space usage for the tiers in your storage environment.

Capacity metrics for block storage systems

To review trends in capacity and space usage for storage, you add metrics to capacity charts. You use the charts to detect capacity shortages and space usage trends.

Alphabetical lists of the capacity and space usage metrics that you can add to charts are provided in the following sections:

- [Storage system capacity metrics](#)
- [Pool capacity metrics](#)
- [Volume capacity metrics](#)

Tip: IBM® Storage Insights Pro displays capacity values in base 2 (GiB), while the XIV® management GUI displays capacity values in base 10 (GB, TB). Even though different units of measurement are used, the storage values are equivalent.

Storage system capacity metrics

To detect capacity shortages and investigate space usage trends, you can add the following metrics to the capacity chart for storage systems:

Adjusted Used Capacity (%)

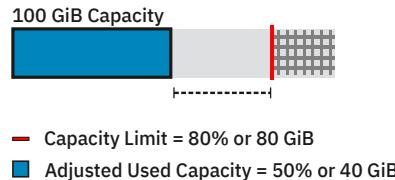
The amount of capacity that can be used without exceeding the capacity limit.

Example: Adjusted Used Capacity

Before Capacity Limit Was Set



After Capacity Limit Was Set



The formula for calculating Adjusted Used Capacity (%) is $(\text{Used Capacity in GiB}/\text{Capacity Limit in GiB}) * 100$. For example, if the capacity is 100 GiB, the used capacity is 40 GiB, and the capacity limit is 80% or 80 GiB, then the value for Adjusted Used Capacity (%) is $(40 \text{ GiB}/80 \text{ GiB}) * 100$ or 50%. So, in this example, you can use 30% or 40 GiB of the usable capacity of the resource before you reach the capacity limit.

If the used capacity exceeds the capacity limit, the value for Adjusted Used Capacity (%) is over 100%.

To add the Adjusted Used Capacity (%) column, right-click any column heading on the Block Storage Systems page.

See these related values for more information Capacity Limit (%), and Capacity-to-Limit (GiB).

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Available Capacity (GiB)

(Previously known as Available Pool Space) The total amount of the space in the pools that is not used by the volumes in the pools. To calculate available capacity, the following formula is used:

(pool capacity - used capacity)

For XIV systems, pool capacity is the physical capacity of the pools and does not include the provisioned capacity of the pools.
Availability: All storage systems.

Available Volume Capacity (GiB)

(Previously known as Effective Unallocated Volume Space) The total amount of remaining space that can be used by the volumes in the pools. The following formula is used to calculate this value:

[Provisioned Capacity - Used Capacity]

The capacity that is used by thin-provisioned volumes is typically less than their provisioned capacity. Therefore, the available capacity represents the difference between the provisioned capacity and the used capacity for all the volumes in the pools.
Availability: All storage systems.

Capacity (GiB)

(Previously known as Pool Capacity) The total amount of storage space in the pools. For XIV systems and IBM Spectrum® Accelerate, capacity represents the physical ("hard") capacity of the pool, not the provisioned ("soft") capacity. Pools that are allocated from other pools are not included in the total pool space.

Availability: All storage systems.

Capacity Limit (%) and Capacity Limit (GiB)

The limit that was set on the capacity that is used by your storage systems. For example, the policy of your company is to keep 20% of the usable capacity of your storage systems in reserve. So, you log into the GUI as Administrator and set the capacity limit to 80%.

Example: Administrator Sets Capacity Limit to 80%



Click the illustration above to find out how to set capacity limits.

The GiB value for the capacity limit for the storage system is calculated when you set the value for the Capacity Limit (%).

To add the Capacity Limit (%) and the Capacity Limit (GiB) columns, right-click any column heading on the Block Storage Systems page.

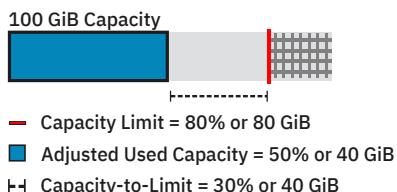
See these related values for more information Adjusted Used Capacity (%) and Capacity-to-Limit (GiB).

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Capacity-to-Limit (GiB)

The amount of capacity that is available before the capacity limit is reached.

Example: Capacity-to-Limit



The formula for calculating Capacity-to-Limit (GiB) is (Capacity Limit in GiB - Used Capacity in GiB). For example, if the capacity limit is 80% or 80 GiB and the used capacity is 40 GiB, then the value for Capacity-to-Limit (GiB) is (80 GiB - 40 GiB or 80% - 50%) which is 30% or 40 GiB.

See these related values for more information Capacity Limit (%) and Adjusted Used Capacity (%).

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Compression Savings (%)

The estimated amount and percentage of capacity that is saved by using data compression, across all pools on the storage system.

The percentage is calculated across all compressed volumes in the pools and does not include the capacity of non-compressed volumes.

For storage systems with drives that use inline data compression technology, the Compression Savings does not include the capacity savings that are achieved at the drive level.

The following formula is used to calculate the amount of storage space that is saved:

`written capacity - compressed size`

The following formula is used to calculate the percentage of capacity that is saved:

`((written capacity - compressed size) ÷ written capacity) × 100`

For example, the written capacity, which is the amount of data that is written to the volumes before compression, is 40 GiB. The compressed size, which reflects the size of compressed data that is written to disk, is just 10 GiB. Therefore, the compression savings percentage across all compressed volumes is 75%.

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

For FlashSystem A9000 and FlashSystem A9000R, all volumes in the pools are compressed.

Deduplication Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication, across all data reduction pools on the storage system. The percentage is calculated across all deduplicated volumes in the pools and does not include the capacity of volumes that are not deduplicated.

The following formula is used to calculate the amount of storage space that is saved:

`written capacity - deduplicated size`

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{written capacity} - \text{deduplicated size}) \div \text{written capacity}) \times 100$$

For example, the written capacity, which is the amount of data that is written to the volumes before deduplication, is 40 GiB. The deduplicated size, which reflects the size of deduplicated data that is written to disk, is just 10 GB. Therefore, data deduplication reduced the size of the data that is written by 75%.

Availability: FlashSystem A9000, FlashSystem A9000R, and resources that run IBM Spectrum Virtualize version 8.1.3 or later.

Drive Compression Savings (%)

The amount and percentage of capacity that is saved with drives that use inline data compression technology. The percentage is calculated across all compressed drives in the pools.

The amount of storage space that is saved is the sum of drive compression savings.

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{used written capacity} - \text{compressed size}) \div \text{used written capacity}) \times 100$$

Availability: Storage systems that contain IBM FlashCore® Modules with hardware compression.

Mapped Capacity (GiB)

(Previously known as Assigned Volume Space) The total volume space in the storage system that is mapped or assigned to host systems, including child pool capacity.

Availability: All storage systems.

Overprovisioned Capacity (GiB)

(Previously known as Unallocatable Volume Space) The capacity that cannot be used by volumes because the physical capacity of the pools cannot meet the demands for provisioned capacity. The following formula is used to calculate this value:

$$[\text{Provisioned Capacity} - \text{Capacity}]$$

Availability: All storage systems.

Provisioned Capacity (%)

(Previously known as Virtual Allocation) The percentage of the physical capacity that is committed to the provisioned capacity of the volumes in the pool. If the value exceeds 100%, the physical capacity doesn't meet the demands for provisioned capacity. The following formula is used to calculate this value:

$$[(\text{Provisioned Capacity} \div \text{Capacity}) \times 100]$$

Example: If the provisioned capacity percentage is 200% for a total storage pool size of 15 GiB, then the provisioned capacity that is committed to the volumes in the pool is 30 GiB. This configuration means that twice as much space is committed than is physically contained in the pool. If the provisioned capacity percentage is 100% for the same pool, then the provisioned capacity that is committed to the pool is 15 GiB. This configuration means that all the physical capacity of the pool is already used by volumes. A provisioned capacity percentage that is higher than 100% is considered aggressive because insufficient physical capacity is available in the pool to satisfy the maximum allocation for all the thin-provisioned volumes in the pool. In such cases, you can use the value for Shortfall (%) to estimate how critical the shortage of space is for a pool.

Availability: All storage systems.

Provisioned Capacity (GiB)

(Previously known as Total Volume Capacity)

The total amount of provisioned capacity of volumes within the pool. If the pool is a parent pool, it also includes the storage space that can be made available to the volumes in the child pools.

Availability: All storage systems.

Safeguarded Capacity (GiB)

The total amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000®.

Shortfall (%)

The percentage of space that is over committed to the pools with thin-provisioned volumes. For example, you commit 100 GiB of space to a thin-provisioned volume in a pool with a capacity of 50 GiB. As the space is used by the thin-provisioned volume in increments of 10 GiB, the space available for allocation decreases and the shortfall in capacity becomes more acute.

To calculate the shortfall, the following formula is used:

$$[(\text{overprovisioned capacity} \div \text{committed but available capacity}) \times 100]$$

A shortfall occurs when you commit more space to the volumes in the pools than is physically available to the pools. If the physical space available to the pools is less than the committed provisioned capacity, then the pools do not have enough space to fulfill the commitment to the provisioned capacity.

For example, the physical capacity of the pools is 70 GiB, but 150 GiB of provisioned capacity was committed to the thin-provisioned volumes. If the volumes are using 50 GiB, then 100 GiB is still committed to those volumes (150 GiB – 50 GiB) with only 20 GiB of

available pool space (70 GiB – 50 GiB). Because only 20 GiB of the pool space is available, 80 GiB of the committed space cannot be allocated (100 GiB - 20 GiB). In this case, the percentage of committed space that is unavailable is 80% [(80 GiB ÷ 100 GiB) × 100]. Availability: DS8000, FlashSystem storage systems, SAN Volume Controller, Storwize® family storage systems that are configured with block storage, XIV systems, Dell EMC VMAX, VNX, and VNXe storage systems, and IBM Spectrum Accelerate storage systems.

Total Capacity Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication, pool compression, thin provisioning, and drive compression, across all volumes in the pool.

The following formula is used to calculate the amount of storage space that is saved:

[Provisioned Capacity – Used Capacity]

The following formula is used to calculate the percentage of capacity that is saved:

((Provisioned Capacity – Used Capacity) ÷ Provisioned Capacity) × 100

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

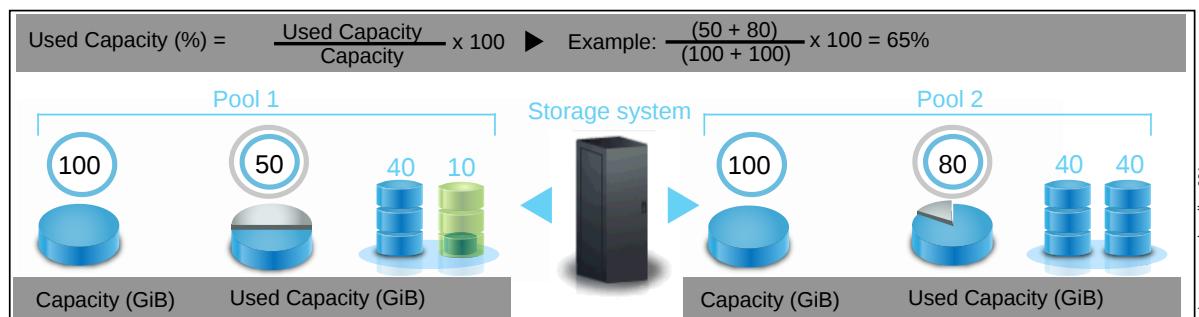
Unmapped Capacity (GiB)

(Previously known as Unassigned Volume Space) The total amount of space in the volumes that are not assigned to hosts.

Availability: All storage systems.

Used Capacity (%)

(Previously known as Physical Allocation)



The percentage of physical capacity in the pools that is used by the standard-provisioned volumes, the thin-provisioned volumes, and the volumes in child pools. Check the value for used capacity percentage to see:

- Whether the physical capacity of the pools is fully allocated. That is, the value for used capacity is 100%.
- Whether you have sufficient capacity to provision new volumes with storage
- Whether you have sufficient capacity to allocate to the compressed and thin-provisioned volumes in the pools

Availability: All storage systems.

Used Capacity (GiB)

(Previously known as Allocated Space) The amount of space that is used by the standard- and thin-provisioned volumes in the pools. If the pool is a parent pool, the amount of space that is used by the volumes in the child pools is also calculated.

The capacity that is used by for thin-provisioned volumes is less than their provisioned capacity, which is shown in the Provisioned Capacity (GiB) column. If a pool doesn't have thin-provisioned volumes, the value for used capacity is the same as the value for provisioned capacity.

Availability: All storage systems.

Pool capacity metrics

If sufficient data is collected, you can view charts that compare the capacity, used capacity, and available capacity of the pools in your data center.

In the Zero Capacity column on the Pools page, you can see the date, based on the storage usage trends for the pool, when the pool will run out of available capacity.

Zero Capacity: The capacity information that is collected over 180 days is analyzed to determine, based on historical storage consumption, when the pools will run out of capacity. The pools that have already run out of capacity are marked as depleted. For the other pools, a date is provided so that you know when the pools are projected to run out of capacity. If sufficient information isn't collected to analyze the storage usage of the pool, None is shown as the value for zero capacity. If a capacity limit is set for the pool, the date shown in the Zero Capacity column is the date when the available capacity based on the capacity limit will be depleted. For example, if the capacity limit for a

100 GiB pool is 80%, it is the date when the available capacity of the pool is less than 20 GiB. Depleted is shown in the column when the capacity limit is reached.

To detect capacity shortages and investigate trends in storage usage, you can add the following metrics to the capacity chart for pools:

Adjusted Used Capacity (%)

The amount of capacity that can be used without exceeding the capacity limit.

Example: Adjusted Used Capacity

Before Capacity Limit Was Set

100 GiB Capacity



After Capacity Limit Was Set

100 GiB Capacity



- Used Capacity = 40 GiB
- Available Capacity = 60 GiB

- Capacity Limit = 80% or 80 GiB
- Adjusted Used Capacity = 50% or 40 GiB
- Capacity-to-Limit = 30% or 40 GiB

The formula for calculating Adjusted Used Capacity (%) is (Used Capacity in GiB/Capacity Limit in GiB)*100. For example, if the capacity is 100 GiB, the used capacity is 40 GiB, and the capacity limit is 80% or 80 GiB, then the value for Adjusted Used Capacity (%) is (40 GiB/80 GiB)* 100 or 50%. So, in this example, you can use 30% or 40 GiB of the usable capacity of the resource before you reach the capacity limit.

If the used capacity exceeds the capacity limit, the value for Adjusted Used Capacity (%) is over 100%.

To add the Adjusted Used Capacity (%) column, right-click any column heading on the Pools page.

See these related values for more information Capacity Limit (%) and Capacity-to-Limit (GiB).

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Available Capacity (GiB)

(Previously known as Available Pool Space) The amount of physical space that is available in the pool. If the pool is a parent pool, the amount of space that is used by the volumes in the child pools is also included.

Availability: All storage systems. For FlashSystem A9000 and FlashSystem A9000R, this value represents provisioned capacity rather than physical space.

Available Repository Capacity (GiB)

The available, unallocated storage space in the repository for Track Space-Efficient (TSE) thin-provisioning.

Availability: DS8000 thin-provisioned pools.

Available Soft Capacity (GiB)

The amount of virtual storage space that is available to allocate to volumes in a storage pool.

Availability: XIV systems, and IBM Spectrum Accelerate storage systems.

Available Written Capacity (GiB)

(Previously known as Effective Used Capacity) The amount of capacity that can be written to the pools before inline compression is applied. If the pools are not compressed, this value is the same as Available Capacity.

Important: Because data compression is very efficient, a pool can run out of Available Written Capacity while physical capacity is still available. To stay aware of your capacity needs, monitor this value and Available Capacity.

Capacity (GiB)

The total amount of storage space in the pool. For XIV systems and IBM Spectrum Accelerate, capacity represents the physical or ("hard") capacity of the pool, not the provisioned ("soft") capacity.

Availability: All storage systems.

Capacity Limit (%) and Capacity Limit (GiB)

The limit that was set on the capacity that is used by your pools. For example, the policy of your company is to keep 20% of the usable capacity of your pools in reserve. So, you log into the GUI as Administrator and set the capacity limit of your pools to 80%.

Example: Administrator Sets Capacity Limit to 80%



Click the illustration above to find out how to set capacity limits.

The GiB value for the capacity limit for the pool is calculated when you set the value for the Capacity Limit (%).

To add the Capacity Limit (%) and the Capacity Limit (GiB) columns, right-click any column heading on the Pools page.

See these related values for more information Adjusted Used Capacity (%) and Capacity-to-Limit (GiB).

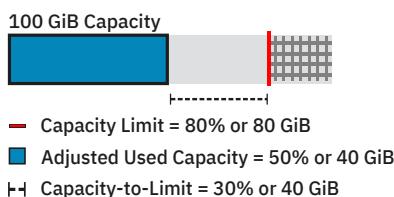
Zero capacity: When you set the capacity limit for pools, the values shown for Zero Capacity are readjusted to take into account the capacity limit of the pool. The date will represent when the capacity limit of the pool is reached. If the pool has already reached the capacity limit, Depleted is shown. None is shown when a trend in storage consumption can't be detected because the pool's storage isn't being consumed or because not enough data was collected to predict storage consumption.

Availability: This metric is not available for all storage systems, such as Dell EMC VMAX.

Capacity-to-Limit (GiB)

The amount of capacity that is available before the capacity limit is reached.

Example: Capacity-to-Limit



The formula for calculating Capacity-to-Limit (GiB) is (Capacity Limit in GiB - Used Capacity in GiB). For example, if the capacity limit is 80% or 80 GiB and the used capacity is 40 GiB, then the value for Capacity-to-Limit (GiB) is (80 GiB - 40 GiB or 80% - 50%) which is 30% or 40 GiB.

See these related values for more information Capacity Limit (%) and Adjusted Used Capacity (%).

Availability: This metric is not available for all storage systems, such as FlashSystem A9000, FlashSystem A9000R, and Dell EMC VMAX.

Compression Savings (%)

The estimated amount and percentage of capacity that is saved by using data compression. The percentage is calculated across all compressed volumes in the pool and does not include the capacity of non-compressed volumes.

For storage systems with drives that use inline data compression technology, the Compression Savings does not include the capacity savings that are achieved at the drive level.

The following formula is used to calculate the amount of storage space that is saved:

written capacity - compressed size

The following formula is used to calculate the percentage of capacity that is saved:

((written capacity - compressed size) ÷ written capacity) × 100

For example, the written capacity, which is the amount of data that is written to the volumes before compression, is 40 GiB. The compressed size, which reflects the size of compressed data that is written to disk, is just 10 GiB. Therefore, the compression savings percentage across all compressed volumes is 75%.

Availability: IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Deduplication Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication. The percentage is calculated across all deduplicated volumes in the pool and does not include the capacity of volumes that are not deduplicated.

The following formula is used to calculate the amount of storage space that is saved:

written capacity - deduplicated size

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{written capacity} - \text{deduplicated size}) \div \text{written capacity}) \times 100$$

For example, the written capacity, which is the amount of data that is written to the volumes before deduplication, is 40 GiB. The deduplicated size, which reflects the size of deduplicated data that is written to disk, is just 10 GB. Therefore, data deduplication reduced the size of the data that is written by 75%.

Availability: Storage systems that run IBM Spectrum Virtualize version 8.1.3 or later.

Drive Compression Savings (%)

The amount and percentage of capacity that is saved with drives that use inline data compression technology. The percentage is calculated across all compressed drives in the pools.

The amount of storage space that is saved is the sum of drive compression savings.

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{used written capacity} - \text{compressed size}) \div \text{used written capacity}) \times 100$$

Availability: Storage systems that contain IBM FlashCore Modules with hardware compression.

Enterprise HDD Available Capacity (GiB)

The amount of storage space that is available on the Enterprise hard disk drives that can be used by Easy Tier® for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Enterprise HDD Capacity (GiB)

The total amount of storage space on the Enterprise hard disk drives that can be used by Easy Tier for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Mapped Capacity (GiB)

The space on all of the volumes in a pool that are mapped or assigned to host systems. For a thin-provisioning pool, this value includes the provisioned capacity of thin-provisioned volumes, which might exceed the total space in the pool.

Availability: All storage systems.

Nearline HDD Available Capacity (GiB)

The amount of storage space that is available on the Nearline hard disk drives that can be used by Easy Tier for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Nearline HDD Capacity (GiB)

The total amount of storage space on the Nearline hard disk drives that can be used by Easy Tier for re-tiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Overprovisioned Capacity (GiB)

(Previously known as Unallocatable Volume Space) The amount of space that cannot be used by volumes because the physical capacity of the pool cannot meet the demands for provisioned capacity. The following formula is used to calculate this value:

$$[\text{Provisioned Capacity} - \text{Capacity}]$$

In thin-provisioned environments, it is possible to over commit (over provision) storage in a pool by creating volumes with more provisioned capacity than can be physically allocated in the pool. This value represents the amount of volume space that cannot be allocated based on the current capacity of the pool.

Availability: All storage systems.

Provisioned Capacity (%)

(Previously known as Virtual Allocation) The percentage of the physical capacity that is committed to the provisioned capacity of the volumes in the pool. If the value exceeds 100%, the physical capacity doesn't meet the demands for provisioned capacity. The following formula is used to calculate this value:

$$[(\text{Provisioned Capacity} \div \text{Capacity}) \times 100]$$

Example: If the provisioned capacity percentage is 200% for a total storage pool size of 15 GiB, then the provisioned capacity that is committed to the volumes in the pool is 30 GiB. This configuration means that twice as much space is committed than is physically contained in the pool. If the provisioned capacity percentage is 100% for the same pool, then the provisioned capacity that is committed to the pool is 15 GiB. This configuration means that all the physical capacity of the pool is already used by volumes.

A provisioned capacity percentage that is higher than 100% is considered aggressive because insufficient physical capacity is available in the pool to satisfy the maximum allocation for all the thin-provisioned volumes in the pool. In such cases, you can use the value for Shortfall (%) to estimate how critical the shortage of space is for a pool.

Availability: All storage systems.

Provisioned Capacity (GiB)

(Previously known as Total Volume Capacity) The total amount of storage capacity that can be made available to the standard- and thin-provisioned volumes in the pool. If the pool is a parent pool, it also includes the storage capacity that can be made available to the volumes in the child pools.

Availability: All storage systems.

Repository Capacity (GiB)

The total storage capacity of the repository for Track Space-Efficient (TSE) thin-provisioning.

Availability: DS8000 thin-provisioned pools.

Reserved Volume Capacity

(Previously known as Unused Space) The amount of pool capacity that is reserved but has not been used yet to store data on the thin-provisioned volume.

Availability: Resources that run IBM Spectrum Virtualize.

Safeguarded Capacity (GiB)

The total amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000.

SCM Available Capacity (GiB)

The available capacity on Storage Class Memory (SCM) drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: IBM Spectrum Virtualize systems, such as FlashSystem 9100, FlashSystem 7200, and Storwize family storage systems that are configured with block storage.

SCM Capacity (GiB)

The total capacity on Storage Class Memory (SCM) drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: IBM Spectrum Virtualize systems, such as FlashSystem 9100, FlashSystem 7200, and Storwize family storage systems that are configured with block storage.

Shortfall (%)

The percentage of space that is over committed to pools with thin-provisioned volumes. For example, you commit 100 GiB of space to a thin-provisioned volume in a pool with a capacity of 50 GiB. As the space is used by the thin-provisioned volume in increments of 10 GiB, the space available for allocation decreases and the shortfall in capacity becomes more acute.

If the pool is not thin-provisioned, the shortfall percentage equals zero. If shortfall percentage isn't calculated for the storage system, the field is left blank.

You can use this percentage to determine when the amount of over-committed space in a pool is at a critically high level.

Specifically, if the physical space in a pool is less than the committed provisioned capacity, then the pool does not have enough space to fulfill the commitment to provisioned capacity. This value represents the percentage of the committed provisioned capacity that is not available in a pool. As more space is used over time by volumes while the pool capacity remains the same, this percentage increases.

[View a short animation about how Shortfall works.](#)

Example: The remaining physical capacity of a pool is 70 GiB, but 150 GiB of provisioned capacity was committed to thin-provisioned volumes. If the volumes are using 50 GiB, then 100 GiB is still committed to the volumes (150 GiB – 50 GiB) with a shortfall of 30 GiB (70 GiB remaining pool space – 100 GiB remaining commitment of volume space to the volumes).

Because the volumes are overcommitted by 30 GiB based on the available capacity in the pool, the shortfall is 30%.

Availability: DS8000, FlashSystem storage systems, SAN Volume Controller, Storwize family storage systems that are configured with block storage, XIV systems, and IBM Spectrum Accelerate storage systems.

Soft Capacity (GiB)

The amount of virtual storage space that is configured for the pool.

Availability: XIV systems and IBM Spectrum Accelerate storage systems.

Tier 0 Flash Available Capacity (GiB)

The amount of storage space that is available on the Tier 0 flash solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 0 Flash Capacity (GiB)

The total amount of storage space on the Tier 0 flash solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 1 Flash Available Capacity (GiB)

The amount of storage space that is available on the Tier 1 flash, read-intensive solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 1 Flash Capacity (GiB)

The total amount of storage space on the Tier 1 flash, read-intensive solid-state drives that can be used by Easy Tier for retiering the volume extents in the pool.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 2 Flash Available Capacity (GiB)

The available capacity on Tier 2 flash, high-capacity drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: DS8000 storage systems.

Tier 2 Flash Capacity (GiB)

The total capacity on Tier 2 flash, high-capacity drives in the pool. Easy Tier can use these drives to retier the volume extents in the pool.

Availability: DS8000 storage systems.

Total Capacity Savings (%)

The estimated amount and percentage of capacity that is saved by using data deduplication, pool compression, thin provisioning, and drive compression, across all volumes in the pool.

The following formula is used to calculate the amount of storage space that is saved:

$$\text{Provisioned Capacity} - \text{Used Capacity}$$

The following formula is used to calculate the percentage of capacity that is saved:

$$((\text{Provisioned Capacity} - \text{Used Capacity}) \div \text{Provisioned Capacity}) \times 100$$

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Unmapped Capacity (GiB)

The total amount of space in the volumes that are not assigned to hosts. For a thin-provisioning pool, this value includes the provisioned capacity of thin-provisioned volumes, which might exceed the total space in the pool.

Availability: All storage systems.

Available Volume Capacity (GiB)

(Previously known as Effective Unallocated Volume Space) The total amount of remaining space that can be used by the volumes in the pools. The following formula is used to calculate this value:

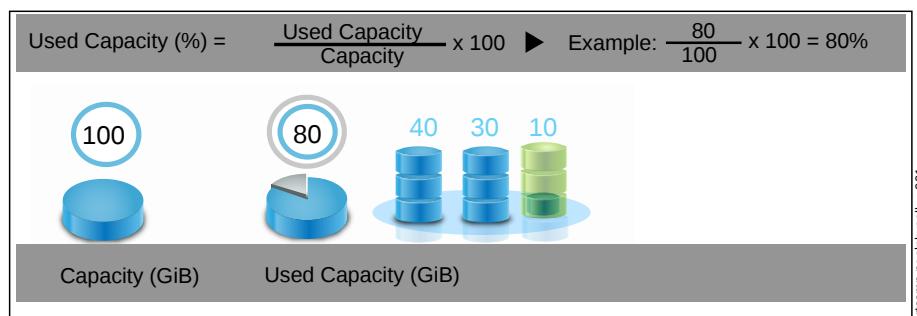
$$[\text{Provisioned Capacity} - \text{Used Capacity}]$$

The capacity that is used by thin-provisioned volumes is typically less than their provisioned capacity. Therefore, the available capacity represents the difference between the provisioned capacity and the used capacity for all the volumes in the pool.

Availability: All storage systems.

Used Capacity (%)

(Previously known as Physical Allocation)



The percentage of physical capacity that is used by the volumes in the pool, including the volumes in child pools. This value is always less than or equal to 100% because you cannot allocate more physical space than is available in a pool. Check the value for used capacity to see:

- Whether the physical capacity of the pool is fully allocated. That is, the value for used capacity is 100%.
- Whether you have sufficient capacity to provision new volumes with storage
- Whether you have sufficient capacity to allocate to the compressed and thin-provisioned volumes in the pool

Availability: All storage systems, except FlashSystem A9000 and FlashSystem A9000R.

Used Capacity (GiB)

(Previously known as Allocated Space) The amount of physical capacity that is used by the volumes in the pool. If the pool is a parent pool, the amount of space that is used by the volumes in the child pools is also included.

The capacity that is used by thin-provisioned volumes is less than their provisioned capacity, which is shown in the Provisioned Capacity column. If a pool does not contain thin-provisioned volumes, this value is the same as Provisioned Capacity.

Availability: All storage systems, except FlashSystem A9000 and FlashSystem A9000R.

Used Written Capacity (%)

(Previously known as Effective Used Capacity) For devices with inline hardware compression, the effective used capacity percentage is the percentage of capacity that is provisioned to the standard-provisioned volumes and the thin-provisioned volumes, given the drive compression savings.

Used Written Capacity (GiB)

(Previously known as Effective Used Capacity) The amount of capacity that is written to the volumes in a pool before inline disk compression is applied. If a pool is not compressed, this value is the same as Used Capacity.

Written Capacity Limit (GiB)

(Previously known as Effective Capacity) The maximum of amount of capacity that can be written to a pool before inline-disk compression is applied. If a pool is not compressed, this value is the same as Capacity.

Volume capacity metrics

You use the capacity chart to detect capacity shortages for the following types of volumes:

- Space-efficient volumes such as compressed volumes and thin-provisioned volumes
- Standard-provisioned volumes that use Easy Tier to re-tier volume extents

You can review the capacity usage by space-efficient volumes to detect capacity shortfalls. You can also review the capacity usage of volumes that use Easy Tier to distribute volume extents across Enterprise HDD, Nearline HDD, and SSD drives.

To detect capacity shortages and investigate capacity usage trends, you can add the following metrics to the chart for volumes:

Capacity (GiB)

The capacity of the compressed or the thin-provisioned volume, which comprises the sum of the used and available capacity. For thin-provisioned volumes in XIV systems pools or IBM Spectrum Accelerate pools, capacity is the physical ("hard") capacity of the volume.

Availability: All storage systems.

Compression Savings (%)

The estimated amount and percentage of capacity that is saved by using data compression.

The following formula is used to calculate the amount of storage space that is saved:

`written capacity - compressed size`

The following formula is used to calculate the percentage of capacity that is saved:

`((written capacity - compressed size) ÷ written capacity) × 100`

Availability: FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.

Exception: For compressed volumes that are also deduplicated, on storage systems that run IBM Spectrum Virtualize, this column is blank.

Enterprise HDD Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Enterprise hard disk drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Nearline HDD Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Nearline hard disk drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Safeguarded Capacity (GiB)

The amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000.

SCM Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Storage Class Memory (SCM) drives.

Availability: IBM Spectrum Virtualize systems, such as FlashSystem 9100, FlashSystem 7200, and Storwize family storage systems that are configured with block storage.

Tier 0 Flash Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Tier 0 flash drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 1 Flash Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Tier 1 flash, read-intensive drives.

Availability: DS8000 and storage systems that run IBM Spectrum Virtualize.

Tier 2 Flash Capacity (GiB)

The amount of volume capacity that Easy Tier has placed on Tier 2 flash, high-capacity drives.

Availability: DS8000 storage systems.

Used Capacity (GiB)

(Previously known as Allocated Space) The amount of space that is used by the compressed, thin-provisioned, or the Easy Tier volume. Typically, the space that is used by the compressed or thin-provisioned volume is less than the capacity of the volume. For Easy Tier volumes, used capacity is the capacity that is used by the volume's extents on the Enterprise HDD, Nearline HDD, or SSD drives.

Availability: All storage systems.

Written Capacity (GiB)

(Previously known as Written Space) The amount of data that is written from the assigned hosts to the volume before compression or data deduplication are used to reduce the size of the data. For example, the written capacity for a volume is 40 GiB. After compression, the volume used space, which reflects the size of compressed data that is written to disk, is just 10 GiB.

- [Key capacity concepts](#)

Understand the terms that are used to measure and plan capacity.

- [Key capacity concept: Shortfall](#)

View a short animation about how shortfall can help you determine when the amount of over-committed space in a pool is at a critically high level.

Key capacity concepts

Understand the terms that are used to measure and plan capacity.

Scenarios are used to explore the following capacity concepts for block storage systems:

- [Standard provisioning](#)
- [Thin-provisioning](#)
 - [Thin-provisioning savings](#)
 - [Data reduction savings](#)
 - [Total capacity savings](#)
 - [Effective capacity](#)

Tip: To review the capacity terms and definitions that are used, click [Definitions for the key capacity terms and concepts](#).

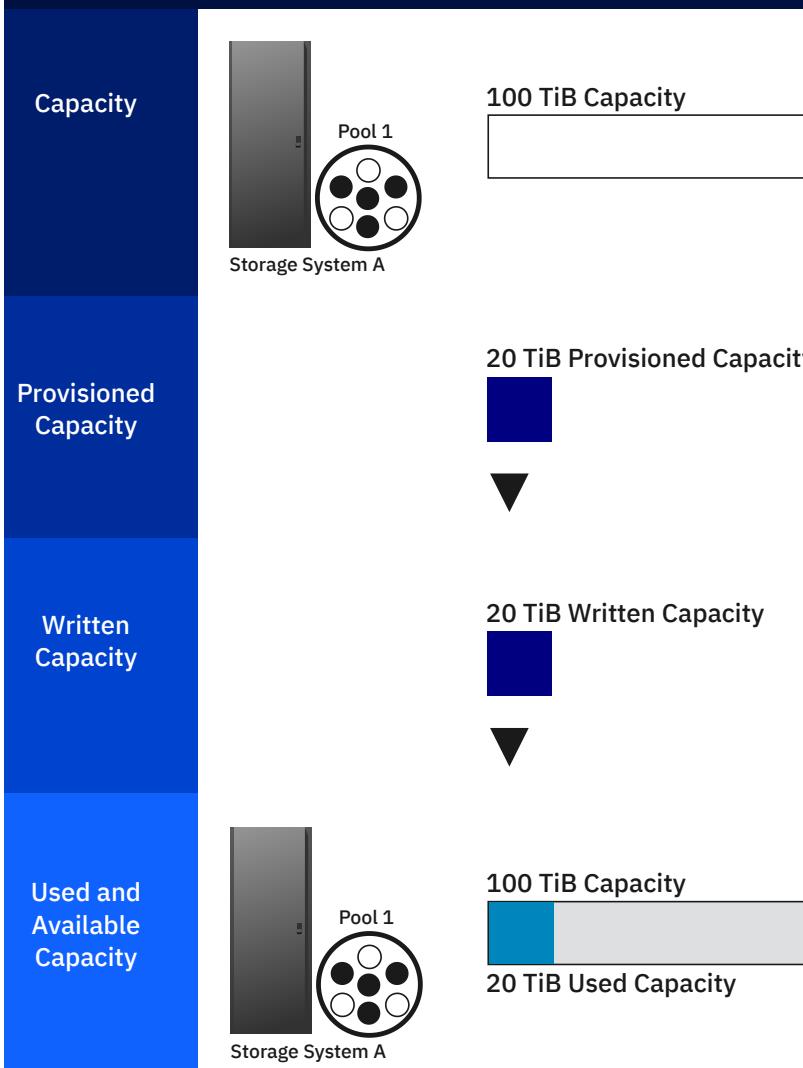
Standard provisioning

You add Storage System A with a capacity of 100 TiB to IBM® Storage Insights for monitoring.

Then, you add a standard-provisioned volume with a capacity of 20 TiB.

You create standard-provisioned volumes when you want to dedicate the usable capacity of the storage system to the device that writes to it. From the perspective of the pool and storage system, the capacity is used and is no longer available to the storage system and pool.

Standard Provisioning

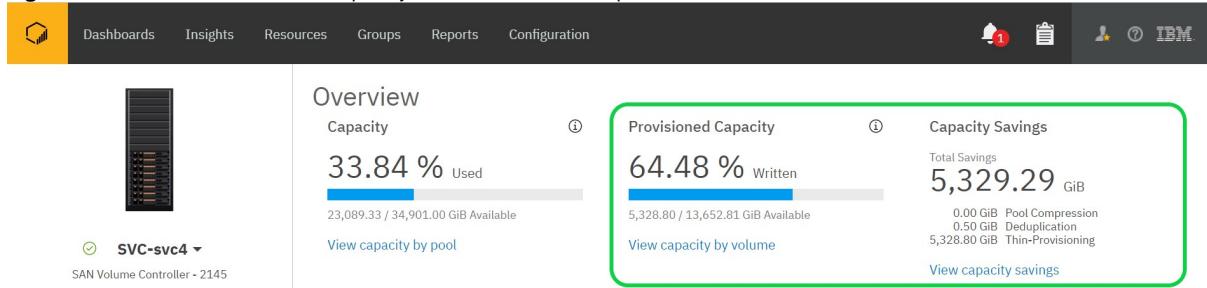


The capacity values that are reported by the storage system for standard-provisioned volumes are as follows:

- Used Capacity (%) is reported as fully allocated, and Used Capacity (GiB) has the same value as the provisioned capacity of the volume.
- Available Capacity (%) is reported as 00.00.

The capacity of the data that is written to standard-provisioned volumes is not measured by the storage system. However, the written capacity of standard-provisioned volumes is included in the calculation of the total written capacity of the volumes. Because the data that is written to standard-provisioned volumes isn't reduced when data is stored, the written capacity has the same value as the provisioned capacity of the volume.

Figure 1. Overview chart: Written capacity of standard and thin-provisioned volumes



Tip: From the Resource menu, click Block Storage Systems. Double-click a storage system and check the Provisioned Capacity chart.

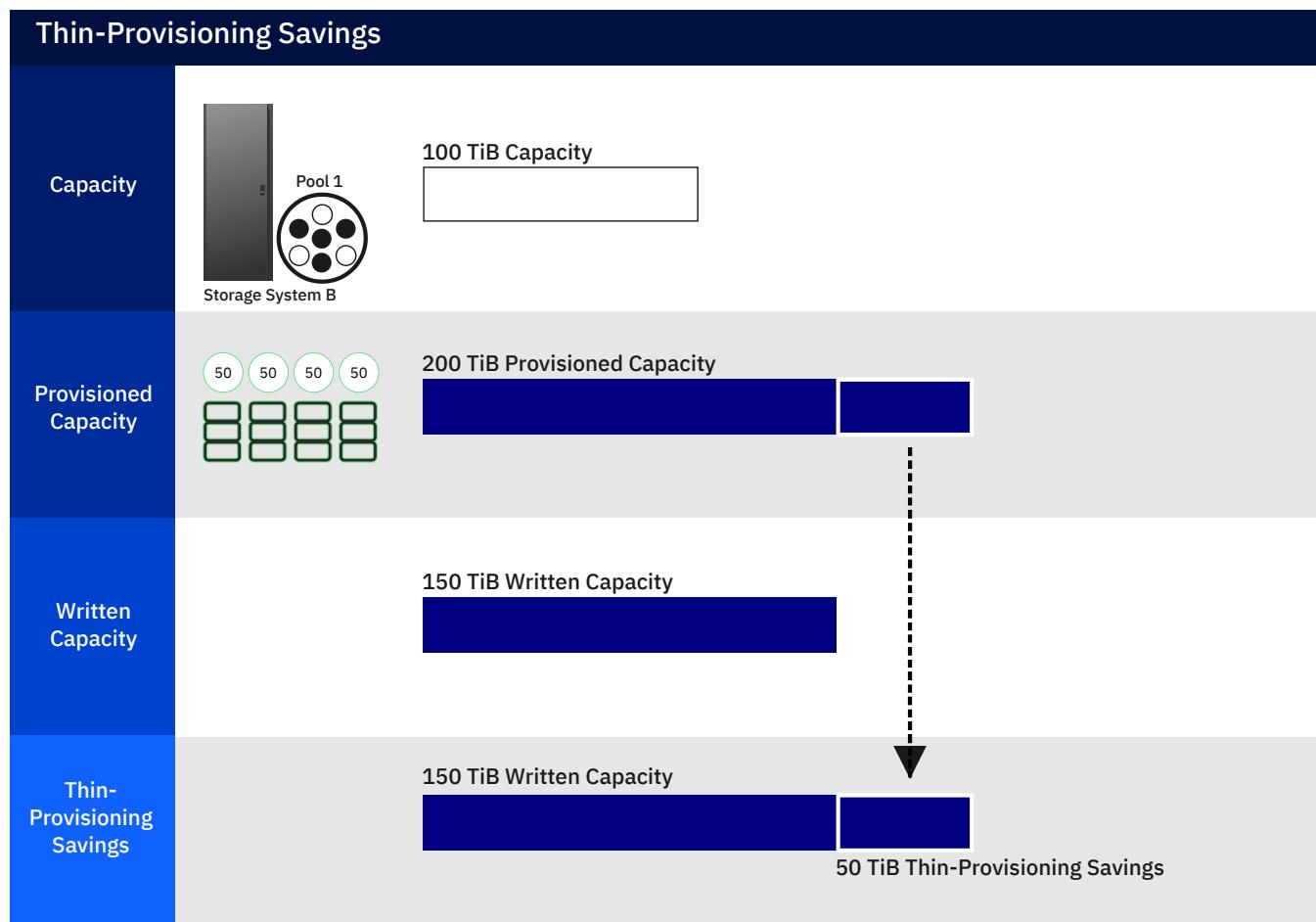
Thin-provisioning

Unlike standard-provisioned volumes, the capacity of thin-provisioned volumes is not dedicated to the device that writes to it. Devices get the capacity when they write data to the thin-provisioned volumes. Depending on the data reduction techniques that are supported by the storage system, the data that is written to the thin-provisioned volumes can be reduced before it is stored on the volumes.

Thin-provisioning savings

Thin-provisioning savings are the total amount of capacity that is saved in a pool, system, or volume by using capacity when needed as a result of write operations. The capacity that is saved is the difference between the provisioned capacity and the written capacity.

In this scenario, you add four thin-provisioned volumes with a total capacity of 200 TiB to Storage System B, which has a capacity of 100 TiB.



Thin-provisioning savings are the difference between the 200 TiB provisioned to the thin-provisioned volumes and the 150 TiB of data that is written to the volumes, which is 50 TiB.

Measuring the capacity data reduction savings of thin-provisioned volumes
Measuring the capacity data reduction savings of thin-provisioned volumes

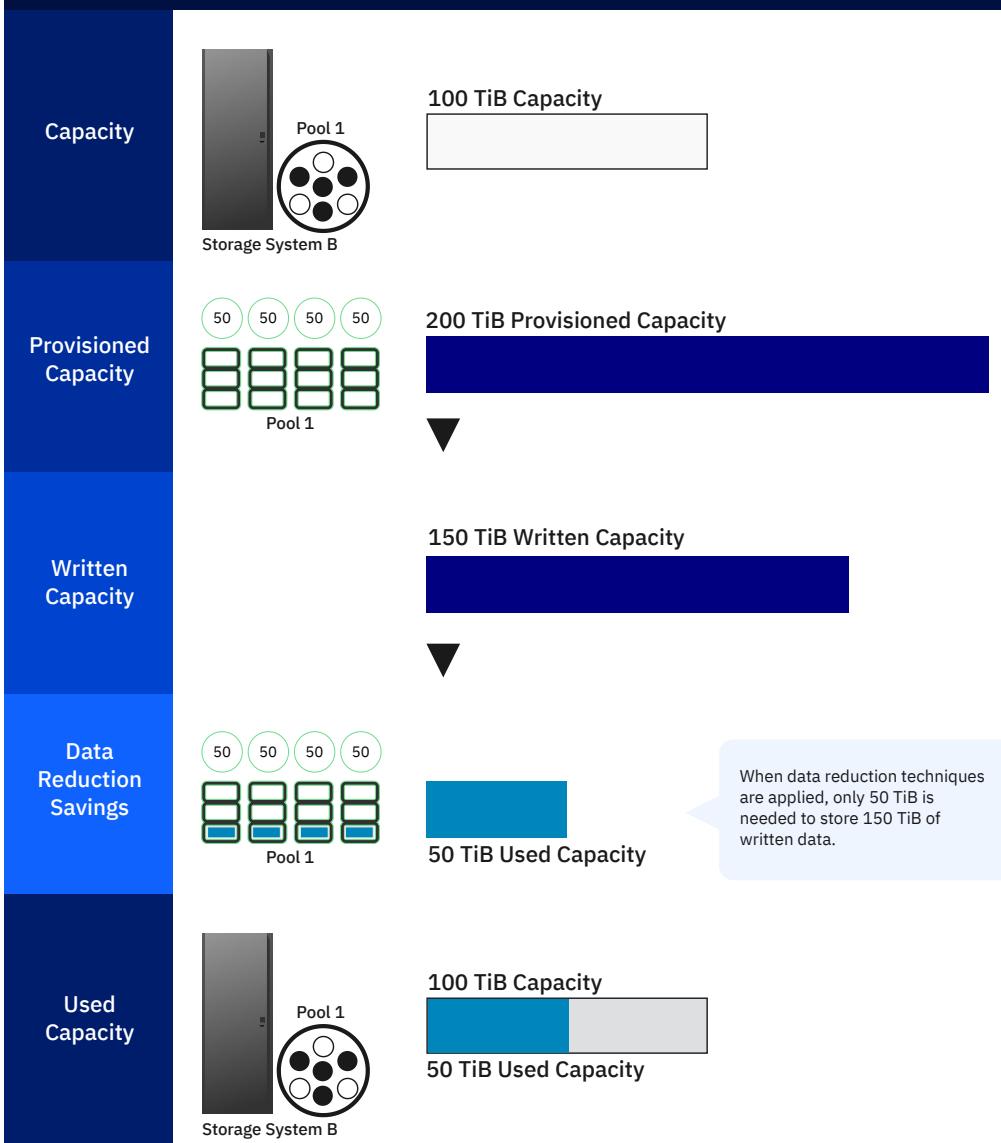
(To enlarge, right-click the video and select the full screen or new tab option.)

Data reduction savings

Data reduction savings are the total amount of usable capacity that is saved in a pool, system, or volume through the application of data reduction algorithms on the written data, such as compression and deduplication. This saved capacity is the difference between the written capacity and the used capacity.

Before data is stored on thin-provisioned volumes, it can be reduced. For example, if your storage system supports compression and deduplication, these data reduction techniques are applied to reduce the amount of capacity that is needed to store the data.

Data Reduction Savings

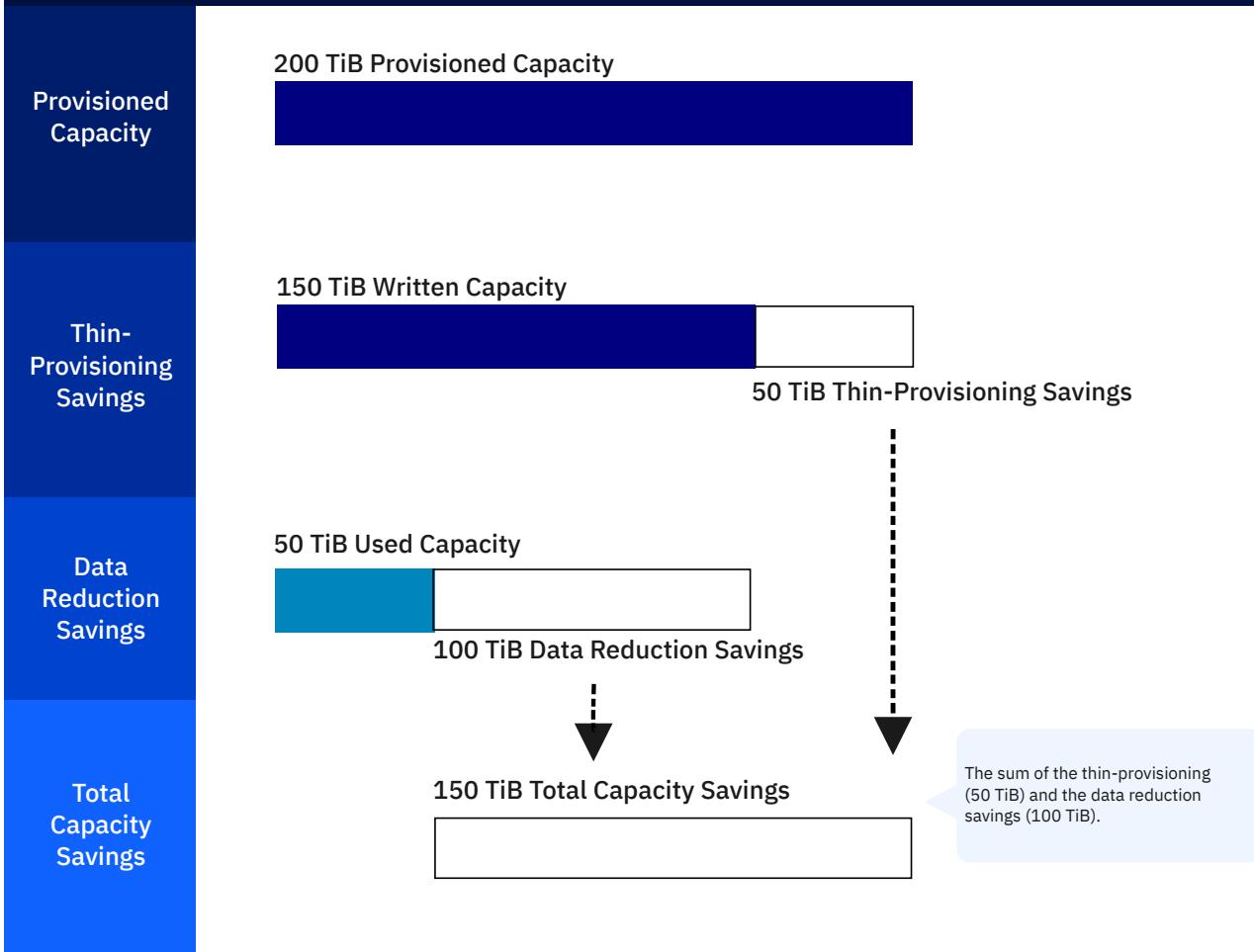


In this scenario, the data reduction savings are the difference between the written capacity (150 TiB), and the used capacity(50 TiB), which is 100 TiB or 67%.

Total capacity savings

Total capacity savings are the amount of capacity that is saved in a pool, system, or volume through thin-provisioning and data reduction techniques.

Total Capacity Savings



In the scenario illustrated above, the thin-provisioning savings are (200 TiB - 150 TiB), which is 50 TiB. The data reductions savings are (150 TiB - 50 TiB), which is 100 TiB. So, the total capacity savings are 150 TiB.

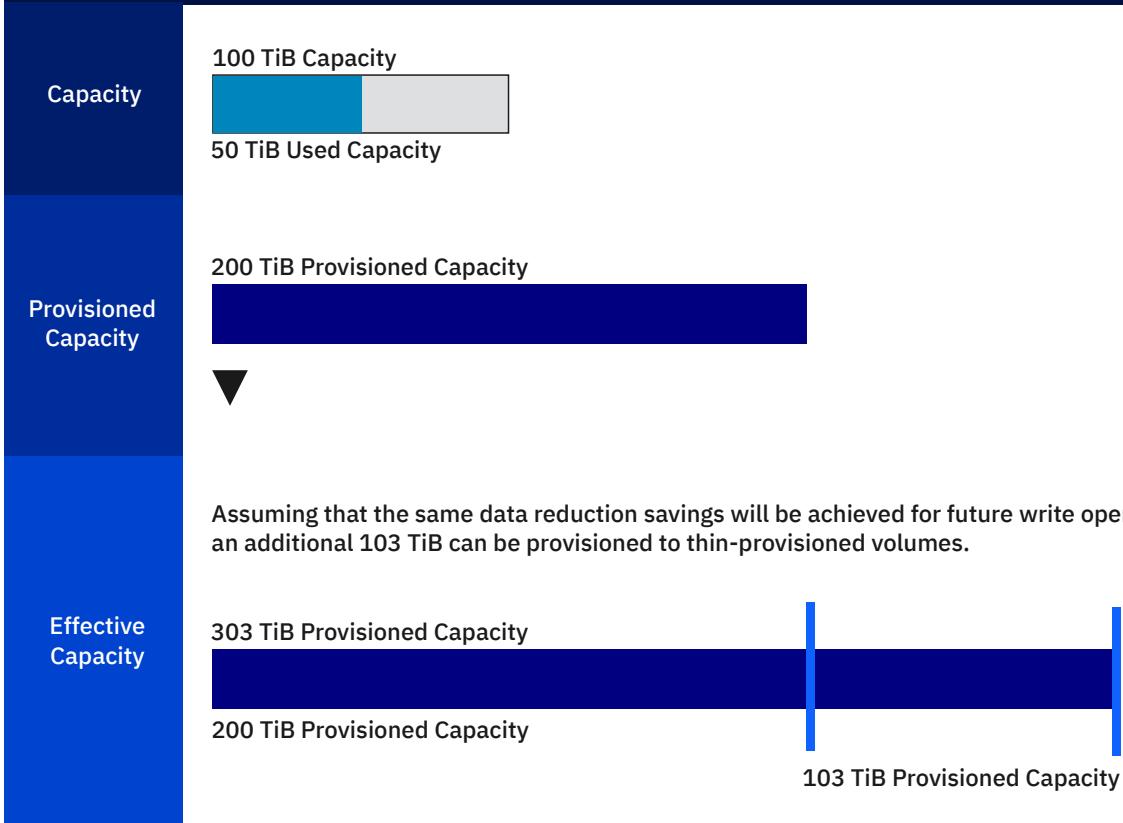
Effective capacity

Effective capacity is the amount of provisioned capacity that can be created in a system or pool without running out of capacity given the current data reduction savings that are being achieved. To calculate effective capacity, you divide the capacity of the storage system or pool by the data reduction savings percentage.

Note: In some storage systems, restrictions in the system determine the maximum provisioned capacity that is allowed in a pool or system. In these cases, the effective capacity cannot exceed this limit.

You can use effective capacity to estimate how much capacity you can provision to your thin-provisioned volumes without running out of usable capacity.

Effective Capacity



In the scenario illustrated above, the storage system has a capacity of 100 TiB and a current data reduction savings of 66%. So, the effective capacity is $100 / (1.00 - 0.67)$, which is 303 TiB. Currently, the provisioned capacity of the volumes is 200 TiB. Assuming that the same data reduction savings are achieved for subsequent write operations, more thin-provisioned volumes can be created with a total capacity of 303 TiB.

Definitions for the key capacity terms and concepts

These are capacity terms and concepts that are used:

Available capacity

The amount of usable capacity that is not yet used in a system, pool, array, or MDisk.

Capacity

The amount of usable capacity that is available for storing data on a system, pool, array, or MDisk after formatting and RAID techniques are applied.

Compression

A function that removes repetitive characters, spaces, strings of characters, or binary data from the data being processed and replaces characters with control characters. Compression reduces the amount of storage space that is required for data.

Data deduplication

A method of reducing storage needs by eliminating redundant data. Only one instance of the data is retained on storage media. Other instances of the same data are replaced with a pointer to the retained instance.

Data reduction

A set of techniques that can be used to reduce the amount of usable capacity that is required to store data. Examples of data reduction include data deduplication and compression.

Data reduction savings

The total amount of usable capacity that is saved in a pool, system, or volume through the application of data reduction algorithms on the written data, such as compression and deduplication. This saved capacity is the difference between the written capacity and the used capacity.

Effective capacity

The amount of provisioned capacity that can be created in a system or pool without running out of usable capacity given the current data reduction savings that are being achieved. This capacity equals the usable capacity that is divided by the data reduction savings percentage. In some storage systems, restrictions in the system determine the maximum provisioned capacity that is allowed in a pool or system. In those cases, the effective capacity cannot exceed this limit.

Provisioned capacity

The total capacity of all volumes in a pool or system.

Standard-provisioned volumes

Unlike thin-provisioned volumes, which use capacity when it is needed, the capacity that is provisioned to standard-provisioned or thick volumes is no longer available to the pool. Standard-provisioned volumes are fully allocated, and their capacity is reported as used because their capacity is no longer available to the pool and storage system.

Thin-provisioning

The ability to defer capacity allocation on a storage resource until data is actually written to it.

Thin-provisioning savings

The total amount of usable capacity that is saved in a pool, system, or volume by using usable capacity when needed as a result of write operations. The capacity that is saved is the difference between the provisioned capacity minus the written capacity.

Total capacity savings

The total amount of usable capacity that is saved in a pool, system, or volume through thin-provisioning and data reduction techniques. This saved capacity is the difference between the used usable capacity and the provisioned capacity.

Used capacity

The amount of capacity that is taken up by data in a system, pool, array, or MDisk after data reduction techniques have been applied.

Written capacity

The amount of usable capacity that would have been used to store written data in a pool or system if data reduction was not applied.

Key capacity concept: Shortfall

View a short animation about how shortfall can help you determine when the amount of over-committed space in a pool is at a critically high level.

Understanding shortfall  Simplifying storage, deploying new applications, and controlling costs with IBM Spectrum Storage

Capacity metrics for file storage systems

To review trends in capacity and space usage for file storage systems, you add metrics to capacity charts. You use the charts for filesets, file systems, and file system pools to detect capacity shortages and space usage trends.

Alphabetical lists of the capacity and space usage metrics that you can add to charts are provided in the following sections:

- [Capacity metrics for filesets](#)
- [Capacity metrics for file systems](#)
- [Capacity metrics for file system pools](#)

Capacity metrics for filesets

If sufficient data is collected about the filesets in your file storage systems, you can view charts that compare the used capacity of the filesets. The following metric is displayed in the capacity chart for filesets:

Used Capacity (GiB)

The amount of storage capacity that is used by the fileset. Used capacity is not provided for filesets that are cache targets.

Availability: All storage systems.

Capacity metrics for file systems

To detect capacity shortages and investigate capacity usage trends, you can add the following metrics to the capacity chart for file systems:

Available Inodes

The number of inodes that are available in a file system.

Available Capacity (GiB)

The amount of storage capacity that is available (not allocated) on a file system.

Capacity (%)

The percentage of the total storage space on the file system that is used by files and directories.

Available for: All storage systems.

Capacity (GiB)

(Previously known as Total Capacity) The capacity on the file system.

Available for: All storage systems.

Maximum Inodes

The total number of inodes that the file system can contain. This value consists of the available inodes and the used inodes for the file system.

Available for: All storage systems.

Physical Capacity (GiB)
The raw capacity of the partition where a file system resides.

Used Inodes
The number of used inodes on a file system. An inode is the internal structure that describes the individual files or directories in the file system metadata. An inode contains the node, type, owner, and location of a file or directory.

Availability: All storage systems.

Used Inodes (%)
The percentage of inodes that are already used on the file system. Each time that you create a file or directory on the file system, an inode is allocated to the file or directory.

Available for: All storage systems.

Internal Used Capacity (GiB)
The amount of storage space that is unavailable (allocated) on a file system. For IBM Spectrum Scale, this value does not include the space that is used by migrated data on external pools.

Capacity metrics for file system pools

If sufficient data is collected about the file system pools in your data center, you can view charts that compare the capacity of the pools with the space that is allocated to the pools and the space that is still available in the pools.

The internal resource for IBM Spectrum Scale storage systems is called Pools. For all other file storage systems, the internal resource is called File System Pools.

To detect capacity shortages and investigate space usage trends, you can add the following metrics to the capacity chart for file system pools:

Available Capacity (GiB)
The amount of unallocated storage capacity in the pool. Available capacity usually comprises the space that can be used for storage. However, if the pool is not formatted, the amount of overhead capacity might also be included in the calculation.

Availability: All storage systems.

Capacity (%)
The percentage of space in the file system pool that is being used.

Available for: All storage systems.

Capacity (GiB)
(Previously known as Total Capacity) The capacity in the storage pool.

Available for: All storage systems.

Used Capacity (GiB)
The amount of space in the file system pool that is being used.

Available for: All storage systems.

Capacity metrics for object storage systems

To review trends in capacity and space usage for object storage systems, you add metrics to capacity charts. Use the charts for containers to detect capacity shortages and space usage trends for the containers in your object storage systems.

Capacity metrics for containers

If sufficient data is collected about the containers in your object storage systems, you can view charts that compare the used capacity of the containers. You can add the following metrics to the capacity chart for containers:

Available Objects
The number of objects that you can add to the container on the object storage system.

Available for: IBM Spectrum Scale storage systems.

Available Capacity (GiB)
The amount of file system capacity that can be used to store object data for the container.

Available for: IBM Spectrum Scale storage systems.

Capacity Quota (%)
The percentage of the capacity quota for the container that was used when data was collected for the storage system. The quota limits the amount of file system capacity that can be used by the container. This column contains a value only if a capacity quota is defined for the container on the OpenStack Swift object storage system.

If the used capacity value for the container exceeds the capacity quota value, the percentage exceeds 100%. The used capacity can exceed the capacity quota if the quota is set after object files are uploaded to the file system or if an object file without size information is uploaded to the file system.

Available for: IBM Spectrum Scale storage systems.
Capacity Quota (GiB)
The amount of file system capacity that can be used to store object data for the container. This column contains a value only if a capacity quota is defined for the container on the OpenStack Swift object storage system.
Available for: IBM Spectrum Scale storage systems.
Objects
The number of objects in the container on the object storage system.
An object stores data content, such as files, videos, images, virtual machine snapshots, and other unstructured data. In IBM Spectrum Scale, objects are stored as files on the GPFS file system.
Available for: IBM Spectrum Scale storage systems.
Objects Quota
The number of objects that can be stored in the container. This column contains a value only if an objects quota is defined for the container on the OpenStack Swift object storage system.
Available for: IBM Spectrum Scale storage systems.
Objects Quota (%)
The percentage of the objects quota for the container that was used when data was collected for the storage system. The quota limits the number of objects that can be stored in the container. This column contains a value only if an objects quota is defined for the container on the OpenStack Swift object storage system.
If the number of objects that are used exceeds the objects quota, the percentage exceeds 100%. The number can exceed the quota if the quota is configured after the object files are stored on the file system.
Available for: IBM Spectrum Scale storage systems.
Used Capacity (GiB)
The amount of file system capacity that is used by the objects in the container. If data collection occurs immediately after objects are added to a container, the used capacity value might not reflect the updates until after the next data collection.
Available for: IBM Spectrum Scale storage systems.

Capacity metrics for tiers

Review trends in the capacity and space usage for tiers. You use the charts to detect capacity shortages and space usage for the tiers in your storage environment.

Based on historical space usage, you can plan the capacity growth for tiers.

You can view values for the following metrics in the tier charts:

Capacity (GiB)

The total amount of storage space in the tier, which comprises the total storage space of the pools in the tier.

Used Capacity (GiB)

The capacity that is used by pools in the tier.

Performance views

View the charts and the performance metrics that are collected about storage resources and their internal and related resources. Also view charts and performance metrics for switches and their internal and related resources.

- [**Investigating the performance of storage resources**](#)

You can investigate the information that is collected about the storage resources that you add to IBM® Storage Insights Pro. To identify performance issues, the information that is collected is shown in charts and tables.

- [**Controls for performance views**](#)

The Performance page includes controls for you to customize how information is displayed. You can determine the performance metrics that are displayed for storage system resources such as volumes, disks, or ports and you can specify a time range for the information. You can also determine the port metrics that are displayed for switches.

- [**Performance metrics**](#)

Collect and use metrics to measure the performance of storage systems that are monitored by IBM Storage Insights Pro. Metrics are also collected to measure the performance of switches that are monitored.

- [**Exporting performance data for storage systems**](#)

To help resolve performance issues with storage systems, you can export performance data for the resource to a compressed file. If you contact IBM Support to help you analyze the problem, you might be asked to send this file.

- [**IBM Spectrum Virtualize guideline values for key performance indicators**](#)

To improve the performance and resiliency of your storage environment, compare the guideline values for key performance

indicators with the values reported for your storage systems and devices.

- [Tutorial: Viewing the aggregated workload for an application](#)

Bob is a storage administrator. Bob wants to easily evaluate the performance of the accounting application because the Accounts department is expanding to a new location and they want to replicate their data across both locations. Bob needs to work out the inter-site link capacity requirements.

Investigating the performance of storage resources

You can investigate the information that is collected about the storage resources that you add to IBM® Storage Insights Pro. To identify performance issues, the information that is collected is shown in charts and tables.

About this task

Use the performance charts and tables to analyze, detect, and investigate issues that might affect your storage environment such as slow response times and workloads with high I/O rates.

Try it out! From the Resources menu, click Block Storage Systems, and then click Performance.

Note: The image that is provided is a mock-up of the Performance tab to illustrate the information that is provided and the actions that you can complete.



Get a head start on how to use the performance charts to detect and investigate performance anomalies:

Table 1. Actions and features of performance charts

Number	Description
1	<p>When you click the Performance tab, a highly granular chart is automatically generated that tracks the performance of key metrics, such as I/O rates and response times over the last 12 hours. By default, charts are generated for 5 of the resources.</p> <p>To refine the information that is shown in the chart, you can complete these actions:</p> <ul style="list-style-type: none"> • Click the resource in the Selected Resources pane to check the performance of a single resource. • Press Ctrl and Shift and then click the resources to compare the performance of two or more resources. • Click resources in the table under the chart to add them to the chart.
2	Highly granular charts at sample data resolution are shown by default for the last hour, 6 hours, 12 hours, and day. That is, performance is analyzed, measured, and reported at 5-minute intervals. To analyze performance at sample data resolution for longer periods, such as 1 or 2 weeks, reduce the number of resources that are selected. You can also use the calendar tool to customize the reporting period to a number of days instead of a week or a month.

Number	Description
3	To switch from chart to a table view of the performance metrics that are shown in the chart, click the Toggle button. 💡 You can download the performance metadata that was used to generate the chart. Although the charts aren't included in the download, you can use the metadata to generate your own charts.
4	To export the performance metrics that are shown in the chart to a spreadsheet, click the Export button.
5	To open the chart in a new window, click the Open in new window button. For example, you detect slow response times for one of the storage systems. You want to find out which of the storage system's internal resources is causing the slow response times. To investigate, you want to examine and compare the performance metrics that are shown at the storage system level with the performance metrics that are shown at the node, pool, or volumes levels. So, you complete these actions: <ol style="list-style-type: none"> 1. Open a new window. 2. In the Selected Resources pane in the new window, click the storage system. 3. Click Actions and select the internal resource from the list. Repeat this procedure to compare the performance metrics to detect the resources that are causing the slow response times. 💡 When you open a new window, you can click the Synchronize Time button to synchronize the selected time period with the time period of the first chart that you opened.
6	To add or change the performance metrics that are shown in the chart, click the Add Metrics button. You can add up to six metrics with two different metrical units to the chart.
7	You can customize the period that is examined in the chart by changing the start and end dates.

If applicable, three values are calculated for each of the performance metrics that are shown for the resources in the table:

- The average value of the performance metric over the selected period.
- The minimum value of the performance metric over the selected period.
- The maximum value of the performance metric over the selected period.

Table 2. Actions and features of the performance table

Number	Description
8	Use the filter to group the resources that you want to view in the table and the chart. For example, if you have a naming convention for types of storage systems, you can type the letters in the filter and press Enter. The chart and the table are updated to show the resources that you want to see.
9	Click  to add information about the resource to the table. For example, you can add information about Coverage (%) to the table to measure the availability of performance metrics over the selected time period.
10	Explore the following actions: <ul style="list-style-type: none"> • Click Actions and select an internal resource. The resource opens in a new window so you can investigate which of the internal resources are overloaded or experiencing high response times. • Click Edit Table Metrics to change or add more performance metrics to the table. You can add as many performance metrics as you like to the table. • Click Create Report to share information by email about performance with your colleagues.

- [**Investigating the performance of storage systems**](#)

To detect performance issues, view the charts and the information that is collected about storage systems.

- [**Tutorial: Comparing the performance of storage systems**](#)

In this tutorial, you compare the performance of two storage systems.

- [**Investigating the performance of a storage system**](#)

To detect performance issues, view the charts and the information that is collected about a storage system.

- [**Investigating the performance of applications**](#)

To detect performance issues, view the charts and the information that is collected about applications.

- [**Investigating the performance of application subcomponents**](#)

To detect performance issues, view the charts and the information that is collected about application subcomponents.

- [**Investigating the performance of applications and subcomponents added to departments**](#)

To detect performance issues with the applications that are added to departments, view the charts and the information that is collected about the storage resources that are associated with the applications.

- [**Investigating the performance of applications and subcomponents added to subdepartments**](#)

To detect performance issues about the applications that are added to subdepartments, view the charts and the information that is collected about the storage resources that are associated with the applications.

- [**Identifying performance issues for IBM Spectrum Virtualize storage systems**](#)

You can identify key metrics that are outside of a standard range for resources that run IBM Spectrum Virtualize by using the key performance indicators charts.

- [Tutorial: Identifying the source of slow drain problems caused by depletion of buffer credits](#)

Use this tutorial to find out how to use IBM Storage Insights Pro to identify a host that has depleted buffer credits that are causing a slow drain condition.

Investigating the performance of storage systems

To detect performance issues, view the charts and the information that is collected about storage systems.

Before you begin

You must add the storage systems that you want to monitor and performance data must be collected.

About this task

You can investigate the performance of storage systems, the internal resources of storage systems such as volumes and pools, and the resources that are related to storage systems such as servers and back-end storage systems.

Procedure

1. From the Resources menu, click Block Storage Systems.

Tip: To view information about the internal resources of the storage system, right-click the storage system, click Actions, and then click the storage resource.

2. Click the Performance tab.

Results

The chart shows the total I/O rate and the overall response times of the storage systems that were added for monitoring.

Related reference

- [Units of measurement for storage data](#)
- [Controls for performance views](#)
- [Performance metrics for resources that run IBM Spectrum Virtualize](#)

Tutorial: Comparing the performance of storage systems

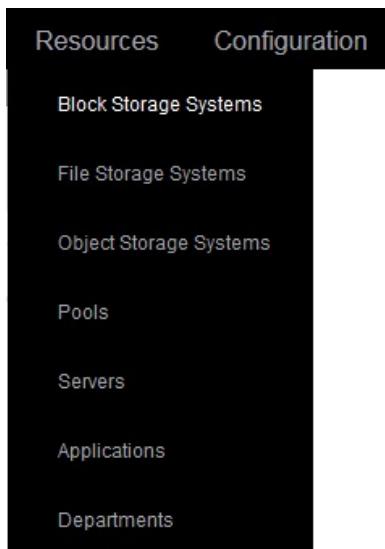
In this tutorial, you compare the performance of two storage systems.

About this task

Your company recently purchased an IBM FlashSystem® 900 storage system. The storage system was added to IBM® Storage Insights Pro and the performance of the storage system is being monitored. Your managers ask you to compare the performance of the FlashSystem 900 storage system to another storage system so that they can assess the performance of their investment. In particular, your managers are interested in the response times and the I/O rates of the FlashSystem 900.

Procedure

1. Go to Resources > Block Storage Systems.



2. Click the FlashSystem 900 storage system and the non-flash storage system that you want to compare the FlashSystem 900 with.
3. Right-click the selected storage systems, then click View Performance.

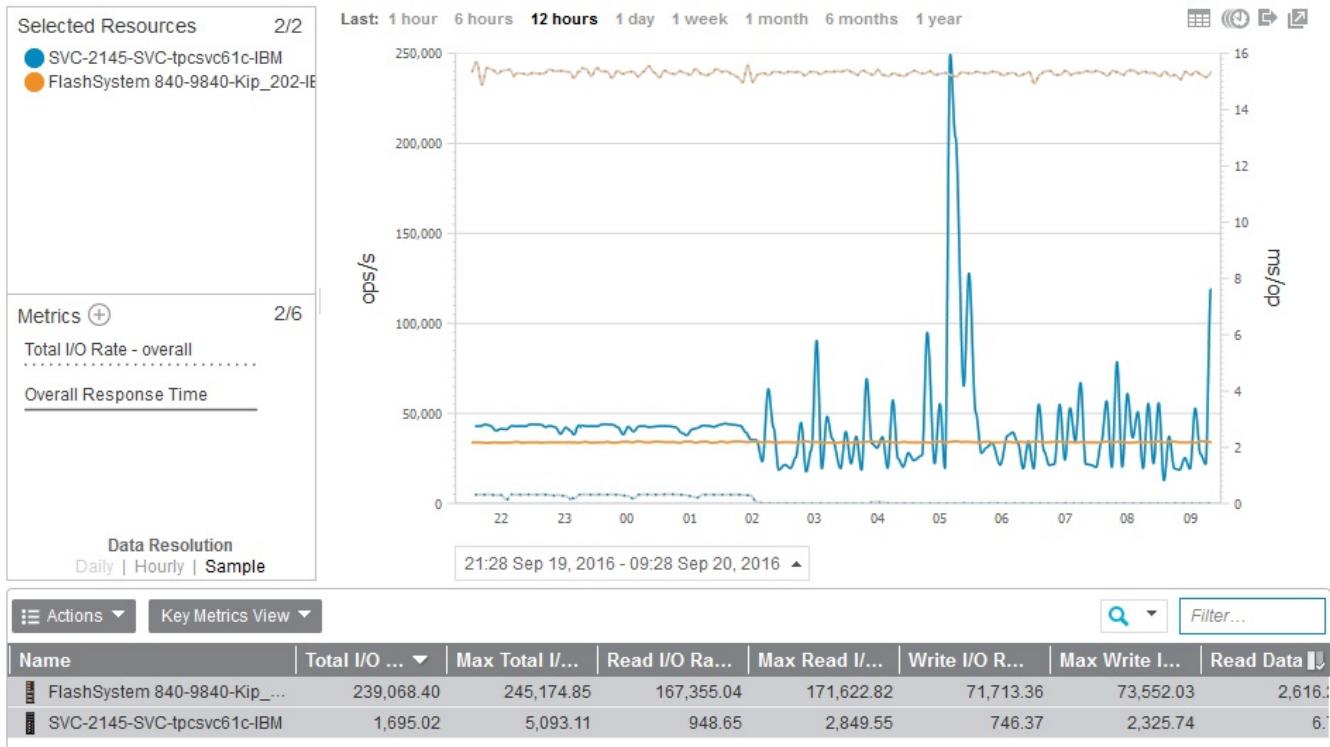
Block Storage Systems

16 Normal
0 Warning
1 Unreachable
13 Error

Storage Systems		Actions	+ Add Storage System	View Performance	View Capacity	Probe Status	Performance...	Physical Allocat...	Pool Capacity (GiB)	Pool Shortfall (%)	Pools	Volumes	Firmware
	SVC-2145-SVC-tpcsvc61c-IBM	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	23,570.25	0 %	19	1249	7.7.0.0 (build ...)
	SpectrumAccelerate-2810-XIV ...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	9,808.14	0 %	3	15	11.5.3
	DS8000-2107-75GL581-IBM	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	13,904.00	62 %	5	4028	6.6.31.1460
	FlashSystem 840-9840-Kip_20...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	26,622.68	0 %	1	1	1.4.5.0 (build ...)
	FlashSystem 840-9840-Syste...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	19,199.97	0 %	1	20	1.4.5.0 (build ...)
	FlashSystem 900-9840-Kip_37...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	53,245.35	0 %	1	1	1.4.5.0 (build ...)
	FlashSystem 900-9840-SVT_D...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	5,324.54	0 %	1	31	1.4.5.0 (build ...)
	FlashSystem 900-9840-Syste...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	15,973.61	0 %	1	118	1.4.5.0 (build ...)
	FlashSystem A9000-9835-GO...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	4,717.02	0 %	1	0	12.0.0.a
	FlashSystem A9000-9835-XIV ...	<input checked="" type="checkbox"/>	Normal	View Performance	View Capacity	Data Collection	Edit Alert Notification Settings	Add to General Group	0.00	0 %	0	0	12.0.1

Results

A performance view is displayed. The view shows the performance of the two storage systems on a chart and in a table. By default, the performance view shows the Total I/O Rate - overall and Overall Response Time metrics. The time period for the information is the last 12 hours.



Investigating the performance of a storage system

To detect performance issues, view the charts and the information that is collected about a storage system.

Before you begin

You must add the storage system that you want to monitor and performance data must be collected.

About this task

You can investigate the performance of the storage system, the internal resources of the storage system such as volumes and pools, and the resources that are related to the storage system such as servers and back-end storage systems.

Procedure

- From the Resources menu, click Block Storage Systems.
- Right-click a storage system, and click View Details.
- From the Actions list, click View Performance.

Tip: To view information about the internal resources of the storage system, click Actions and click the storage resource.

Results

The chart shows the total I/O rate and the overall response times of the storage system.

Related reference

- [Units of measurement for storage data](#)
- [Controls for performance views](#)
- [Performance metrics for resources that run IBM Spectrum Virtualize](#)

Investigating the performance of applications

To detect performance issues, view the charts and the information that is collected about applications.

Before you begin

You must create applications and application subcomponents and you must create filters to associate storage resources with the applications.

Procedure

1. From the Groups menu, click Applications.
2. Optional: To see the aggregated performance information for all of the member volumes in the application, right-click the application, and click View Performance.
Note: This feature isn't available to all IBM® Storage Insights users. Look for news from IBM about when this feature will be available to you.
3. To investigate the performance of the individual storage resources in the application, right-click the application, and click View Details.

Results

Where the View Performance feature is available, the aggregated information for all of the volumes in the application is displayed on the performance view. By default, the Total I/O Rate and the Total Data Rate are displayed in the performance chart. You can also select to display the read and write I/O rates, and the read and write data rates in the chart.

On the Overview page for the application, the storage resources that are associated with the application are shown in the Related Resources section.

Learn more: To view charts and information about the performance of the storage resources, click the storage resource, and then click the Performance tab.

Related reference

- [Units of measurement for storage data](#)
- [Controls for performance views](#)
- [Performance metrics for resources that run IBM Spectrum Virtualize](#)

Investigating the performance of application subcomponents

To detect performance issues, view the charts and the information that is collected about application subcomponents.

Before you begin

You must create application subcomponents and you must create filters to associate storage resources with the application subcomponents.

Procedure

1. From the Groups menu, click Applications.
2. In the General section, click Subcomponents.
3. Right-click the subcomponent, and click View Details.
4. Optional: To see the aggregated performance information for all of the member volumes in the subcomponent, right-click the subcomponent, and click View Performance.
Note: This feature isn't available to all IBM® Storage Insights users. Look for news from IBM about when this feature will be available to you.

Results

Where the View Performance feature is available, the aggregated information for all of the volumes in the subcomponent is displayed on the performance view. By default, the Total I/O Rate and the Total Data Rate are displayed in the performance chart. You can also select to display the read and write I/O rates, and the read and write data rates in the chart.

On the Overview page for the subcomponent, the storage resources that are associated with the subcomponent are shown in the Related Resources section.

Learn more: To view charts and information about the performance of the storage resources, click the storage resource, and then click the Performance tab.

Related reference

- [Units of measurement for storage data](#)
 - [Controls for performance views](#)
 - [Performance metrics for resources that run IBM Spectrum Virtualize](#)
-

Investigating the performance of applications and subcomponents added to departments

To detect performance issues with the applications that are added to departments, view the charts and the information that is collected about the storage resources that are associated with the applications.

Before you begin

You must create the departments and add applications, or application subcomponents, or both to the departments.

Procedure

1. From the Groups menu, click Departments.
2. Right-click the department, and click View Details.
3. In the Related Resources section, click a storage resource.
4. Click the Performance tab.

Related reference

- [Units of measurement for storage data](#)
 - [Controls for performance views](#)
 - [Performance metrics for resources that run IBM Spectrum Virtualize](#)
-

Investigating the performance of applications and subcomponents added to subdepartments

To detect performance issues about the applications that are added to subdepartments, view the charts and the information that is collected about the storage resources that are associated with the applications.

Before you begin

You must create the subdepartments and add applications, or application subcomponents, or both to the subdepartments.

Procedure

1. From the Groups menu, click Departments.
2. Right-click the department, and click View Details.
3. In the General section, click Subdepartments.
4. Right-click a subdepartment, and click View Details.
5. In the Related Resources section, click a storage resource.
6. Click the Performance tab.

Related reference

- [Units of measurement for storage data](#)
- [Controls for performance views](#)
- [Performance metrics for resources that run IBM Spectrum Virtualize](#)

Identifying performance issues for IBM Spectrum Virtualize storage systems

You can identify key metrics that are outside of a standard range for resources that run IBM Spectrum Virtualize by using the key performance indicators charts.

Before you begin

Before you view the performance of your resources that run IBM Spectrum Virtualize, ensure that performance data was collected for those systems. IBM® Storage Insights Pro collects data so that you can measure the performance of storage systems.

About this task

In this documentation, IBM Spectrum Virtualize is used to refer collectively to IBM SAN Volume Controller, IBM Spectrum Virtualize for Public Cloud, IBM Spectrum Virtualize as Software Only, and IBM Storwize® storage systems, and to IBM FlashSystem® devices that run IBM Spectrum Virtualize.

Restriction: Key performance indicators are provided only for IBM FlashSystem 9100 from the IBM FlashSystem family. Key performance indicators are not provided for file storage in Storwize V7000 Unified storage systems.

Procedure

1. To select a storage system, choose one of the following options from the menu bar:

Resource	Menu bar
Block storage systems	Resources > Block Storage Systems
File storage systems	Resources >> File Storage Systems

2. From the list of storage systems that are displayed, right-click the resource that you want to view and click View Details. For example, select a SAN Volume Controller or a Storwize storage system on the Block Storage Systems page, or select a Storwize V7000 Unified storage system on the File Storage Systems page.
3. In the General section of the resource details page, click Performance. The key performance indicators charts are displayed with data that was collected from monitored resources over the last 24 hours. The performance of each monitored resource is charted against the best practice guidelines for IBM Spectrum Virtualize storage systems.
4. Optional: If you want to view the performance charts for a period other than the default 24-hour period, change the date for all of the charts. Click Last 24 hours and use the calendar to specify a date.
5. Optional: Drill down to view detailed information about a specific I/O group, port, or node. Click a resource from the chart's list. For example, select the name of an I/O group in the Read Response Time by I/O Group chart to view the average number of milliseconds taken by the I/O group to complete a read operation.

By default, metrics are shown on the charts for the following time periods:

- The last 24 hours
- The same 24-hour period for yesterday
- The same 24-hour period for the day seven days before today

If you selected a date from the calendar, the metrics are shown on the charts for the following time periods:

- The selected date
- The day before the selected date
- The day seven days before the selected date

Tutorial: Identifying the source of slow drain problems caused by depletion of buffer credits

Use this tutorial to find out how to use IBM® Storage Insights Pro to identify a host that has depleted buffer credits that are causing a slow drain condition.

About this task

Fibre Channel (FC) networks use buffer credits to control the flow of data frames from port to port. The number of buffer credits for a port is the number of data frames that the port can receive. When that number is reached, ports cannot send further data frames until the receiving port indicates that it is ready. If all of the buffer credits of a port are being used, then the port cannot receive more data.

For example, if a host has a performance problem, then its ports might not be able to clear their buffer credits to receive more data. If the host ports cannot receive data, then switch ports cannot send data to the host ports, so the buffer credits of the switch port become depleted too. Ports on other switches in the fabric that try to send data through the switch port are also affected, and their buffer credits become depleted in turn. In this way, the buffer credit problem builds throughout the storage environment. The buffer credit depletion on the host ports impacts the switches that communicated with the host. The switches that communicate with that switch cannot use their buffer credits, so storage systems cannot communicate with the switches.

In this way, a single host with a performance problem can impact all the hosts that use the same switches and inter-switch links. This condition is called *slow drain*. Slow drain in your storage environment can manifest as a problem with storage systems rather than with a host.

Procedure

1. Configure a performance alert for Port Send Delay Time, Port Send Delay I/O Percentage, or Zero Buffer Credit Timer, depending on the storage system.

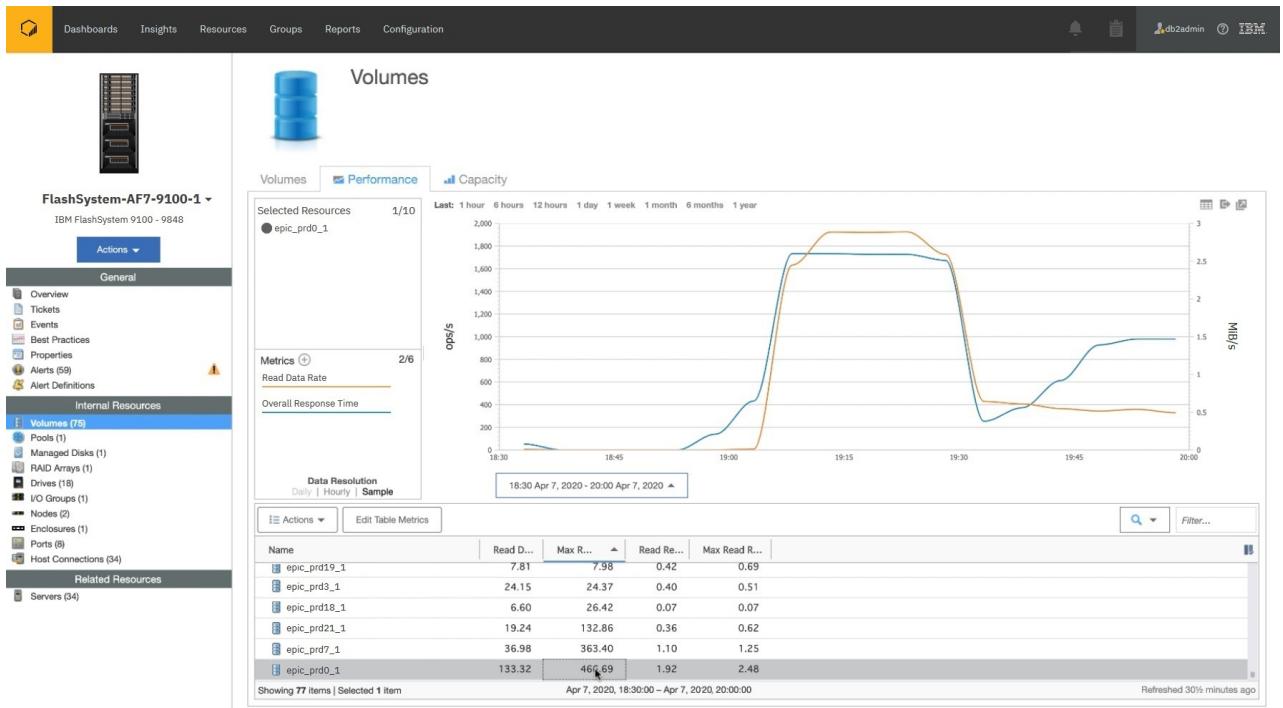
For example, configure a Port Send Delay Time alert for FlashSystem 9100 that is triggered when the delay is greater than 10 ms/op.

The screenshot shows the IBM Storage Insights interface. At the top, there's a navigation bar with icons for Dashboards, Insights, Resources, Groups, Reports, and Configuration, and a user name dbAdmin. Below the navigation bar is a large title "Alerts" with a warning icon. To the right of the title, it says "Alert Policy: None" and "Policy Actions". The main area displays a table of alerts:

Alert Name	Condition	Violation	Sev...	Occurrence Time	Internal Resource	Alert Source
IBMPA_PerformancePortSendDelay...	>= 20 %	33.35 %	⚠ Warn...	Apr 7, 2020, 19:28:20	node1_Port_3	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	33.43 %	⚠ Warn...	Apr 7, 2020, 19:28:20	node1_Port_1	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	31.95 %	⚠ Warn...	Apr 7, 2020, 19:28:20	node1_Port_4	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	32.58 %	⚠ Warn...	Apr 7, 2020, 19:28:20	node1_Port_2	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	22.94 %	⚠ Warn...	Apr 7, 2020, 23:18:23	node1_Port_4	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	24.26 %	⚠ Warn...	Apr 7, 2020, 23:18:23	node1_Port_3	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	24.35 %	⚠ Warn...	Apr 7, 2020, 23:18:23	node1_Port_1	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	23.54 %	⚠ Warn...	Apr 7, 2020, 23:18:23	node1_Port_2	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	31.73 %	⚠ Warn...	Apr 8, 2020, 00:49:21	node1_Port_4	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	32.38 %	⚠ Warn...	Apr 8, 2020, 00:49:21	node1_Port_2	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	33.32 %	⚠ Warn...	Apr 8, 2020, 00:49:21	node1_Port_1	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	33.32 %	⚠ Warn...	Apr 8, 2020, 00:49:21	node1_Port_3	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	29.13 %	⚠ Warn...	Apr 8, 2020, 01:59:24	node1_Port_3	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	29.04 %	⚠ Warn...	Apr 8, 2020, 01:59:24	node1_Port_1	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	27.64 %	⚠ Warn...	Apr 8, 2020, 01:59:24	node1_Port_4	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	27.99 %	⚠ Warn...	Apr 8, 2020, 01:59:24	node1_Port_2	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	28.99 %	⚠ Warn...	Apr 8, 2020, 03:14:20	node1_Port_2	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	30.34 %	⚠ Warn...	Apr 8, 2020, 03:14:20	node1_Port_3	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	30.44 %	⚠ Warn...	Apr 8, 2020, 03:14:20	node1_Port_1	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	28.87 %	⚠ Warn...	Apr 8, 2020, 03:14:20	node1_Port_4	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	33.47 %	⚠ Warn...	Apr 8, 2020, 03:34:21	node1_Port_4	Default FlashSystem Family policy
IBMPA_PerformancePortSendDelay...	>= 20 %	34.95 %	⚠ Warn...	Apr 8, 2020, 03:34:21	node1_Port_3	Default FlashSystem Family policy

Showing 59 items | Selected 0 items Refreshed a few moments ago

2. To view the alerts, click Dashboards and then click Alerts. If the Port Send Delay Time alert was triggered, note the time of the alert.
3. To view information about the affected storage system, click the link in the Resource column.
4. In the Internal Resources section of the storage system details page, click Volumes.
5. Click the Performance tab.
6. Set a time period for the performance chart. Set the start time to before the alert occurred and the end time to after the alert occurred.
7. Set the chart to display the following metrics:
 - Read Data Rate
 - Overall Response time
8. Sort the performance table by the Max Total I/O Rate column.
9. Click the volume with the highest Total I/O Rate to show the volume in the chart. Verify that the Read Data Rate spiked at the time that the alert occurred.

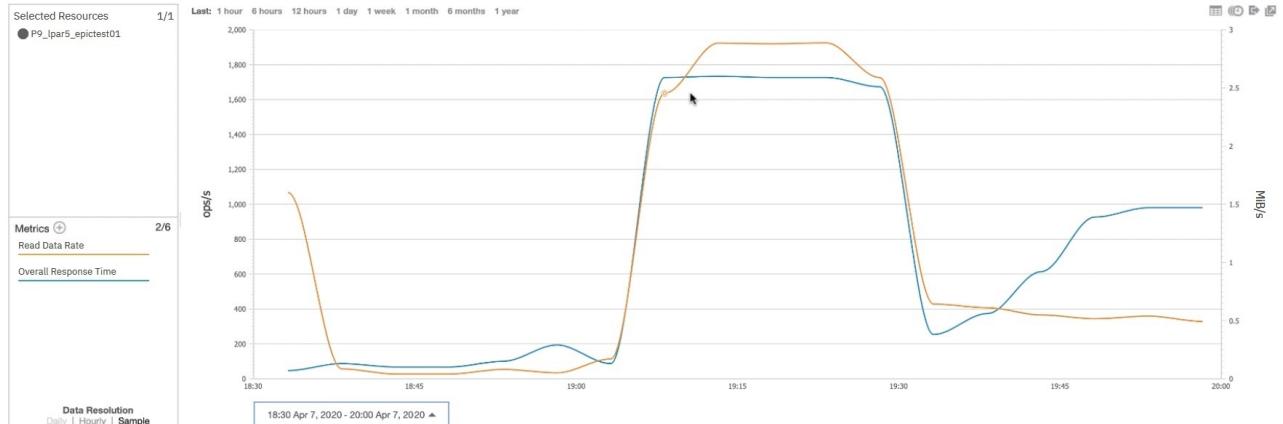


10. Right-click the volume in the performance table, then click Host Connection Performance.

11. Set the chart to display the following metrics:

- Read Data Rate
- Overall Response time

12. Verify that the spike for the Read Data Rate and the Overall Response Time occurred when the alert was triggered. If the spike occurred at the same time, the host **P9_1par5_epictest01** is the source of the slow drain that is causing problems on the storage system.



Tip: If the buffer credit problem occurs in a cluster, there might be multiple hosts that are mapped to the volume. In this case, you must investigate the hosts individually to determine which ones cause the delay in sending from the port.

Controls for performance views

The Performance page includes controls for you to customize how information is displayed. You can determine the performance metrics that are displayed for storage system resources such as volumes, disks, or ports and you can specify a time range for the information. You can also determine the port metrics that displayed for switches.



View chart

View performance information in a chart format. The chart shows a visual representation of how resource performance trends over time. Each line on the chart represents a metric and a resource. The y-axis shows the unit of measurement for a metric. If more metrics were selected with a different unit of measurement, an extra y-axis is shown on the right side of the chart window.

Hover the mouse pointer over points on a line to view a snapshot of performance information at a specific time.



View table

View performance information in a table format. Each row represents a resource and a time stamp. Each column represents a metric. You can view other metrics and information for a resource by right-clicking anywhere in the header row for the table and selecting more columns. The type of resource determines the metrics and information that is available. You can filter, sort, and customize the columns in a table.



Metrics

Add metrics to the performance chart. On the Select Chart Metrics dialog, metrics are organized into Volume, Disk, Pool, Port, and Node categories. The metrics and categories that are available depend on the type of resource that is being shown in the chart. The number next to the name of the category represents the number of metrics that are currently selected from that category. You can select multiple metrics at the same time and from different categories, but you cannot include more than two unit types in the same view. For example, if you select metrics that use % and ops/s as units of measurement, you cannot select more metrics that use different units of measurement such as KiB/op or MiB/s. When you have added metrics to the chart, you can select or deselect a metric from the list of displayed metrics to show or hide the corresponding line in the chart.



Hide and show resources

When the chart includes multiple resources, you can click the icon next to a resource to show only the line for that resource. Each icon is shown in a different color to match the color of line for the resource.

You can also show and hide resources in the chart by selecting resources in the performance chart legend. To select multiple resources at the same time, press Shift or Ctrl and click those resources. Press Shift and click to select consecutive rows in the chart legend; press Ctrl and click to select non-consecutive rows.

If you hide a resource in the performance chart, the row for that resource remains visible in the chart legend.

You can show up to 10 resources in a chart at the same time.

Data resolution

Determine the granularity of the data that is shown in a performance view. Granularity determines the points that are shown on the y-axis of a chart, the points on the lines in a chart, and the rows in a table. When you first view performance information, the default time range is the last 12 hours and the granularity matches the frequency of data collection (sample).

To change the granularity of chart or table, select one of the following options from the granularity menu:

Daily

Set the granularity to show 1-day increments for performance information that is shown on the chart and table.

This granularity is only available if the time range of the chart is more than one day.

Hourly

Set the granularity to show 1-hour increments for performance information that is shown on the chart and table.

This granularity is only available if the time range of the chart is more than one hour.

Sample

Set the granularity to show sample data collected, for example, at 15-minute intervals.

This granularity is only available if the time range of the chart is less than two weeks.

Data is displayed as 5-minute intervals in the chart only when data is available for all of the selected time range. If data is not available at 5-minute intervals for any portion of the selected time range, the data is displayed at 10-minute intervals.

Restriction: Each granularity has a maximum time range for displaying data. This time range is dynamically calculated based on the resources and metrics that are shown on the chart, and the data points per line. When the maximum range is exceeded, the granularity icon is disabled and a message indicates that there are too many lines on the chart. To avoid this problem, reduce the time range or the number of resources or metrics that are selected.

Specify a time range

You can change the time range to show performance metrics for a specific period.

Ensure that performance data was collected during the time range that you select. If data was not collected during the time range, the chart and table are blank. If data collection was interrupted during the time range, the chart and table show gaps for the time increments when data was not collected. For example, if you select a time range for the last seven days, but data was not collected on day 4 and day 5, the lines in the chart do not show data for days 4 and 5.



Hide and show chart controls

The performance view lists the names of resources that are being shown in the chart and the controls for customizing that chart.

Click the vertical line to hide the controls and display the chart in the entire window. Click the line again to show the controls.



Export information about the chart to a file

Export information in the chart or table to a CSV file.



Open the performance view in a separate web browser window

Open a duplicate of the current performance view in a separate web browser window. You can change the information that is displayed in this separate window while retaining the original performance view for comparison.



Synchronize the time range across all the open performance views

Synchronize the time range across all the performance views that are displayed in separate browser windows. Use this action when you change the time range in a performance view and want to apply the same time range to the other performance views.

Restriction: This action affects only the performance views that are displayed in separate browser windows. The time range of the performance view that is shown as part of the main window for the GUI is not affected.

For example, you can view the storage system volumes and open separate browser windows for the host connections, pools, and managed disks that are related to one of the volumes. If you change the time range in the performance view for host connections, click the synchronize button to apply the same time range to the views for pools and managed disks. The performance view of the original volume is not changed.

Actions for managing the resources in the performance chart legend

The performance chart legend in the bottom section of the view shows more information about the selected resources. Each row represents a storage system, and each column provides extra asset and performance information about the storage system.

On the Actions menu, the following actions are available when you select one or more resources in the chart legend:

View resource Performance

View the performance of resources that are internal or related to a resource in the chart legend. For example, when you view the performance of a SAN Volume Controller, you can right-click it and view the performance of its internal resources, such as disks, volumes, ports, managed disks, and back-end storage.

Information about an internal or related resource is shown in a separate web browser window. This window uses the same time range as the performance view in the main window of the GUI.

Tip: If you right-click a storage system and select Volume performance, only the volumes for which performance data was collected are shown. If performance data was not collected for an internal or related resource, that resource is not shown in the view.

View Properties

View key information about a resource, including asset, configuration, capacity, and performance information.

View Details

View key details about a resource, including capacity, system activity, and disk and volume utilization information.

Launch Storage System GUI

Open the GUI for the storage system.

Export

Export information in the chart legend to a CSV, PDF, or HTML file. Columns that are hidden in the chart legend are not included in the saved file.

On the Key Metrics View menu, the following actions are available when you select one or more resources in the chart legend:

Key Metrics View

View a set of predefined metrics for resources in the chart legend.

Custom View

Customize the set of metrics that are shown for resources in the chart legend.

On the Filter menus, you can filter the storage systems that are shown in the chart legend.

Related concepts

- [Customizing lists](#)

Related tasks

- [Viewing the performance of storage systems](#)

Related reference

- [Performance views](#)

Performance metrics

Collect and use metrics to measure the performance of storage systems that are monitored by IBM® Storage Insights Pro. Metrics are also collected to measure the performance of switches that are monitored.

You must deploy one or more data collectors to collect performance metadata. The metadata is collected, analyzed, and mined to gain valuable insights into the performance of your storage systems and their internal resources, such as pools and volumes. You also gain insights into switch performance through the collection of performance metadata for physical switches, switch ports, and Trunks.

With the metadata that is collected, historical and current performance charts are generated. You can use the charts to compare the performance of your storage resources over time, identify and troubleshoot performance anomalies, and compare the key performance indicators from your storage systems that run IBM Spectrum Virtualize with best practice guidelines.

Similarly, you can use historical and current performance charts to compare the performance of your switches over time, identify and troubleshoot performance anomalies, and compare key performance indicators from switches and ports.

Time zone determination: The time zone of the browser that you use to access IBM Storage Insights determines when the data is collected and the date and time that is shown in the chart and table views.

- [**Performance metrics for Dell EMC storage systems**](#)

Monitor the performance metrics that are collected for Unity, VMAX, and VNX storage systems.

- [**Performance metrics for IBM FlashSystem 900**](#)

To review trends in performance for IBM FlashSystem® 900 storage systems, you add performance metrics to performance charts.

Use the charts to monitor the performance of the storage systems.

- [**Performance metrics for Hitachi VSP storage systems**](#)

Monitor the performance metrics that are collected for storage systems.

- [**Performance metrics for NetApp storage systems**](#)

Monitor the performance metrics that are collected for NetApp storage systems that are running ONTAP 9.

- [**Performance metrics for Pure storage systems**](#)

Monitor the performance metrics that are collected for your Pure FlashArray//M and FlashArray//X storage systems.

- [**Performance metrics for IBM Spectrum Scale**](#)

Monitor the performance metrics that are collected for IBM Spectrum Scale storage systems.

- [**Performance metrics for DS8000**](#)

Monitor the performance metrics that are collected for DS8000® storage systems.

- [**Performance metrics for resources that run IBM Spectrum Virtualize**](#)

Monitor the performance metrics that are collected for IBM Spectrum Virtualize storage systems.

- [**Performance metrics for XIV, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R**](#)

Monitor the performance metrics that are collected for XIV® systems, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R.

Performance metrics for Dell EMC storage systems

Monitor the performance metrics that are collected for Unity, VMAX, and VNX storage systems.

Overview

The performance metrics are described in the following sections:

- [Unity storage systems](#)
- [VMAX storage systems](#)
- [VNX storage systems](#)

Restriction: For Dell EMC, performance metrics are only available for block storage systems.

Unity storage systems

The following performance metrics are available for Unity resources:

- [Volume metrics for Unity](#)
- [Disk metrics for Unity](#)
- [Port metrics for Unity](#)
- [Node metrics for Unity](#)
- [File system metrics for Unity](#)

A performance metric might apply to one or more storage resources. To check which resources the performance metric applies to, see the tips and the table footnotes.

Volume metrics for Unity

Volume performance metrics are divided into the following categories:

- [Key volume metrics](#)
- [Cache hit metrics](#)

Tip: You can view the volume metrics in [Key volume metrics](#) for the following resources:

- Volumes

- Pools
- Nodes
- Storage systems

Table 1. Key volume metrics

Metric	Description
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Response Time (Overall)	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.
Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.

Tip: You can view the volume metrics in [Cache hit metrics](#) for the following resources:

- Nodes
- Storage systems

Table 2. Cache hit metrics

Metric	Description
Overall I/O Cache Hits (Read) %	The percentage of all read operations that find data in the cache. This value includes both sequential and random read operations, and read operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because in the event of a cache miss, the data must be read from the back-end storage resources.
Overall I/O Cache Hits (Write) %	The percentage of all write operations that are handled in the cache. This value includes both sequential and random write operations, and write operations in the volume cache and volume copy cache where applicable.
Overall I/O Cache Hits (Total) %	The percentage of all read operations and write operations that are handled in the cache. This value includes both sequential and random read and write operations, and read and write operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.

Disk metrics for Unity

You can view the metrics in [Key disk metrics](#) for the following resources:

- Pools
- Disks
- Nodes
- Storage systems

Table 3. Key disk metrics

Metric	Definition
I/O Rate (Read)	The average number of read operations per second that are issued to the back-end storage resources.
I/O Rate (Write)	The average number of write operations per second that are issued to the back-end storage resources.
I/O Rate (Total)	The average number of I/O operations per second that are transmitted between the back-end storage resources and the component. This value includes both read and write operations.
Data Rate (Read)	The average number of MiB per second that are read from the back-end storage resources.
Data Rate (Write)	The average number of MiB per second that are written to the back-end storage resources.
Data Rate (Total)	The average rate at which data is transmitted between the back-end storage resources and the component. The rate is measured in MiB per second and includes both read and write operations.

Metric	Definition
Response Time (Overall)	The average number of milliseconds for the back-end storage resources to respond to a read or a write operation.
Transfer Size (Read)	The average number of KiB that are transferred per read operation from the back-end storage resources.
Transfer Size (Write)	The average number of KiB that are transferred per write operation to the back-end storage resources.
Transfer Size (Overall)	The average transfer size, in KiB, of a read or a write operation to the back-end storage resources.

Port metrics for Unity

You can view the metrics in [Key port metrics](#) for ports, nodes, and storage systems.

Table 4. Key port metrics

Metric	Description
I/O Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
I/O Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Send)	The average rate at which data is sent through the port. The rate is measured in MiB per second.
Data Rate (Receive)	The average rate at which data is received by the port. The rate is measured in MiB per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
Transfer Size (Send)	The average number of KiB that are transferred per send operation.
Transfer Size (Receive)	The average number of KiB that are transferred per receive operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

Node metrics for Unity

You can view the metrics in [Key node metrics](#) for nodes and storage systems.

Table 5. Key node metrics

Metric	Description
System CPU	The average percentage of time that the processors on nodes are busy doing system I/O tasks.

File system metrics for Unity

Unless otherwise noted, you can view the performance metrics in [Key file system metrics](#) for the following resources:

- Pools
- Nodes
- File systems
- Storage systems

Tip: For a storage system, the metrics contain summary values for all of the file systems on the storage system.

Table 6. Key file systems metrics

Metric	Definition
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.

Metric	Definition
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.

VMAX storage systems

The following performance metrics are available for VMAX resources:

- [Volume metrics for VMAX](#)
- [Disk metrics for VMAX](#)
- [Port metrics for VMAX](#)

A performance metric might apply to one or more storage resources. To check which resources the performance metric applies to, see the tips and the table footnotes.

Volume metrics for VMAX

Volume performance metrics are divided into the following categories:

- [Key volume metrics](#)
- [Cache hit metrics](#)
- [Transfer size metrics](#)

Tip: Unless otherwise noted, you can view the volume metrics in [Key volume metrics](#), [Cache hit metrics](#), and [Transfer size metrics](#) for the following resources:

- Volumes
- Directors
- Storage systems

Table 7. Key volume metrics

Metric	Description
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Response Time (Read) ¹	The average number of milliseconds to complete a read operation.
Response Time (Write) ¹	The average number of milliseconds to complete a write operation.
Response Time (Overall) ¹	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.
Volume Utilization ²	The average percentage of time that the volume is busy.
Normal I/O Rate (Read)	The average number of nonsequential read operations per second.
Normal I/O Rate (Write)	The average number of nonsequential write operations per second.
Normal I/O Rate (Total)	The average number of nonsequential I/O operations per second. This value includes both read and write operations.
Sequential I/O Rate (Read)	The average number of sequential read operations per second.

Metric	Description
Sequential I/O Rate (Write)	The average number of sequential write operations per second.
Sequential I/O Rate (Total)	The average number of sequential I/O operations per second. This value includes both read and write operations.
Note:	
1.	This metric is only available when you view the performance of volumes or storage systems.
2.	This metric is only available when you view the performance of volumes.

Table 8. Cache hit metrics

Metric	Description
Normal I/O Cache Hits (Read)	The percentage of nonsequential read operations that find data in the cache. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
Normal I/O Cache Hits (Write)	The percentage of nonsequential write operations that are handled in the cache.
Normal I/O Cache Hits (Total)	The percentage of nonsequential I/O operations that are handled in the cache. This value includes both read and write operations. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
Sequential I/O Cache Hits (Read)	The percentage of sequential read operations that find data in the cache. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
Sequential I/O Cache Hits (Write)	The percentage of sequential write operations that are handled in the cache.
Sequential I/O Cache Hits (Total)	The percentage of sequential I/O operations that are handled in the cache. This value includes both read and write operations. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
Overall I/O Cache Hits (Read)	The percentage of all read operations that find data in the cache. This value includes both sequential and random read operations, and read operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because in the event of a cache miss, the data must be read from the back-end storage resources.
Overall I/O Cache Hits (Write)	The average percentage of all write operations that are handled in the cache, across all volumes on the server. This value includes both sequential and nonsequential write operations.
Overall I/O Cache Hits (Total)	The percentage of all read operations and write operations that are handled in the cache. This value includes both sequential and random read and write operations, and read and write operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.

Table 9. Transfer size metrics

Metric	Description
Average Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Average Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Average Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.

Disk metrics for VMAX

Disk performance metrics for VMAX block storage systems are divided into the following categories:

- [Key disk metrics](#)
- [Transfer size metrics](#)

Table 10. Key disk metrics

Metric	Definition
I/O Rate (Read)	The average number of read operations per second that are issued to the back-end storage resources.
I/O Rate (Write)	The average number of write operations per second that are issued to the back-end storage resources.

Metric	Definition
I/O Rate (Total)	The average number of I/O operations per second that are transmitted between the back-end storage resources and the component. This value includes both read and write operations.
Data Rate (Read)	The average number of MiB per second that are read from the back-end storage resources.
Data Rate (Write)	The average number of MiB per second that are written to the back-end storage resources.
Data Rate (Total)	The average rate at which data is transmitted between the back-end storage resources and the component. The rate is measured in MiB per second and includes both read and write operations.
Response Time (Overall)	The average number of milliseconds for the back-end storage resources to respond to a read or a write operation.
Disk Utilization Percentage	The approximate utilization percentage of a particular array over a particular time interval, that is, the average percent of time that the disk associated with the array was busy.

Table 11. Transfer size metrics

Metric	Description
Transfer Size (Read)	The average number of KiB that are transferred per read operation from the back-end storage resources.
Transfer Size (Write)	The average number of KiB that are transferred per write operation to the back-end storage resources.
Transfer Size (Overall)	The average transfer size, in KiB, of a read or a write operation to the back-end storage resources.

Port metrics for VMAX

You can view the metrics below for ports and storage systems.

Table 12. Port metrics

Metric	Description
I/O Rate (Total)	The average number of send operations and receive operations per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
Response Time (Overall)	The average number of milliseconds to complete a send or receive operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

VNX storage systems

The following performance metrics are available for VNX resources:

- [Volume metrics for VNX](#)
- [Disk metrics for VNX](#)
- [Port metrics for VNX](#)

Volume metrics for VNX

Volume performance metrics are divided into the following categories:

- [Key volume metrics](#)
- [Transfer size metrics](#)

Tip: Unless otherwise noted, you can view the volume metrics in [Key volume metrics](#) and [Transfer size metrics](#) for the following resources:

- Volumes
- Nodes
- Storage systems

Table 13. Key volume metrics

Metric	Description
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.

Metric	Description
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.

Table 14. Transfer size metrics

Metric	Description
Average Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Average Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Average Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.

Disk metrics for VNX

Disk performance metrics for VNX storage systems are divided into the following categories:

- [Key disk metrics](#)
- [Transfer size metrics](#)

Table 15. Key disk metrics

Metric	Definition
I/O Rate (Read)	The average number of read operations per second that are issued to the back-end storage resources.
I/O Rate (Write)	The average number of write operations per second that are issued to the back-end storage resources.
I/O Rate (Total)	The average number of I/O operations per second that are transmitted between the back-end storage resources and the component. This value includes both read and write operations.
Data Rate (Read)	The average number of MiB per second that are read from the back-end storage resources.
Data Rate (Write)	The average number of MiB per second that are written to the back-end storage resources.
Data Rate (Total)	The average rate at which data is transmitted between the back-end storage resources and the component. The rate is measured in MiB per second and includes both read and write operations.

Table 16. Transfer size metrics

Metric	Description
Transfer Size (Read)	The average number of KiB that are transferred per read operation from the back-end storage resources.
Transfer Size (Write)	The average number of KiB that are transferred per write operation to the back-end storage resources.
Transfer Size (Overall)	The average transfer size, in KiB, of a read or a write operation to the back-end storage resources.

Port metrics for VNX

You can view the metrics below for ports and storage systems.

Table 17. Port metrics

Metric	Description
I/O Rate (Total)	The average number of send operations and receive operations per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

Performance metrics for IBM FlashSystem 900

To review trends in performance for IBM FlashSystem® 900 storage systems, you add performance metrics to performance charts. Use the charts to monitor the performance of the storage systems.

Overview

The performance metrics are described in the following sections:

- [Volume metrics](#)
- [Disk metrics](#)
- [Port metrics](#)

Restrictions:

- IBM FlashSystem 900 storage systems do not track performance for individual volumes. The volume metrics that are available are provided to allow comparisons across different storage systems, but represent performance that is measured for ports rather than for volumes.
- IBM® Storage Insights Pro supports only Fibre Channel adapters and ports that are installed on storage systems. For IBM FlashSystem 900 storage systems that have other types of ports, performance data is only available for the drives.
- Response time metrics are not available for all IBM FlashSystem 900 storage systems, depending on the firmware release of the storage system. To collect and view response time metrics, ensure that you have firmware level 1.4.5 or later.

Volume metrics

IBM FlashSystem 900 storage systems do not track the performance of individual volumes. Therefore, the performance metrics that you can view represent the sum of the measured performance of all the ports in the storage system.

Table 1. Metrics for volumes

Metric	Description
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Response Time (Read)	The average number of milliseconds to complete a read operation.
Response Time (Write)	The average number of milliseconds to complete a write operation.
Response Time (Total)	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.

Disk metrics

You can view the following performance metrics for drives or flash modules on IBM FlashSystem 900 storage systems.

Table 2. Metrics for disks

Metric	Description
Data Rate (Read)	The average number of MiB per second that are read from the back-end storage resources.
Data Rate (Write)	The average number of MiB per second that are written to the back-end storage resources.
Data Rate (Total)	The average rate at which data is transmitted between the back-end storage resources and the component. The rate is measured in MiB per second and includes both read and write operations.
Flash Health Percentage	The overall flash module health. The health percentage is calculated based on the number of unusable blocks on the flash module.

Port metrics

You can view the following port performance metrics for Fibre Channel ports on IBM FlashSystem 900 storage systems. No performance data is available for InfiniBand or FCoE ports.

Table 3. Metrics for ports

Metric	Description
Bandwidth (Send)	The percentage of the port bandwidth that is used for send operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth (Receive)	The percentage of the port bandwidth that is used for receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth (Total)	The percentage of the port bandwidth that is used for send and receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Data Rate (Send)	The average rate at which data is sent through the port. The rate is measured in MiB per second.
Data Rate (Receive)	The average rate at which data is received by the port. The rate is measured in MiB per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
I/O Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
I/O Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
I/O Rate (Total)	The average number of send operations and receive operations per second.
Response Time (Send)	The average number of milliseconds to complete a send operation.
Response Time (Receive)	The average number of milliseconds to complete a receive operation.
Response Time (Overall)	The average number of milliseconds to complete a send or receive operation.
Transfer Size (Send)	The average number of KiB that are transferred per send operation.
Transfer Size (Receive)	The average number of KiB that are transferred per receive operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

Performance metrics for Hitachi VSP storage systems

Monitor the performance metrics that are collected for storage systems.

The following performance metrics are available for Hitachi VSP storage systems.

- [Volume metrics](#)
- [Port metrics](#)
- [Node metrics](#)

A performance metric might apply to one or more storage resources. To check which resources the performance metric applies to, see the tips.

Volume metrics

Volume performance metrics are divided into the following categories:

- [Key volume metrics](#)
- [Cache hit metrics](#)

Tip: You can view the volume metrics in [Key volume metrics](#) for the following resources:

- Volumes
- Pools
- Storage systems

Table 1. Key volume metrics

Metric	Description
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.

Metric	Description
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Response Time (Read)	The average number of milliseconds to complete a read operation.
Response Time (Write)	The average number of milliseconds to complete a write operation.
Response Time (Overall)	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.
Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.

Tip: You can view the volume metrics in [Cache hit metrics](#) for the following resources:

- Volumes
- Pools
- Storage systems

Table 2. Cache hit metrics

Metric	Description
Overall I/O Cache Hits (Read) %	The percentage of all read operations that find data in the cache. This value includes both sequential and random read operations, and read operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because in the event of a cache miss, the data must be read from the back-end storage resources.
Overall I/O Cache Hits (Write) %	The percentage of all write operations that are handled in the cache. This value includes both sequential and random write operations, and write operations in the volume cache and volume copy cache where applicable.

Port metrics

You can view the metrics in [Key port metrics](#) for ports and storage systems.

Table 3. Key port metrics

Metric	Description
I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
Response Time (Overall)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

Node metrics

You can view the metrics in [Key node metrics](#) for storage systems.

Table 4. Key node metrics

Metric	Description
System CPU	The average percentage of time that the processors on nodes are busy doing system I/O tasks.

Performance metrics for NetApp storage systems

Monitor the performance metrics that are collected for NetApp storage systems that are running ONTAP 9.

The following performance metrics are available for storage systems that are running ONTAP 9:

- [Volume metrics](#)
- [Disk metrics](#)
- [Port metrics](#)
- [Node metrics](#)
- [File system metrics](#)

A performance metric might apply to one or more storage resources. To check which resources the performance metric applies to, see the tips.

Volume metrics

Volume performance metrics are divided into the following categories:

- [Key volume metrics](#)
- [Cache hit metrics](#)

Tip: You can view the volume metrics in [Key volume metrics](#) for the following resources:

- Volumes
- Pools
- Nodes
- Storage systems

Table 1. Key volume metrics

Metric	Description
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Response Time (Read)	The average number of milliseconds to complete a read operation.
Response Time (Write)	The average number of milliseconds to complete a write operation.
Response Time (Overall)	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.
Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.

Volume cache hit metrics are only available when you view the performance of nodes or storage systems. To check which resources a volume cache hit metric applies to, see the table footnotes.

Table 2. Cache hit metrics

Metric	Description
Overall I/O Cache Hits (Read) % ¹	The percentage of all read operations that find data in the cache. This value includes both sequential and random read operations, and read operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because in the event of a cache miss, the data must be read from the back-end storage resources.
Notes:	<ol style="list-style-type: none">1. This metric is only available when you view the performance of storage systems.

Disk metrics

Disk performance metrics for NetApp storage systems that are running ONTAP 9 are described in [Key disk metrics](#).

Tip: You can view the disk metrics in [Key disk metrics](#) for the following resources:

- Pools
- Disks
- Nodes
- Storage systems

Table 3. Key disk metrics

Metric	Definition
I/O Rate (Read)	The average number of read operations per second that are issued to the back-end storage resources.
I/O Rate (Write)	The average number of write operations per second that are issued to the back-end storage resources.
I/O Rate (Total)	The average number of I/O operations per second that are transmitted between the back-end storage resources and the component. This value includes both read and write operations.
Data Rate (Read)	The average number of MiB per second that are read from the back-end storage resources.
Data Rate (Write)	The average number of MiB per second that are written to the back-end storage resources.
Data Rate (Total)	The average rate at which data is transmitted between the back-end storage resources and the component. The rate is measured in MiB per second and includes both read and write operations.
Response Time (Read)	The average number of milliseconds for the back-end storage resources to respond to a read operation.
Response Time (Write)	The average number of milliseconds for the back-end storage resources to respond to a write operation.
Response Time (Overall)	The average number of milliseconds for the back-end storage resources to respond to a read or a write operation.
Transfer Size (Read)	The average number of KiB that are transferred per read operation from the back-end storage resources.
Transfer Size (Write)	The average number of KiB that are transferred per write operation to the back-end storage resources.
Transfer Size (Overall)	The average transfer size, in KiB, of a read or a write operation to the back-end storage resources.

Port metrics

Port performance metrics are described in [Key port metrics](#).

Tip: You can view the port metrics in [Key port metrics](#) for the following resources:

- Ports
- Nodes
- Storage systems

Table 4. Key port metrics

Metric	Description
I/O Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
I/O Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
I/O Rate (Total)	The average number of send operations and receive operations per second.
Response Time (Send)	The average number of milliseconds to complete a send operation.
Response Time (Receive)	The average number of milliseconds to complete a receive operation.
Response Time (Overall)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
Data Rate (Send)	The average rate at which data is sent through the port. The rate is measured in MiB per second.
Data Rate (Receive)	The average rate at which data is received by the port. The rate is measured in MiB per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.

Metric	Description
Transfer Size (Send)	The average number of KiB that are transferred per send operation.
Transfer Size (Receive)	The average number of KiB that are transferred per receive operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

Node metrics

You can view the metrics in [Key node metrics](#) for storage systems.

Table 5. Key node metrics

Metric	Description
System CPU	The average percentage of time that the processors on nodes are busy doing system I/O tasks.

File system metrics

Unless otherwise noted, you can view the performance metrics in [Key file system metrics](#) for the following resources:

- Pools
- Nodes
- File systems
- Storage systems

Tip: For a storage system, the metrics contain summary values for all of the file systems on the storage system.

Table 6. Key file systems metrics

Metric	Definition
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Response Time (Read)	The average number of milliseconds to complete a read operation.
Response Time (Write)	The average number of milliseconds to complete a write operation.
Response Time (Overall)	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.

Performance metrics for Pure storage systems

Monitor the performance metrics that are collected for your Pure FlashArray//M and FlashArray//X storage systems.

A performance metric might apply to one or more storage resources. To check which resources the performance metric applies to, see the tips.

Volume metrics

Volume performance metrics are described in the [Key volume metrics](#) table.

Tip: You can view the volume metrics in [Key volume metrics](#) for the following resources:

- Volumes
- Storage systems

Table 1. Key volume metrics

Metric	Description
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Response Time (Read)	The average number of milliseconds to complete a read operation.
Response Time (Write)	The average number of milliseconds to complete a write operation.
Response Time (Overall)	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.

Performance metrics for IBM Spectrum Scale

Monitor the performance metrics that are collected for IBM Spectrum Scale storage systems.

Overview

The performance metrics are divided into the following categories:

- [Node performance metrics](#)
- [File system performance metrics](#)

Node performance metrics

You can view the following metrics for each IBM Spectrum Scale cluster node.

Table 1. Metrics for nodes

Metric	Definition
CPU Utilization (User)	The average percentage of time that the processors on a node are busy doing user tasks.
CPU Utilization (System)	The average percentage of time that the processors on a node are busy doing system tasks.
CPU Utilization (Total)	The average percentage of time that the processors on a node are busy doing user tasks and system tasks.
Memory Used (Cache and Buffer)	The average percentage of memory on a node that is used for cache and buffer memory.
Memory Used	The average percentage of memory that is used on a node. This value does not include the memory that is used for cache and buffer memory.
Memory Used (Total)	The average percentage of memory that is used on a node. This value includes the memory that is used for cache and buffer memory.
I/O Rate (Read)	The average number of read operations per second.
I/O Rate (Write)	The average number of write operations per second.
I/O Rate (Total)	The average number of read operations and write operations per second.

File system performance metrics

You can view file system metrics for the following resources:

- File systems

- IBM Spectrum Scale storage systems

Tip: For a storage system, the metrics contain summary values for all the file systems on the storage system.

Table 2. Metrics for file systems

Metric	Definition
Data Rate (Read)	The average number of MiB per second that are transferred for read operations.
Data Rate (Write)	The average number of MiB per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Maximum Data Rate (Read)	The maximum number of MiB per second that are transferred for read operations.
Maximum Data Rate (Write)	The maximum number of MiB per second that are transferred for write operations.
Maximum Data Rate (Total)	The maximum number of MiB per second that are transferred for read operations and write operations.
I/O Rate (Read)	The average number of read operations per second.
I/O Rate (Write)	The average number of write operations per second.
I/O Rate (Total)	The average number of read operations and write operations per second.
Maximum I/O Rate (Read)	The maximum number of read operations per second.
Maximum I/O Rate (Write)	The maximum number of write operations per second.
Maximum I/O Rate (Total)	The maximum number of read operations and write operations per second.
Response Time (Read)	The average number of milliseconds for the back-end storage resources to respond to a read operation from the file system.
Response Time (Write)	The average number of milliseconds for the back-end storage resources to respond to a write operation from the file system.
Response Time (Overall)	The average number of milliseconds for the back-end storage resources to respond to a read operation or a write operation from the file system.

Related tasks

- [Configuring the collection of performance data for IBM Spectrum Scale](#)

Performance metrics for DS8000

Monitor the performance metrics that are collected for DS8000® storage systems.

Overview

Performance metrics are available for the following resources:

- [Volume metrics](#)
- [Disk metrics](#)
- [Port metrics](#)
- [Host adapter metrics](#)

A performance metric might apply to one or more storage resources. To check which resources the performance metric applies to, see the tips and the table footnotes.

Volume metrics

Volume performance metrics are divided into the following categories:

- [Key volume metrics](#)
- [I/O rate metrics](#)
- [Cache hit percentage metrics](#)
- [Average transfer size and HPF I/O metrics](#)

Tip: Unless otherwise noted, you can view the volume metrics in [Table 1](#), [Table 2](#), [Table 3](#), and [Table 4](#) for the following resources:

- Volumes
- Pools
- Controllers
- Host connections
- Storage systems

Table 1. Key volume metrics

Metric	Description
Cache Holding Time ¹	The average number of seconds that I/O data for a storage system node is held in the cache. A short cache-holding time indicates adverse performance.
Pool Activity Score ²	The activity level of pools, which is set to the following value: [Read I/O Rate × (1 – Read I/O Cache Hit %)] ÷ Total Pool Capacity
Volume Utilization ³	The average percentage of time that the volume is busy.
Write-Cache Delay Percentage	The percentage of I/O operations that are delayed because of space constraints in the write cache, or because of other conditions. The value is a percentage of all operations. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3. The metric is an approximation because actual transfer rates are different for each cache layer. Therefore, you cannot directly compare this metric from resources that are V7.3 or later with earlier versions.
Note:	<ol style="list-style-type: none"> 1. This metric is only available when you view the performance of controllers or storage systems. 2. This metric is only available when you view the performance of pools. 3. This metric is only available when you view the performance of volumes.

Table 2. I/O Rates

Metric	Description
Average Transfer Rate (Cache-to-Disk) ¹	The average number of sectors or tracks per second that are transferred from the cache to the disks.
Average Transfer Rate (Disk-to-Cache) ¹	The percentage of cache hits for record-mode read operations. For record-mode read operations, only the requested data, rather than a full track of data, is managed in the cache.
High Performance FICON® (Read)	The average number of read operations per second that are issued by the High Performance FICON feature of the storage system.
High Performance FICON (Write)	The average number of write operations per second that are issued by the High Performance FICON feature of the storage system.
High Performance FICON (Total)	The average number of I/O operations per second that are issued by the High Performance FICON feature of the storage system. This value includes both read and write operations.
Normal I/O Rate (Read)	The average number of nonsequential read operations per second.
Normal I/O Rate (Write)	The average number of nonsequential write operations per second.
Normal I/O Rate (Total)	The average number of nonsequential I/O operations per second. This value includes both read and write operations.
PPRC Transfer Rate	The average number of tracks per second that are transferred to the secondary device of a Peer-to-Peer Remote Copy (PPRC) pair. This value shows the activity for the source of the PPRC relationship, but shows no activity for the target.
Record Mode Read I/O Rate ¹	The average number of I/O operations per second for record-mode read operations. For record-mode read operations, only the requested data is managed in the cache rather than a full track of data.
Sequential I/O Rate (Read)	The average number of sequential read operations per second.
Sequential I/O Rate (Write)	The average number of sequential write operations per second.
Sequential I/O Rate (Total)	The average number of sequential I/O operations per second. This value includes both read and write operations.

Metric	Description
Write-Cache Delay I/O Rate	The average number of I/O operations per second that are delayed because of space constraints in the write cache, or because of other conditions. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3. The metric is an approximation because actual transfer rates are different for each cache layer. Therefore, you cannot directly compare this metric from resources that are V7.3 or later with earlier versions.

Note:

1. This metric is only available when you view the performance of volumes, pools, controllers, and host connections.

Table 3. Cache hit percentages

Metric	Description
Normal I/O Cache Hits (Read)	The percentage of nonsequential read operations that find data in the cache. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
Normal I/O Cache Hits (Write)	The percentage of nonsequential write operations that are handled in the cache.
Normal I/O Cache Hits (Total)	The percentage of nonsequential I/O operations that are handled in the cache. This value includes both read and write operations. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
Record Mode Read Cache Hit Percentage ¹	The percentage of cache hits for record-mode read operations. For record-mode read operations, only the requested data, rather than a full track of data, is managed in the cache.
Sequential I/O Cache Hits (Read)	The percentage of sequential read operations that find data in the cache. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
Sequential I/O Cache Hits (Write)	The percentage of sequential write operations that are handled in the cache.
Sequential I/O Cache Hits (Total)	The percentage of sequential I/O operations that are handled in the cache. This value includes both read and write operations. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.

Note:

1. This metric is only available when you view the performance of volumes, pools, controllers, and host connections.

Table 4. Average transfer size, HPF I/O, and miscellaneous metrics

Metric	Description
HPF I/O Percentage	The percentage of all I/O operations that are issued by the High Performance FICON feature of the storage system.

Disk metrics

Disk performance metrics are divided into the following categories:

- [Key disk metrics](#)
- [Transfer size metrics](#)

Tip: Unless otherwise noted, you can view the volume metrics in [Table 5](#) and [Table 6](#) for the following resources:

- Ranks
- RAID arrays
- Pools
- Controllers
- Storage systems

Table 5. Key disk metrics

Metric	Description
Data Rate (Read)	The average number of MiB per second that are read from the back-end storage resources.
Data Rate (Write)	The average number of MiB per second that are written to the back-end storage resources.
Data Rate (Total)	The average rate at which data is transmitted between the back-end storage resources and the component. The rate is measured in MiB per second and includes both read and write operations.

Metric	Description
Disk Utilization Percentage ¹	The average percentage of time that the disks that are associated with an array are busy. No value is calculated for this property if there are multiple ranks in the extent pool where the thin-provisioned volumes are allocated. In this case, the value N/A is displayed. This limitation applies only to DS8000 storage systems. If there is only a single rank in the extent pool, the value for this property is calculated regardless of the thin-provisioned volumes. Available for: RAID arrays on DS8000 version 8.5.0 and later. For earlier versions, the value N/A is shown in the performance table view and the metric is not shown on the performance chart.
I/O Rate (Read)	The average number of read operations per second that are issued to the back-end storage resources.
I/O Rate (Write)	The average number of write operations per second that are issued to the back-end storage resources.
I/O Rate (Total)	The average number of I/O operations per second that are transmitted between the back-end storage resources and the component. This value includes both read and write operations.
Response Time (Read)	The average number of milliseconds for the back-end storage resources to respond to a read operation.
Response Time (Write)	The average number of milliseconds for the back-end storage resources to respond to a write operation.
Response Time (Overall)	The average number of milliseconds for the back-end storage resources to respond to a read or a write operation.
Note:	
1. This metric is only available when you view the performance of RAID arrays.	

Table 6. Transfer size metrics

Metric	Description
Average Transfer Size (Read)	The average number of KiB that are transferred per read operation from the back-end storage resources.
Average Transfer Size (Write)	The average number of KiB that are transferred per write operation to the back-end storage resources.
Average Transfer Size (Overall)	The average transfer size, in KiB, of a read or a write operation to the back-end storage resources.

Port metrics

Port performance metrics are divided into the following categories:

- [Key port metrics](#)
- [Port I/O rate metrics](#)
- [Port data rate metrics](#)
- [Port response time metrics](#)
- [Error rate metrics](#)
- [Remote mirror metrics](#)
- [Transfer size metrics](#)

Tip: Unless otherwise noted, you can view the port metrics in [Table 7](#), [Table 11](#), [Table 12](#), and [Table 13](#) for ports and storage systems. The port metrics in [Table 8](#), [Table 9](#), and [Table 10](#) are only available for ports.

Table 7. Key port metrics

Metric	Description
Data Rate (Receive)	The average rate at which data is received by the port. The rate is measured in MiB per second.
Data Rate (Send)	The average rate at which data is sent through the port. The rate is measured in MiB per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
I/O Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
I/O Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
I/O Rate (Total)	The average number of send operations and receive operations per second.
Response Time (Receive)	The average number of milliseconds to complete a receive operation.
Response Time (Send)	The average number of milliseconds to complete a send operation.
Response Time (Overall)	The average number of milliseconds to complete a send or receive operation.
Port Utilization (Receive) ¹	The average percentage of time that the port is busy receiving data.

Metric	Description
Port Utilization (Send) ¹	The average percentage of time that the port is busy sending data.
Port Utilization (Overall) ¹	The average percentage of time that the port is busy sending or receiving data.
Bandwidth (Receive) ¹	The percentage of the port bandwidth that is used for receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth (Send) ¹	The percentage of the port bandwidth that is used for send operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth (Overall) ¹	The percentage of the port bandwidth that is used for send and receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Note:	
1. This metric is only available when you view the performance of ports.	

Table 8. Port I/O rate metrics

Metric	Description
FICON I/O Rate (Send)	The average number of send operations per second for Fibre Channel connection (FICON) usage.
FICON I/O Rate (Receive)	The average number of receive operations per second for FICON usage.
FICON I/O Rate (Total)	The average number of send and receive operations per second for FICON usage.
FCP I/O Rate (Send)	The average number of send operations per second for Fibre Channel Protocol (FCP) usage.
FCP I/O Rate (Receive)	The average number of receive operations per second for FCP usage.
FCP I/O Rate (Total)	The average number of send operations and receive operations per second for FCP usage.

Table 9. Port data rates

Metric	Description
FICON Data Rate (Send)	The average number of MiB per second that is sent for FICON usage.
FICON Data Rate (Receive)	The average number of MiB per second that is received for FICON usage.
FICON Data Rate (Total)	The average number of MiB per second that is transferred for FICON usage. This value includes both send and receive FICON operations.
FCP Data Rate (Send)	The average number of MiB per second that are sent for FCP usage.
FCP Data Rate (Receive)	The average number of MiB per second that are received for FCP usage.
FCP Data Rate (Total)	The average number of MiB per second that are transferred for FCP usage. This value includes both send and receive FCP operations.

Table 10. Port response times

Metric	Description
FICON Response Time (Send)	The average number of milliseconds to complete a send operation for FICON usage.
FICON Response Time (Receive)	The average number of milliseconds to complete a receive operation for FICON usage.
FICON Response Time (Overall)	The average number of milliseconds to complete a send or receive operation for FICON usage. This value includes both send and receive FICON operations.
FCP Response Time (Send)	The average number of milliseconds to complete a send operation for FCP usage.
FCP Response Time (Receive)	The average number of milliseconds to complete a receive operation for FCP usage.
FCP Response Time (Overall)	The average number of milliseconds to complete a send or receive operation for FCP usage.

Table 11. Error rate metrics.

Tip: You can view the following metrics for ports and storage systems.

Metric	Description
Frame Errors (CRC Errors)	The average number of frames per second that are received in which a cyclic redundancy check (CRC) error is detected. A CRC error is detected when the CRC in the transmitted frame does not match the CRC computed by the receiver. For Brocade switches, this metric includes only the CRC Errors with a good end-of-frame (EOF) indicator.
Frame Errors (Error Frame)	The average number of error frames per second that are received. An error frame is a frame that violates the Fibre Channel Protocol.

Metric	Description
Frame Errors (Invalid Relative Offset Rate)	The average number of times per second that frames are received with an invalid relative offset in the frame header.
Link Errors (Invalid Link Transmission)	The average number of times per second that an invalid transmission word was detected by the port while the link did not experience any signal or synchronization loss.
Link Errors (Invalid Transmission Words)	The average number of bit errors per second that are detected.
Link Errors (Link Failures)	The average number of miscellaneous fibre channel link errors per second for ports. Link errors might occur when an unexpected Not Operational (NOS) is received or a link state machine failure was detected.
Link Errors (Primitive Sequence Protocol Error Rate)	The average number of primitive sequence protocol errors per second that are detected. This error occurs when there is a link failure for a port.
Link Errors (Sequence Timeouts)	The average number of times per second that the port detects a timeout condition after the port receives a sequence initiative for a Fibre Channel exchange.
Link Errors (Signal Loss)	The average number of times per second at which the port lost communication with its partner port. These types of errors usually indicate physical link problems, caused by faulty SFP modules or cables, or caused by faulty connections at the switch or patch panel. However, in some cases, this error can also occur when the maximum link distance between ports is exceeded, for the type of connecting cable and light source.
Link Errors (Sync Loss)	The average number of times per second that the port lost synchronization with its partner port. These types of errors usually indicate physical link problems, caused by faulty SFP modules or cables, or caused by faulty connections at the switch or patch panel. However in some cases this can also occur due to mismatching port speeds between the partner ports, when auto-negotiation of link speed is disabled.
Port Protocol Errors (Credit Recovery Link Resets)	The estimated average number of link resets per second that a switch or port completed to recover buffer credits. This estimate attempts to disregard link resets that were caused by link initialization. When you troubleshoot a SAN, use this metric to help identify port conditions that might slow the performance of the resources to which those ports are connected.
Port Protocol Errors (Duplicate Frames)	The average number of duplicate frames per second that are received. A duplicate frame is a frame that the system previously processed for the port.
Port Protocol Errors (Link Reset Received)	The average number of times per second that the port changes from an active (AC) state to a Link Recovery (LR2) state.
Port Protocol Errors (Link Reset Transmitted)	The average number of times per second that the port changes from an active (AC) state to a Link Recovery (LR1) state.
Port Protocol Errors (Out of Order ACK)	The average number of times per second that an out-of-order acknowledge (ACK) frame is detected. An ACK frame is used for end-to-end flow control and is sent to verify receipt of a frame.
Port Protocol Errors (Out of Order Data)	The average number of times per second that an out-of-order frame is detected.
Note:	
1. This metric is only available when you view the performance of ports.	

Table 12. Remote mirror metrics

Metric	Description
PPRC Data Rate (Receive)	The average number of MiB per second that are received by using the Peer-to-Peer Remote Copy (PPRC) protocol.
PPRC Data Rate (Send)	The average number of MiB per second that are sent by using the PPRC protocol.
PPRC Data Rate (Total)	The average number of MiB per second that are transferred by using the PPRC protocol. This value includes both send and receive PPRC operations.

Metric	Description
PPRC I/O Rate (Receive)	The average number of operations per second that are received by using the PPRC protocol.
PPRC I/O Rate (Send)	The average number of operations per second that are sent by using the PPRC protocol.
PPRC I/O Rate (Total)	The average number of send operations and receive operations per second using the PPRC protocol.
PPRC Response Time (Receive)	The average number of milliseconds to complete a receive operation by using the PPRC protocol.
PPRC Response Time (Send)	The average number of milliseconds to complete a send operation by using the PPRC protocol.
PPRC Response Time (Overall)	The average number of milliseconds to complete a send or receive operation by using the PPRC protocol.

Table 13. Transfer size metrics

Metric	Description
Average Transfer Size (Receive)	The average number of KiB that are transferred per receive operation.
Average Transfer Size (Send)	The average number of KiB that are transferred per send operation.
Average Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

»

Host adapter metrics

Host adapter performance metrics are divided into the following categories:

- [Key metrics](#)
- [I/O rate metrics](#)
- [Data rate metrics](#)
- [Response time metrics](#)
- [Remote mirror metrics](#)
- [Transfer size metrics](#)
- [Error rate metrics](#)

Table 14. Key metrics

Metric	Description
Data Rate (Receive)	The average rate at which data is received by the port. The rate is measured in MiB per second.
Data Rate (Send)	The average rate at which data is sent through the port. The rate is measured in MiB per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.
I/O Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
I/O Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
I/O Rate (Total)	The average number of send operations and receive operations per second.
Response Time (Receive)	The average number of milliseconds to complete a receive operation.
Response Time (Send)	The average number of milliseconds to complete a send operation.
Response Time (Overall)	The average number of milliseconds to complete a send or receive operation.

Table 15. I/O rate metrics

Metric	Description
FICON I/O Rate (Send)	The average number of send operations per second for Fibre Channel connection (FICON) usage.
FICON I/O Rate (Receive)	The average number of receive operations per second for FICON usage.
FICON I/O Rate (Total)	The average number of send and receive operations per second for FICON usage.
FCP I/O Rate (Send)	The average number of send operations per second for Fibre Channel Protocol (FCP) usage.
FCP I/O Rate (Receive)	The average number of receive operations per second for FCP usage.
FCP I/O Rate (Total)	The average number of send operations and receive operations per second for FCP usage.

Table 16. Data rates

Metric	Description

Metric	Description
FICON Data Rate (Send)	The average number of MiB per second that is sent for FICON usage.
FICON Data Rate (Receive)	The average number of MiB per second that is received for FICON usage.
FICON Data Rate (Total)	The average number of MiB per second that is transferred for FICON usage. This value includes both send and receive FICON operations.
FCP Data Rate (Send)	The average number of MiB per second that are sent for FCP usage.
FCP Data Rate (Receive)	The average number of MiB per second that are received for FCP usage.
FCP Data Rate (Total)	The average number of MiB per second that are transferred for FCP usage. This value includes both send and receive FCP operations.

Table 17. Response times

Metric	Description
FICON Response Time (Send)	The average number of milliseconds to complete a send operation for FICON usage.
FICON Response Time (Receive)	The average number of milliseconds to complete a receive operation for FICON usage.
FICON Response Time (Overall)	The average number of milliseconds to complete a send or receive operation for FICON usage. This value includes both send and receive FICON operations.
FCP Response Time (Send)	The average number of milliseconds to complete a send operation for FCP usage.
FCP Response Time (Receive)	The average number of milliseconds to complete a receive operation for FCP usage.
FCP Response Time (Overall)	The average number of milliseconds to complete a send or receive operation for FCP usage.

Table 18. Remote mirror metrics

Metric	Description
PPRC Data Rate (Receive)	The average number of MiB per second that are received by using the Peer-to-Peer Remote Copy (PPRC) protocol.
PPRC Data Rate (Send)	The average number of MiB per second that are sent by using the PPRC protocol.
PPRC Data Rate (Total)	The average number of MiB per second that are transferred by using the PPRC protocol. This value includes both send and receive PPRC operations.
PPRC I/O Rate (Receive)	The average number of operations per second that are received by using the PPRC protocol.
PPRC I/O Rate (Send)	The average number of operations per second that are sent by using the PPRC protocol.
PPRC I/O Rate (Total)	The average number of send operations and receive operations per second using the PPRC protocol.
PPRC Response Time (Receive)	The average number of milliseconds to complete a receive operation by using the PPRC protocol.
PPRC Response Time (Send)	The average number of milliseconds to complete a send operation by using the PPRC protocol.
PPRC Response Time (Overall)	The average number of milliseconds to complete a send or receive operation by using the PPRC protocol.

Table 19. Transfer size metrics

Metric	Description
Average Transfer Size (Receive)	The average number of KiB that are transferred per receive operation.
Average Transfer Size (Send)	The average number of KiB that are transferred per send operation.
Average Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both send and receive operations.

Table 20. Error rate metrics

Metric	Description
Extreme I/O Concurrency Rate	The average number of times per second that the port on DS8000 had more than 1500 concurrent I/O operations or exchanges. The number of concurrent I/O operations for a port on DS8000 cannot exceed 2000.
Extreme I/O Concurrency Percentage	The average percentage of I/O operations for which the port on DS8000 had more than 1500 concurrent I/O operations or exchanges. The number of concurrent I/O operations for ports on DS8000 cannot exceed 2000.

Metric	Description
I/O Busy Rate	The average number of times per second that the port on DS8000 returned a SCSI Queue Full or a Busy status to the server. Ports can return these statuses if the number of I/O operations or exchanges exceeds an internal DS8000 threshold.
I/O Busy Percentage	The average percentage of I/O operations or exchanges for which the port on DS8000 returned a SCSI Queue Full or a Busy status to the server. Ports can return these statuses if the number of I/O operations exceeds an internal DS8000 threshold.
I/O Overrun Rate	The average number of times per second that the port on DS8000 had to discard commands because the number of concurrent I/O operations or exchanges for the port exceeded 2000.
I/O Overrun Percentage	The average percentage of I/O operations that the port on DS8000 had to discard because the number of concurrent I/O operations or exchanges for the port exceeded 2000.
Zero Send Buffer Credit Percentage	The amount of time, as a percentage, that the port on DS8000 had depleted its send buffer credits. That is, the percentage of time that the receiving port had no credit to provide to the port on DS8000.
Zero Receive Buffer Credit Percentage	The amount of time, as a percentage, that the port on DS8000 had depleted its receive buffer credits. That is, the percentage of time that the port on DS8000 had no credit to provide to the sending port.

«

Performance metrics for resources that run IBM Spectrum® Virtualize

Monitor the performance metrics that are collected for IBM Spectrum Virtualize storage systems.

Overview

In this documentation, IBM Spectrum Virtualize is used to refer collectively to IBM® SAN Volume Controller, IBM Spectrum Virtualize for Public Cloud, IBM Spectrum Virtualize as Software Only, and IBM Storwize® storage systems, and to IBM FlashSystem® devices that run IBM Spectrum Virtualize.

Definitions are provided for the performance metrics that are collected for the following storage systems:

- FlashSystem 5000
- FlashSystem 5100
- FlashSystem 7200
- FlashSystem 9100
- FlashSystem 9200
- FlashSystem V9000
- SAN Volume Controller
- IBM Spectrum Virtualize for Public Cloud
- Storwize V3500
- Storwize V3700
- Storwize V5000
- Storwize V7000
- Storwize V7000 Unified (block storage only)

The following terms are used in the performance metrics for these storage systems:

Stage

To write data from a disk to the cache. The data is not prefetched data.

Destage

To write data from the cache to a disk.

Prestage

To write prefetched data from a disk to the cache.

The performance metrics are divided into the following categories:

- [Volume performance metrics](#)
- [Disk performance metrics](#)
- [Pool performance metrics](#)
- [Port performance metrics](#)
- [Node performance metrics](#)

Volume performance metrics

Volume performance metrics are divided into the following categories:

- [Key metrics for volumes](#)
- [I/O rate metrics for volumes](#)
- [Cache hit percentage metrics for volumes](#)
- [Response time metrics for volumes](#)
- [Remote mirror metrics for volumes](#)
- [Volume cache \(VC\) metrics for volumes](#)
- [Volume copy cache \(VCC\) metrics for volumes](#)
- [Compression metrics for volumes](#)
- [Miscellaneous metrics for volumes](#)
- [Legacy cache metrics for volumes](#)

Tip:

Unless otherwise noted, you can view the volume metrics in [Table 1](#), [Table 2](#), [Table 3](#), [Table 4](#), [Table 5](#), [Table 6](#), [Table 7](#), [Table 9](#), and [Table 10](#) for the following resources:

- Host connections
- I/O groups
- Nodes
- Pools
- Storage systems
- Volumes

Table 1. Key metrics for volumes

Metric	Definition
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Unmap) ¹	The average number of MiBs per second that were unmapped. This metric corresponds to the collected ub statistic.
Data Rate (Total)	The average number of MiB per second that are transferred for read, write, and unmap operations. ¹
Overall Host Attributed Response Time Percentage	The percentage of the average response time that can be attributed to delays from host systems. This value includes both read response times and write response times, and can help you diagnose slow hosts and fabrics that are not working efficiently. For read response time, the value is based on the time that it takes for hosts to respond to transfer-ready notifications from the nodes. For write response time, the value is based on the time that it takes for hosts to send the write data after the node responds to a transfer-ready notification.
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Unmap) ¹	The average number of unmap operations per second. This metric corresponds to the collected uo statistic.
Overall I/O Rate (Total)	The average number of nonsequential I/O operations per second. This value includes read, write, and unmap operations. ¹
Pool Activity Score ²	The activity level of pools, which is set to the following value: [Read I/O Rate × (1 – Read I/O Cache Hit %)] ÷ Total Pool Capacity
Response Time (Read)	The average number of milliseconds to complete a read operation.
Response Time (Write)	The average number of milliseconds to complete a write operation.
Response Time (Unmap) ¹	The average number of milliseconds required to complete an unmap operation. This metric corresponds to the collected ul statistic.
Response Time (Overall)	The average number of milliseconds to complete an I/O operation. This value includes read, write, and unmap operations. ¹
Volume Utilization ³	The average percentage of time that the volume is busy.

Metric	Definition
Write Cache Delay	The percentage of I/O operations that are delayed because of space constraints in the write cache, or because of other conditions. The value is a percentage of all operations. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3. The metric is an approximation because actual transfer rates are different for each cache layer. Therefore, you cannot directly compare this metric from resources that are V7.3 or later with earlier versions.
Notes:	<ol style="list-style-type: none"> 1. This metric applies only to storage systems that are running IBM Spectrum Virtualize V8.1.1 or later. To view details about collected statistics, see Starting statistics collection. 2. This metric is also available when you view the performance of pools. 3. This metric is only available when you view the performance of volumes.

Table 2. I/O rate metrics for volumes

Metric	Definition
Transfer Rate (Cache-to-Disk)*	The average number of sectors or tracks per second that are transferred from the cache to the disks.
Transfer Rate (Disk-to-Cache)*	The average number of sectors or tracks per second that are transferred per second from the disks to the cache.
Unaligned Unmap I/O Rate	The average number of volume unmap operations per second that are not aligned on an 8K boundary. This metric corresponds to the collected uou statistic. This metric applies only to storage systems that are running IBM Spectrum Virtualize V8.1.1 or later. To view details about collected statistics, see Starting statistics collection .
Write-Cache Delay I/O Rate*	The average number of I/O operations per second that are delayed because of space constraints in the write cache, or because of other conditions. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3. The metric is an approximation because actual transfer rates are different for each cache layer. Therefore, you cannot directly compare this metric from resources that are V7.3 or later with earlier versions.

Note: *This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3. The metric is an approximation because actual transfer rates are different for each cache layer. Therefore, you cannot directly compare this metric from resources that are V7.3 or later with earlier versions.

Table 3. Cache hit percentages metrics for volumes

Metric	Definition
Overall I/O Cache Hits (Read)	The percentage of all read operations that find data in the cache. This value includes both sequential and random read operations, and read operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because in the event of a cache miss, the data must be read from the back-end storage resources.
Overall I/O Cache Hits (Write)	The percentage of all write operations that are handled in the cache. This value includes both sequential and random write operations, and write operations in the volume cache and volume copy cache where applicable.
Overall I/O Cache Hits (Total)	The percentage of all read operations and write operations that are handled in the cache. This value includes both sequential and random read and write operations, and read and write operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.

Table 4. Response time metrics for volumes

Metric	Definition
Peak Response Time (Read)	The worst response time measured for a read operation in the sample interval.
Peak Response Time (Write)	The worst response time measured for a write operation in the sample interval.
Peak Response Time (Unmap)	The worst response time measured for an unmap operation in the sample interval. This metric corresponds to the collected ulw statistic. This metric applies only to storage systems that are running IBM Spectrum Virtualize V8.1.1 or later. To view details about collected statistics, see Starting statistics collection .

Table 5. Remote mirror metrics for volumes

Metric	Definition
Global Mirror (Overlapping Write I/O Rate)	The average number of overlapping write operations per second that are issued by the Global Mirror primary site. Some overlapping writes are processed in parallel and are excluded from this value.
Global Mirror (Overlapping Write Percentage)	The percentage of overlapping write operations that are issued by the Global Mirror primary site. Some overlapping writes are processed in parallel and are excluded from this value.

Metric	Definition
Global Mirror (Secondary Write Lag)	The average number of additional milliseconds that it takes to service each secondary write operation for Global Mirror. This value does not include the time to service the primary write operations. You monitor the value of Global Mirror Secondary Write Lag to identify delays that occurred during the process of writing data to the secondary site.
Global Mirror (Write I/O Rate)	The average number of write operations per second that are issued to the Global Mirror secondary site.

Volume cache (VC) metrics are only available for SAN Volume Controller, Storwize, and FlashSystem block storage systems whose firmware version is V7.3 or later.

Tip:

The volume cache is sometimes referred to as *upper cache*.

Table 6. Volume cache (VC) metrics for volumes

Metric	Definition
Cache Hits (Dirty Writes)	The percentage of all cache write hits that occur on data that is marked as modified in the volume cache. This value represents how effectively write operations are coalesced before the data is written to disk.
Cache Hits (Read)	The percentage of read operations that find data in the volume cache.
Cache Hits (Total)	The percentage of cache hits for read and write operations that are handled in the volume cache.
Cache Hits (Write)	The percentage of cache hits for write operations that are handled in the volume cache.
Fast-Write Write Data Rate	The average number of MiB per second that were written to disk in fast-write mode in the upper cache. Use this information to help identify the source of back-end overloading, measure the workloads that exit the upper caches, and detect IO amplification in general.
I/O Rate (Destage)	The average number of cache-to-disk transfer operations per second that are processed in the volume cache.
I/O Rate (Stage)	The average number of disk-to-cache transfer operations per second that are processed in the volume cache.
I/O Rate (Read)	The average number of read operations per second that are processed in the volume cache. This value includes operations that are started by hosts or by remote replication sources.
I/O Rate (Total)	The average number of read and write operations per second that are processed by the volume cache. This value includes requests sent by hosts and by remote replication sources.
I/O Rate (Write)	The average number of write operations per second that are processed by the volume cache. This value includes operations that are started by hosts or by remote replication sources.
Response Time (Destage)	The average number of milliseconds that it took to complete each destage operation in the volume cache. That is, the time that it took to do write operations from the volume cache to the disk.
Response Time (Stage)	The average number of milliseconds that it took to complete each stage operation in the volume cache. That is, the time that it took to do read operations from the disk to the volume cache.
Transfer Rates (Cache-to-Disk)	The average number of sectors that are transferred per second from the volume cache to the disks.
Transfer Rates (Disk-to-Cache)	The average number of sectors that are transferred per second from the disks to the volume cache.
Write Delay Percentage (Flush-through)	The percentage of write operations that are written to disk in flush-through mode in the volume cache.
Write Delay Percentage (Total Delay)	The percentage of I/O operations that are delayed because of space constraints in the write cache, or because of other conditions in the volume cache. The value is a percentage of all operations.
Write Delay Percentage (Write-through)	The percentage of write operations that are written to disk in write-through mode in the volume cache.
Write Delay Rate (Flush-through)	The average number of tracks per second that are written to disk in flush-through mode in the volume cache.
Write Delay Rate (Total Delay)	The average number of I/O operations per second that are delayed. The delay might occur because of space constraints in the write cache, or because of other conditions in the volume cache. The value is an average of all operations.
Write Delay Rate (Write-through)	The average number of sectors per second that are written to disk in write-through mode in the volume cache.

Volume copy cache (VCC) metrics are only available for SAN Volume Controller, Storwize, and FlashSystem block storage systems whose firmware version is V7.3 or later.

Tip: The volume copy cache is sometimes referred to as *lower cache*.

Table 7. Volume copy cache (VCC) metrics for volumes

Metric	Definition
Cache Hits (Dirty Writes)	The percentage of all cache write hits that occur on data that is marked as modified in the volume copy cache. This value represents how effectively write operations are coalesced before the data is written to disk.
Cache Hits (Read-ahead)*	The percentage of all read cache hits that occur on pre-staged data.
Cache Hits (Read)	The percentage of read operations that find data in the volume copy cache.
Cache Hits (Total)	The percentage of cache hits for read and write operations that are handled in the volume copy cache.
Cache Hits (Write)	The percentage of cache hits for write operations that are handled in the volume copy cache.
Fast Write Data Rate	The average number of MiB per second that were written to disk in fast-write mode in the lower cache. Use this information to help identify the source of back-end overloading, measure the workloads that exit the lower copy caches, and detect IO amplification in general.
I/O Rate (Destage)	The average number of cache-to-disk transfer operations per second that are processed in the volume copy cache.
I/O Rate (Prestage)	The average number of prefetch disk-to-cache transfer operations per second that are processed in the volume copy cache.
I/O Rate (Stage)	The average number of disk-to-cache transfer operations per second that are not prefetch operations and are processed in the volume copy cache.
I/O Rate (Read)	The average number of read operations per second that are processed in the volume copy cache. This value includes read operations that are associated with FlashCopy® services, volume mirroring, and other internal processes. This value might also include some operations that are passed from the volume cache.
I/O Rate (Total)	The average number of read and write operations per second that are processed by the volume copy cache. This value includes operations that are associated with FlashCopy services, volume mirroring, and other internal processes. This value might also include some operations that are passed from the volume cache.
I/O Rate (Write)	The average number of write operations per second that are processed by the volume copy cache. This value includes read operations that are associated with FlashCopy services, volume mirroring, and other internal processes. This value might also include some operations that are passed from the volume cache.
Response Time (Destage)	The average number of milliseconds that it took to complete each destage operation in the volume copy cache. That is, the time that it took to do write operations from the volume copy cache to the disk.
Response Time (Prestage)	The average number of milliseconds that it took to complete each prestage operation in the volume copy cache. That is, the time that it took to prefetch data from the disk into the volume copy cache.
Response Time (Stage)	The average number of milliseconds that it took to complete each stage operation in the volume copy cache. That is, the time that it took to do read operations from the disk to the volume copy cache.
Transfer Rates (Cache-to-Disk)	The average number of sectors that are transferred per second from the volume copy cache to the disks.
Transfer Rates (Disk-to-Cache)	The average number of sectors that are transferred per second from the disks to the volume copy cache.
Write Delay Percentage (Flush-through)	The percentage of write operations that are written to disk in flush-through mode in the volume copy cache.
Write Delay Percentage (Total Delay)	The percentage of I/O operations that are delayed because of space constraints in the write cache, or because of other conditions in the volume copy cache. The value is a percentage of all operations.
Write Delay Percentage (Write-through)	The percentage of write operations that are written to disk in write-through mode in the volume copy cache.
Write Delay Rate (Flush-through)	The average number of sectors per second that are written to disk in flush-through mode in the volume copy cache.
Write Delay Rate (Total Delay)	The average number of I/O operations per second that are delayed. The delay might occur because of space constraints in the write cache, or because of other conditions in the volume copy cache. The value is an average of all operations.
Write Delay Rate (Write-through)	The average number of sectors per second that are written to disk in write-through mode in the volume copy cache.

Note: *This metric is only available for SAN Volume Controller, Storwize, and FlashSystem block storage systems whose firmware version is V7.4 or later.

Note:

Unless otherwise noted, you can view the volume metrics in [Table 8](#) for the following resources:

- Nodes
- I/O groups

- Storage systems

Table 8. Compression metrics for volumes

Metric	Definition
Compressed Volumes I/O Rate	The average number of all read and write operations per second for compressed volumes.
Compressed Volumes Data Rate	The average number of MiB per second that were read from or written to compressed volumes.
Compressed Volumes Response Time	The average number of milliseconds to complete an I/O operation for compressed volumes. This value includes both read and write operations.
Uncompressed Volumes I/O Rate	The average number of all read and write operations per second for uncompressed volumes.
Uncompressed Volumes Data Rate	The average number of MiB per second that were read from or written to uncompressed volumes.
Uncompressed Volumes Response Time	The average number of milliseconds to complete an I/O operation for uncompressed volumes. This value includes both read and write operations.

Tip:

Unless otherwise noted, you can view the volume metrics in [Table 9](#) for the following resources:

- Nodes
- I/O groups
- Host connections
- Storage systems

Table 9. Miscellaneous metrics for volumes

Metric	Definition
Cache to Host Transfer Response Time ¹	The average number of milliseconds that is taken to transfer a track from the cache to the host, including any queuing time that occurs because of throttling.
Non-Preferred Node Usage Percentage ²	The overall percentage of I/O operations that are not directed against the preferred node for each volume in an I/O Group. There is a small performance penalty when I/O does not go to the preferred node for each volume.
Transfer Size (Read)	The average number of KiB that are transferred per read operation.
Transfer Size (Write)	The average number of KiB that are transferred per write operation.
Transfer Size (Overall)	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.
Unaligned Write I/O Rate ³	The average number of write operations per second that are not aligned on a boundary between 4 KB physical blocks. Unaligned write operations can cause a significant decrease in efficiency of write operations to some types of back-end disks. You can ignore this metric for iSeries servers.

Notes:

1. The metric is only available for SAN Volume Controller, Storwize, and FlashSystem block storage systems whose firmware version is V7.3 or later.
2. This metric is only available when you view the performance of volumes, I/O groups, and host connections.
3. This metric is only available when you view the performance of pools, volumes, and host connections. The metric is only available for SAN Volume Controller, Storwize, and FlashSystem block storage systems whose firmware version is V7.4 or later.

Legacy cache metrics are only available for SAN Volume Controller and Storwize block storage systems whose firmware version is earlier than V7.3.

Table 10. Legacy cache metrics for volumes

Metric	Definition
Write-Cache Percentages (Flush-through)	The percentage of tracks that are written to disk in flush-through mode. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3.
Write-Cache Percentages (Write-through)	The percentage of tracks that are written to disk in write-through mode. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3.
Write-Cache Percentages (Overflow)	The percentage of all write operations that are handled in the cache. This value includes both sequential and random write operations, and write operations in the volume cache and volume copy cache where applicable.

Metric	Definition
Write-Cache I/O Rate (Flush-through)	The average number of tracks per second that are written to disk in flush-through mode. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3.
Write-Cache I/O Rate (Overflow)	The average number of tracks per second that are written but are delayed because there is not enough space in the write cache. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3.
Write-Cache I/O Rate (Write-through)	The average number of tracks per second that are written to disk in write-through mode. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3.
Dirty Write Percentage of Cache Hits	The percentage of all cache write hits that occur on data in the cache that is marked as modified. This value represents how effectively write operations are coalesced before the data is written to disk. This value applies only to resources that are running a version of IBM Spectrum Virtualize earlier than V7.3.

Disk performance metrics

Disk performance metrics are divided into the following categories:

- [Key metrics for disks](#)
- [Response time metrics for disks](#)
- [Miscellaneous metrics for disks](#)

Unless otherwise noted, you can view disk metrics for the following resources:

- Managed disks
- Pools
- Nodes
- I/O Groups
- Storage systems

Restriction: Performance metadata for managed disks in IBM Spectrum Virtualize for Public Cloud is not yet available.

Table 11. Key metrics for disks

Metric	Definition
Data Rate (Read)	The average number of MiB per second that are read from the back-end storage resources.
Data Rate (Write)	The average number of MiB per second that are written to the back-end storage resources.
Data Rate (Total)	The average rate at which data is transmitted between the back-end storage resources and the component. The rate is measured in MiB per second and includes both read and write operations.
I/O Rate (Read) ¹	The average number of read operations per second that are issued to the back-end storage resources.
I/O Rate (Write) ²	The average number of write operations per second that are issued to the back-end storage resources.
I/O Rate (Total) ³	The average number of I/O operations per second that are transmitted between the back-end storage resources and the component. This value includes both read and write operations.
Response Time (Read)	The average number of milliseconds for the back-end storage resources to respond to a read operation.
Response Time (Write)	The average number of milliseconds for the back-end storage resources to respond to a write operation.
Response Time (Overall)	The average number of milliseconds for the back-end storage resources to respond to a read or a write operation.

Notes:

1. The performance metrics for I/O Rate (Read) are available for pools, nodes, I/O groups, and storage systems.
2. The performance metrics for I/O Rate (Write) are available for pools, nodes, I/O groups, and storage systems.
3. The performance metrics for I/O Rate (Total) are available for pools, nodes, I/O groups, and storage systems.

Table 12. Response time metrics for disks

Metric	Definition
Queue Time (Read)	The average number of milliseconds that a read operation spends in the queue before the operation is sent to the back-end storage resources.
Queue Time (Write)	The average number of milliseconds that a write operation spends in the queue before the operation is sent to the back-end storage resources.

Metric	Definition
Queue Time (Overall)	The average number of milliseconds that a read or a write operation spends in the queue before the operation is sent to the back-end storage resources.
Peak Back-end Queue Time (Read)	The longest time that a read operation spends in the queue before the operation is sent to the back-end storage resources.
Peak Back-end Queue Time (Write)	The longest time that a write operation spends in the queue before the operation is sent to the back-end storage resources.
Peak Back-end Response Time (Read)	The longest time for a back-end storage resource to respond to a read operation.
Peak Back-end Response Time (Write)	The longest time for a back-end storage resource to respond to a write operation by a node.

Table 13. Miscellaneous metrics for disks

Metric	Definition
Transfer Size (Read)	The average number of KiB that are transferred per read operation from the back-end storage resources.
Transfer Size (Write)	The average number of KiB that are transferred per write operation to the back-end storage resources.
Transfer Size (Overall)	The average transfer size, in KiB, of a read or a write operation to the back-end storage resources.
Cache Destage (In-Flight I/O)*	The actual number of concurrent operations that are issued from the cache to the managed disk. The number of in-flight operations cannot exceed the target, but also varies over time, depending on the type of I/O operations and on the performance of the managed disk.
Cache Destage (Target I/O)*	The maximum number of concurrent operations that can be issued from the cache to the managed disk. This target changes over time, depending on changes in cache utilization and on changes in the performance of the managed disk.

Note: *This metric is only available when you view the performance of managed disks. The metric is only available for SAN Volume Controller, Storwize, and FlashSystem block storage systems whose firmware version is V7.3 or later.

Pool performance metrics

Key performance metrics are available for pools.

Unless otherwise noted, you can view pool metrics for the following resources:

- Pools

Table 14. Key metrics for pools

Metric	Definition
Max Write Cache Fullness*	The maximum amount of the lower cache that the write cache partitions on the nodes that manage the pool are using for write operations. If the value is 100%, one or more cache partitions on one or more pools is full. The operations that pass through the pools with full cache partitions will be queued and I/O response times will increase for the volumes in the affected pools.
Write Cache Fullness*	The average amount of the lower cache that the pools' write cache partitions on the nodes are using for write operations. Monitor average cache fullness to identify the pools that are experiencing heavy cache usage.

Note: *This cache fullness metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later.

Port performance metrics

Port performance metrics are divided into the following categories:

- [Key metrics for ports](#)
- [I/O rate metrics for ports](#)
- [Data rate metrics for ports](#)
- [Response time metrics for ports](#)
- [Error rate metrics for ports](#)
- [Power® metrics for ports](#)
- [Miscellaneous metrics for ports](#)

Unless otherwise noted, you can view port metrics for the following resources:

- Ports
- Nodes
- I/O Groups

- Storage systems

Table 15. Key metrics for ports

Metric	Definition
I/O Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
I/O Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
I/O Rate (Total)	The average number of send operations and receive operations per second.
Data Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
Data Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.

Table 16. I/O rate metrics for ports

Metric	Definition
Port-to-Disk I/O Rate (Receive)	The average number of exchanges per second that are received from back-end storage resources.
Port-to-Disk I/O Rate (Send)	The average number of IOs per second that are sent from the storage system to the back-end storage it is virtualizing. Use this metric to help measure the rate of data that is sent to back-end storage.
Port-to-Disk I/O Rate (Total)	The average number of IOs per second that are transmitted between the storage system and the back-end storage it is virtualizing. Use this metric to help measure the rate of data that is sent to back-end storage.
Port-to-Host I/O Rate (Receive)	The average number of IOs per second that are received by the storage system from the hosts that are accessing its storage. Use this metric to help measure host workload against the storage system.
Port-to-Host I/O Rate (Send)	The average number of IOs per second that are sent by the storage system to the hosts that are accessing its storage. Use this metric to help measure host workload against the storage system.
Port-to-Host I/O Rate (Total)	The average number of IOs per second that are transmitted between the storage system and the hosts that are accessing its storage. Use this metric to help measure host workload against the storage system.
Port-to-Local Node I/O Rate (Receive)	The average number of IOs per second that are received from other nodes within the local cluster. Use this metric to understand the rate of inter-cluster communication.
Port-to-Local Node I/O Rate (Send)	The average number of IOs per second that are sent to other nodes within the local cluster. Use this metric to understand the rate of inter-cluster communication.
Port-to-Local Node I/O Rate (Total)	The average number of IOs per second that are transmitted between the resource and other nodes within the local cluster. Use this metric to understand the rate of inter-cluster communication.
Port-to-Remote Node I/O Rate (Receive)	The average number of IOs per second that are received from nodes that are in a remote cluster. Use this metric to understand the amount of remote replication workload.
Port-to-Remote Node I/O Rate (Send)	The average number of IOs per second that are sent to nodes that are in a remote cluster. Use this metric to understand the amount of remote replication workload.
Port-to-Remote Node I/O Rate (Total)	The average number of IOs per second that are transmitted between the resource and nodes that are in a remote cluster. Use this metric to understand the amount of remote replication workload.

Table 17. Data rate metrics for ports

Metric	Definition
Port-to-Disk Data Rate (Receive)	The average rate at which data is received from back-end storage resources. The rate is measured in MiB per second.
Port-to-Disk Data Rate (Send)	The average rate at which data is sent to back-end storage resources. The rate is measured in MiB per second.
Port-to-Disk Data Rate (Total)	The average rate at which data is transmitted between back-end storage resources and the component. The rate is measured in MiB per second and includes both send and receive operations.
Port-to-Host Data Rate (Receive)	The average rate at which data is received from host computers. The rate is measured in MiB per second.
Port-to-Host Data Rate (Send)	The average rate at which data is sent to host computers. The rate is measured in MiB per second.
Port-to-Host Data Rate (Total)	The average rate at which data is transmitted between host computers and the component. The rate is measured in MiB per second and includes both send and receive operations.
Port-to-Local Node Data Rate (Receive)	The average rate at which data is received from other nodes that are in the local cluster. The rate is measured in MiB per second.

Metric	Definition
Port-to-Local Node Data Rate (Send)	The average rate at which data is sent to other nodes that are in the local cluster. The rate is measured in MiB per second.
Port-to-Local Node Data Rate (Total)	The average rate at which data is transmitted between the component and other nodes that are in the local cluster. The rate is measured in MiB per second.
Port-to-Remote Node Data Rate (Receive)	The average rate at which data is received from nodes that are in the remote cluster. The rate is measured in MiB per second.
Port-to-Remote Node Data Rate (Send)	The average rate at which data is sent to nodes that are in the remote cluster. The rate is measured in MiB per second.
Port-to-Remote Node Data Rate (Total)	The average rate at which data is transmitted between the component and nodes that are in the remote cluster. The rate is measured in MiB per second.

Table 18. Response time metrics for ports

Metric	Definition
Port-to-Local Node Response Time (Receive)	The average number of milliseconds to complete a receive operation from another node that is in the local cluster. This value represents the external response time of the transfers.
Port-to-Local Node Response Time (Send)	The average number of milliseconds to complete a send operation to another node that is in the local cluster. This value represents the external response time of the transfers.
Port-to-Local Node Response Time (Overall)	The average number of milliseconds to complete a send or receive operation with another node that is in the local cluster. This value represents the external response time of the transfers.
Port-to-Remote Node Response Time (Overall)	The average number of milliseconds to complete a send operation to, or a receive operation from a node in the remote cluster. This value represents the external response time of the transfers.
Port-to-Remote Node Response Time (Receive)	The average number of milliseconds to complete a receive operation from a node that is in the remote cluster. This value represents the external response time of the transfers.
Port-to-Remote Node Response Time (Send)	The average number of milliseconds to complete a send operation to a node that is in the remote cluster. This value represents the external response time of the transfers.
Port-to-Remote Node Response Time (Overall)	The average number of milliseconds to complete a send operation to, or a receive operation from a node in the remote cluster. This value represents the external response time of the transfers.

Metrics availability restrictions: The response time metrics are available for nodes, I/O groups, and storage systems.

Table 19. Error rate metrics for ports

Metric	Definition
CRC Error Rate	The average number of frames per second that are received in which a cyclic redundancy check (CRC) error is detected. A CRC error is detected when the CRC in the transmitted frame does not match the CRC computed by the receiver. For Brocade switches, this metric includes only the CRC Errors with a good end-of-frame (EOF) indicator.
Link Errors (Invalid Link Transmission Rate)	The average number of bit errors per second that are detected.
Link Errors (Invalid Transmission Word Rate)	The average number of bit errors per second that are detected.
Link Errors (Link Failures)	The average number of miscellaneous fibre channel link errors per second for ports. Link errors might occur when an unexpected Not Operational (NOS) is received or a link state machine failure was detected.
Link Errors (Primitive Sequence Protocol Error Rate)	The average number of primitive sequence protocol errors per second that are detected. This error occurs when there is a link failure for a port.
Link Errors (Signal Loss)	The average number of times per second at which the port lost communication with its partner port. These types of errors usually indicate physical link problems, caused by faulty SFP modules or cables, or caused by faulty connections at the switch or patch panel. However, in some cases, this error can also occur when the maximum link distance between ports is exceeded, for the type of connecting cable and light source.
Link Errors (Sync Loss)	The average number of times per second that the port lost synchronization with its partner port. These types of errors usually indicate physical link problems, caused by faulty SFP modules or cables, or caused by faulty connections at the switch or patch panel. However in some cases this can also occur due to mismatching port speeds between the partner ports, when auto-negotiation of link speed is disabled.
Port Congestion Index*	The estimated degree to which frame transmission was delayed due to a lack of buffer credits. This value is generally 0 - 100. The value 0 means there was no congestion. The value can exceed 100 if the buffer credit exhaustion persisted for an extended amount of time. When you troubleshoot a SAN, use this metric to help identify port conditions that might slow the performance of the resources to which those ports are connected.

Metric	Definition
Port Protocol Errors (Port Send Delay Time)	The average number of milliseconds of delay that occur on the port for each send operation. The reason for these delays might be a lack of buffer credits. You cannot view zero buffer credit performance metrics for 16 Gbps Fibre Channel ports on resources that run IBM Spectrum Virtualize. Use the Port Send Delay Time metric if the Zero Buffer Credit Timer metric is not available.
Port Protocol Errors (Port Send Delay I/O Percentage)	The percentage of send operations where a delay occurred, relative to the total number of send operations that were measured for the port. Use this metric with the Port Send Delay Time metric to distinguish a few long delays from many short delays.
Port Protocol Errors (Zero Buffer Credit Percentage)	The amount of time, as a percentage, that the port was not able to send frames between ports because of insufficient buffer-to-buffer credit. The amount of time value is measured from the last time that the node was reset. In Fibre Channel technology, buffer-to-buffer credit is used to control the flow of frames between ports.
Port Protocol Errors (Zero Buffer Credit Timer)	The number of microseconds that the port is not able to send frames between ports because there is insufficient buffer-to-buffer credit. In Fibre Channel technology, buffer-to-buffer credit is used to control the flow of frames between ports. Buffer-to-buffer credit is measured from the last time that the node was reset. If this metric is not available, use the Port Send Delay Time metric instead.
Note: *The performance metric for Port Congestion Index is only available for ports.	

Table 20. Power metrics for ports

Metric	Definition
SFP Temperature	The temperature of the small form-factor pluggable (SFP) transceiver plugged into a physical port in degrees Celsius (°C). Use this metric to watch for fluctuating and high temperatures of an SFP to monitor its environmental health.
Tx Power	The power in micro watts (μ W) at which the SFP transmits its signal. Use this metric to monitor the transmit power (in microwatts) of an SFP to ensure that it's within the normal operating range and is not causing link instability and degraded performance.
Rx Power	The power in micro watts (μ W) at which the SFP receives a signal. Use this metric to monitor the receive power (in microwatts) of an SFP to ensure that it's within the normal operating range and is not causing link instability and degraded performance.

Tip: These power metrics for ports are available for storage systems that run IBM Spectrum Virtualize 8.4.0 or later.

Table 21. Miscellaneous metrics for ports

Metric	Definition
Port-to-Local Node Queue Time (Receive)	The average time in milliseconds that a receive operation spends in the queue before the operation is processed. This value represents the queue time for receive operations that are issued from other nodes that are in the local cluster.
Port-to-Local Node Queue Time (Send)	The average time in milliseconds that a send operation spends in the queue before the operation is processed. This value represents the queue time for send operations that are issued to other nodes that are in the local cluster.
Port-to-Local Node Queue Time (Overall)	The average number of milliseconds that a send or receive operation spends in the queue before the operation is processed. This value is for send and receive operations that are issued between the component and other nodes that are in the local cluster.
Port-to-Remote Node Queue Time (Receive)	The average time in milliseconds that a receive operation spends in the queue before the operation is processed. This value represents the queue time for receive operations that are issued from a node that is in the remote cluster.
Port-to-Remote Node Queue Time (Send)	The average time in milliseconds that a send operation spends in the queue before the operation is processed. This value represents the queue time for send operations that are issued to a node that is in the remote cluster.
Port-to-Remote Node Queue Time (Overall)	The average number of milliseconds that a send or receive operation spends in the queue before the operation is processed. This value is for send and receive operations that are issued between the component and a node that is in the remote cluster.

Node performance metrics

Unless otherwise noted, you can view node metrics for the following resources:

- Nodes
- I/O Groups
- Storage systems

Table 22. Metrics for nodes

Metric	Definition
--------	------------

Metric	Definition
Compression CPU Utilization (Core 1 to Core 28)	The approximate percentage of time that a processor core was busy with data compression tasks. The performance of each core is shown with a separate metric. Note that the value for this metric will be zero or close to zero if compression accelerator hardware is installed in the nodes.
CPU Utilization (Compression CPU)	The average percentage of time that the processors used for data compression I/O tasks are busy.
CPU Utilization (System CPU)	The average percentage of time that the processors on nodes are busy doing system I/O tasks.
Data Movement Rate (MiBs) ¹	The capacity, in MiBs per second, of the valid data in a reclaimed volume extent that garbage collection has moved to a new extent in the data reduction pool on the node. The valid data must be moved so that the whole extent can be freed up or reused to write new data. This metric corresponds to the collected mm statistic.
Data Rewrite Rate (MiBs) ¹	The rate, in MiBs per second, at which data is rewritten when a host overwrites data in data reduction pools on the node. The new version of the host data is written to a different location so that the capacity that was used by the previous version of the host data can be freed up and reclaimed. This metric corresponds to the collected cm statistic. You can view this metric for nodes only.
Extent Collection Rate (cnt/s) ¹	The number of volume extents per second that were processed for garbage collection. The reclaimable capacity in the volume extents is collected so that it can be reused in the data reduction pools on the node. This metric corresponds to the collected ext col statistic. You can view this metric for nodes only.
Max Read Cache Fullness (%) ²	The maximum amount of the lower cache which the cache partitions of the pools that are managed by the node are using for read operations. If the maximum value for the cache is 100%, the read cache partition for one or more of the pools is full. The read operations that pass through the node to the affected pools will be queued and the I/O response times will increase for the volumes in the affected pools. This metric corresponds to the collected lower cache rfmx statistic.
Max Write Cache Fullness (%) ²	The maximum amount of the lower cache which the cache partitions of the pools that are managed by the node are using for write operations. If the maximum value for the cache is 100%, the write cache partition for one or more of the pools is full. The write operations that pass through the node to the affected pools will be queued and the I/O response times will increase for the volumes in the affected pools. This metric corresponds to the collected lower cache wfmx statistic.
New Address Write Rate (MiBs) ¹	The capacity in MiBs per second that was used to write the host's data to unallocated addresses in the data reduction pool on the node. Review this metric to determine which hosts are increasing the amount of capacity that is being written to data reduction pools on a node. This metric corresponds to the collected nm statistic. You can view this metric for nodes only.
Node Utilization by Node	The average of the bandwidth percentages of those ports in the node that are actively used for host and MDisk send and receive operations. The average is weighted by port speed and adjusted according to the technology limitations of the node hardware.
Read Cache Fullness (%) ²	The average amount of the lower cache which the cache partitions of the pools that are managed by the node are using for read operations. Monitor the average cache fullness for read operations to identify the nodes that are experiencing heavy cache usage. This metric corresponds to the collected lower cache rfav statistic.
Reclaimable Capacity (MiB) ¹	The capacity that can be reclaimed in the data reduction pools on the node. This metric corresponds to the collected rec statistic. You can view this metric for nodes only.
Recovered Capacity Rate (MiBs) ¹	The capacity in number of MiBs per second that was recovered by garbage collection for reuse in the data reduction pools on the node. This metric corresponds to the collected rm statistic. You can view this metric for nodes only.
System CPU Utilization (Core 1 to Core 28)	The approximate percentage of time that a processor core was busy with system I/O tasks. The performance of each core is shown with a separate metric.
Write Cache Fullness (%) ²	The average amount of the lower cache which the cache partitions of the pools that are managed by the node are using for write operations. Monitor the average cache fullness for write operations to identify the nodes that are experiencing heavy cache usage. This metric corresponds to the collected lower cache wfav statistic.
Notes:	
<ol style="list-style-type: none"> This garbage collection metric applies to systems that are running IBM Spectrum Virtualize V8.1.2 or later. To view details about collected statistics, see Starting statistics collection. This cache fullness metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later. To view details about collected statistics, see Starting statistics collection. 	

Performance metrics for XIV, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R

Monitor the performance metrics that are collected for XIV® systems, IBM Spectrum Accelerate, IBM FlashSystem® A9000, and IBM FlashSystem A9000R.

For XIV systems, IBM FlashSystem A9000, and IBM FlashSystem A9000R, performance metrics are available for the following resources:

- [Volume metrics](#)
- [Port metrics](#)

For IBM Spectrum Accelerate, performance metrics are available for the following resource:

- [Volume metrics](#)

Restriction: XIV systems, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R do not track performance statistics for volumes that were never used. Because there are no performance statistics, performance metrics are not shown for these volumes and their related components.

Volume metrics

Volume performance metrics are organized into the following categories:

- [Key storage metrics](#)
- [Cache hit percentage metrics](#)
- [Response time metrics](#)
- [Miscellaneous metrics](#)

Unless otherwise noted, you can view volume metrics for the following resources:

- Volumes
- Pools
- Modules
- Host connections
- Storage systems

Table 1. Key volume metrics

Metric	Description
Data Rate (Read)	The average number of MiBs per second that are transferred for read operations.
Data Rate (Write)	The average number of MiBs per second that are transferred for write operations.
Data Rate (Total)	The average number of MiB per second that are transferred for read operations and write operations.
Overall I/O Rate (Read)	The average number of read operations per second. This value includes both sequential and nonsequential read operations.
Overall I/O Rate (Write)	The average number of write operations per second. This value includes both sequential and nonsequential write operations.
Overall I/O Rate (Total)	The average number of read operations and write operations per second. This value includes both sequential and nonsequential operations.
Response Time (Read)	The average number of milliseconds to complete a read operation.
Response Time (Write)	The average number of milliseconds to complete a write operation.
Response Time (Overall)	The average number of milliseconds to complete an I/O operation. This value includes both read and write operations.

Important: For XIV systems, all the key storage metrics are available for 10.2.2 or later.

Table 2. Cache hit percentage metrics

Metric	Description
Data Cache Hits (Read) ²	The percentage of all read data that is read from the cache.
Data Cache Hits (Write) ²	The percentage of all write data that is written to cache slots that are marked as modified.

Metric	Description
Data Cache Hits (Overall) ²	The percentage of all data that is handled in the cache. This value includes read data that is read from the cache and write data that is written to cache slots that are marked as modified.
Overall I/O Cache Hits (Read) ¹	The percentage of all read operations that find data in the cache. This value includes both sequential and random read operations, and read operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because in the event of a cache miss, the data must be read from the back-end storage resources.
Overall I/O Cache Hits (Write) ¹	The average percentage of all write operations that are handled in the cache, across all volumes on the server. This value includes both sequential and nonsequential write operations.
Overall I/O Cache Hits (Total) ¹	The percentage of all read operations and write operations that are handled in the cache. This value includes both sequential and random read and write operations, and read and write operations in the volume cache and volume copy cache where applicable. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
SSD Read Cache Hits (I/O) ²	The percentage of read operations that find data in the cache on a solid-state drive (SSD). The value for this metric is also included in the value for the Overall Read Cache Hit Percentage metric. This metric is only available for XIV systems that use solid-state drives as drives for caching.
SSD Read Cache Hits (Data) ²	The percentage of all read data that was read from cache memory on a solid-state drive. This metric is only available for XIV systems that use solid-state drives as drives for caching.
Notes:	<ol style="list-style-type: none"> For XIV systems, this metric is available in 10.2.2 or later. For XIV systems, this metric is available in 10.2.4 or later.

Table 3. Response time metrics

Metric	Description
Cache Hit Response Time (Read)	The average number of milliseconds to complete a read-cache hit operation.
Cache Hit Response Time (Write)	The average number of milliseconds to complete a write-cache hit operation.
Cache Hit Response Time (Overall)	The average number of milliseconds to complete a cache hit operation. This value includes the times for both read-cache hit and write-cache hit operations.
Cache Miss Response Time (Read)	The average number of milliseconds to complete a read-cache miss operation.
Cache Miss Response Time (Write)	The average number of milliseconds to complete a write-cache miss operation.
Cache Miss Response Time (Overall)	The average number of milliseconds to complete a cache miss operation. This value includes the times for both read-cache miss and write-cache miss operations.
Response Time by Transfer Size (Small)	The average number of milliseconds to complete an I/O operation that has a small data transfer size. A small data transfer has a size that is less than or equal to 8 KiB.
Response Time by Transfer Size (Medium)	The average number of milliseconds to complete an I/O operation that has a medium data transfer size. A medium data transfer has a size that is greater than 8 KiB and less than or equal to 64 KiB.
Response Time by Transfer Size (Large)	The average number of milliseconds to complete an I/O operation that has a large data transfer size. A large data transfer has a size that is greater than 64 KiB and less than or equal to 512 KiB.
Response Time by Transfer Size (Very Large)	The average number of milliseconds to complete an I/O operation with a data transfer size that is greater than 512 KiB.
SSD Read Cache Hit Response Time	The average number of milliseconds that it takes to complete a hit operation on the read cache on a solid-state drive. The value for this metric is also included in the value for the Read Cache Hit Response Time metric. This metric is only available for XIV systems that use solid-state drives as drives for caching.
Note: For XIV systems, all the response time metrics are available for 10.2.2 or later.	

Table 4. Miscellaneous metrics

Metric	Description
Average Transfer Size (Read) ¹	The average number of KiB that are transferred per read operation.
Average Transfer Size (Write) ¹	The average number of KiB that are transferred per write operation.
Average Transfer Size (Overall) ¹	The average number of KiB that are transferred per I/O operation. This value includes both read and write operations.
I/O Transfer Size (Small) ²	The percentage of I/O operations with a small data transfer size. A small data transfer has a size that is less than or equal to 8 KiB.
I/O Transfer Size (Medium) ²	The percentage of I/O operations with a medium data transfer size. A medium data transfer has a size that is greater than 8 KiB and less than or equal to 64 KiB.
I/O Transfer Size (Large) ²	The percentage of I/O operations with a large data transfer size. A large data transfer has a size that is greater than 64 KiB and less than or equal to 512 KiB.
I/O Transfer Size (Very Large) ²	The percentage of I/O operations with a data transfer size that is greater than 512 KiB.
Data Transfer Size (Small) ²	The percentage of data that is transferred as a result of I/O operations with a small data transfer size. A small data transfer has a size that is less than or equal to 8 KiB.
Data Transfer Size (Medium) ²	The percentage of data that is transferred as a result of I/O operations with a medium data transfer size. A medium data transfer has a size that is greater than 8 KiB and less than or equal to 64 KiB.
Data Transfer Size (Large) ²	The percentage of data that is transferred as a result of I/O operations with a large data transfer size. A large data transfer has a size that is greater than 64 KiB and less than or equal to 512 KiB.
Data Transfer Size (Very Large) ²	The percentage of data that is transferred as a result of I/O operations with a data transfer size that is greater than 512 KiB.
Volume Utilization ^{1, 3}	The average percentage of time that the volume is busy.
Pool Activity Score ^{1, 3}	The activity level of pools, which is set to the following value: [Read I/O Rate × (1 – Read I/O Cache Hit %)] ÷ Total Pool Capacity The value of this metric is the same for all pools in the storage system.
Notes:	
<ol style="list-style-type: none"> 1. For XIV systems, this metric is available in 10.2.2 or later. 2. For XIV systems, this metric is available in 10.2.4 or later. 3. This metric is only available when you view the performance of pools. 	

Port metrics

The following performance metrics for ports are available for XIV systems that are 10.2.4 or later:

- [I/O rate metrics](#)
- [Data rate metrics](#)
- [Response time metrics](#)
- [Miscellaneous port metrics](#)

Restriction: Port metrics are not available for IBM Spectrum Accelerate.

Table 5. I/O rate metrics

Metric	Description
I/O Rate (Send)	The average number of I/O operations per second for operations in which data is sent from a port.
I/O Rate (Receive)	The average number of I/O operations per second for operations in which the port receives data.
I/O Rate (Total)	The average number of send operations and receive operations per second.

Table 6. Data rate metrics

Metric	Description
Data Rate (Send)	The average rate at which data is sent through the port. The rate is measured in MiB per second.
Data Rate (Receive)	The average rate at which data is received by the port. The rate is measured in MiB per second.
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MiB per second and includes both send and receive operations.

Table 7. Response time metrics

Metric	Description
Response Time (Send)	The average number of milliseconds to complete a send operation.
Response Time (Receive)	The average number of milliseconds to complete a receive operation.
Response Time (Overall)	The average number of milliseconds to complete a send or receive operation.

Table 8. Miscellaneous port metrics

Metric	Description
Bandwidth (Send)	The percentage of the port bandwidth that is used for send operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth (Receive)	The percentage of the port bandwidth that is used for receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth (Overall)	The percentage of the port bandwidth that is used for send and receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.

Exporting performance data for storage systems

To help resolve performance issues with storage systems, you can export performance data for the resource to a compressed file. If you contact IBM® Support to help you analyze the problem, you might be asked to send this file.

Procedure

1. In the menu bar, select the type of storage system.
For example, to create a compressed file for a block storage system, go to Resources > Block Storage Systems.
 2. Right-click the storage system and select Export Performance Data.
 3. Select the time range of the performance data that you want to export.
You can select a time range of the previous 4, 8, or 12 hours, or specify an earlier time range by clicking the time and date.
 4. Optional: To include volume data if the time range that you selected is greater than 12 hours, click Advanced export.
Because the amount of performance data might be large, especially for storage systems that have many volumes, volume data is exported only if the time range is less than 12 hours. For time ranges of 12 or more hours, you must click Advanced export to include volume data.
 5. Click Create.
 A task is started and shown in the running tasks icon in the menu bar.
 6. When the task is complete, click the download icon  in the task to save the file locally.
Tip: The file name and the timestamps in the performance data are in the Eastern Standard Time (EST) time zone.
- [Tutorial: Exporting performance data for a SAN Volume Controller system](#)
In this tutorial, you export performance data for a SAN Volume Controller to a compressed package. You then send the package to IBM Support.

Tutorial: Exporting performance data for a SAN Volume Controller system

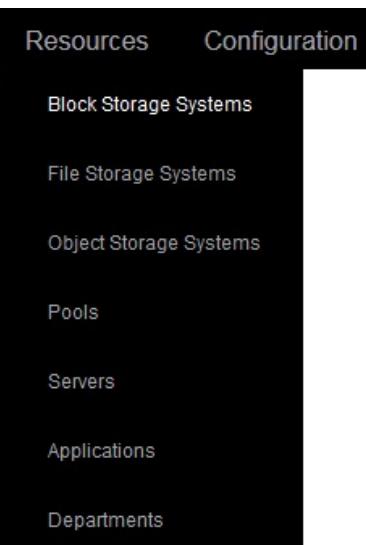
In this tutorial, you export performance data for a SAN Volume Controller to a compressed package. You then send the package to IBM® Support.

About this task

Some volumes on a SAN Volume Controller system have performance problems. You consult IBM Support who require detailed performance data about the SAN Volume Controller system to diagnose the problem. You are asked to export performance data by using IBM Storage Insights Pro.

Procedure

1. Go to Resources > Block Storage Systems.



2. Right-click the SAN Volume Controller system, then click Export Performance Data.

A screenshot of the 'Block Storage Systems' page. On the left, there's a sidebar with a 'Storage Systems' section containing a list of storage systems: XIV-114-1310060, SVC-CG8-SVC8, SVC-CG8-svc2a, SVC-CG8-Sandbox, SVC-CG8-DemoSVC, SVC-8G4-Furious, and Storwize-524-V7000-Class. A context menu is open over the 'SVC-CG8-DemoSVC' entry, listing options like 'View Properties', 'View Details', 'View Performance', 'View Capacity', and 'Export Performance Data'. The 'Export Performance Data' option is highlighted with a blue background. The main area shows performance metrics for each system, including 'Performance' and 'Capacity' graphs and numerical values for 'Pool Capacity (GiB)' and 'Physical Allocation (%)'.

3. Select a time range for the support package.

Typically, the time range includes the time when the performance problem occurred.

4. If you are instructed to do so, select the Advanced export check box. Click Next.

A screenshot of the 'Export Performance Data' dialog box. It has a blue header bar with the title 'Export Performance Data'. Below it is a form with two sections: 'Select a time range to export performance data for' and 'Advanced export'. In the first section, there are buttons for 'Last: 4 hours', '8 hours', and '12 hours', and a date range selector showing '03:30 Apr 21, 2017 - 11:30 Apr 21, 2017'. In the second section, there is a checked checkbox labeled 'Advanced export'. At the bottom are two buttons: 'Next' and 'Cancel'.

5. Click Create when you are prompted to create the package with the details that you specified.

Results

The package is created and your browser downloads the package.

IBM Spectrum® Virtualize guideline values for key performance indicators

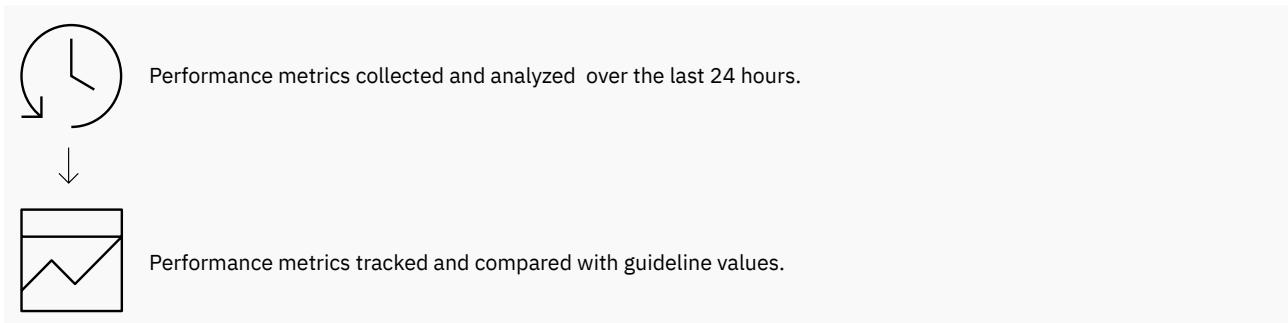
To improve the performance and resiliency of your storage environment, compare the guideline values for key performance indicators with the values reported for your storage systems and devices.

Guideline values for performance were established by monitoring, measuring, analyzing, and stress testing the performance of IBM Spectrum Virtualize storage systems.

The name IBM Spectrum Virtualize is used to refer to the following types of storage systems:

- IBM® SAN Volume Controller
- IBM Spectrum Virtualize for Public Cloud
- IBM Spectrum Virtualize as Software Only
- IBM Storwize® block storage systems
- IBM FlashSystem® devices that run IBM Spectrum Virtualize

Try it out! From the Resources menu, click Block Storage Systems. Double-click a storage system that runs IBM Spectrum Virtualize, and click Performance in the General section of the navigation pane.



By default, the charts compare the performance metrics that were collected each hour over the last 24 hours with the guideline values. You can use the calendar, which is next to the title of the page, to change the date and compare current values with historical values.

In most of the charts, a horizontal line is used to indicate the guideline value for the metric. If your devices report prolonged periods of slow response times, you can check whether the performance values for your devices are over the guideline values.

For example, you experience slow send response times for a node in a cluster. You check the chart that tracks the send response times for the nodes and see that one of the node's response times is higher than the guideline value. You can then take remedial action such as balancing the workload of the nodes across the cluster. Alternatively, you can move some of the workloads to other storage systems.

The following key performance indicators are analyzed:

Max Cache Fullness by Pool

The maximum amount of the lower cache that the write cache partitions on the nodes that manage the pool are using for write operations. If the value is 100%, one or more cache partitions on one or more pools is full. The operations that pass through the pools with full cache partitions are queued and I/O response times will increase for the volumes in the affected pools. Available in IBM Spectrum Virtualize 7.3 or later.

The guideline value is 80%.

A critical alert for max write cache fullness is automatically generated when the value is equal to or more than 99%.

Overall Port Bandwidth Percentage by Port

The percentage of the port bandwidth that is used for receive and send operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.

The guideline value is 50%.

Compare the guideline value for this metric with the values measured for the switch ports. Because a cluster can have many ports, the chart shows only the eight ports with the highest average bandwidth.

A warning alert is automatically generated when the value for port receive bandwidth or port send bandwidth is equal to or more than 75%. A critical alert is generated when the value for port receive bandwidth or port send bandwidth is equal to or more than 85%.

Port-to-Local Node Send Response Time by Node

The average number of milliseconds to complete a send operation to another node that is in the local cluster. This value represents the external response time of the transfers.

 The guideline value is 0.6 ms/op.

Port-to-Remote Node Send Response Time by Node

The average number of milliseconds it takes to complete a send operation to a node in the remote cluster. And, the average number of milliseconds it takes to complete a receive operation from a node in the remote cluster. This value represents the external response time of the transfers.

A guideline value isn't available for this metric because response times for copy-service operations can vary widely.

You can compare the response times to identify discrepancies between the response times for the different nodes.

Read Response Time by I/O Group

The average number of milliseconds to complete a read operation.

 The guideline value is 15 ms/op.

Write Response Time by I/O Group

The average number of milliseconds to complete a write operation.

 The guideline value is 5 ms/op.

Node Utilization Percentage by Node

The average bandwidth percentages for the ports in the node that are actively used for host and MDisk receive and send operations.

The average is weighted based on the port speed and the technology limitations of the node hardware.

 The guideline value is 60%.

Port Send Delay Time

The average number of milliseconds of delay that occurs on the port for each send operation. The reason for these delays might be a lack of buffer credits.

A guideline value isn't available for this metric because delay times can vary significantly depending on configuration and usage.

Compare the delay times to identify discrepancies between the ports' delay times and any spikes that might correlate with the time of any reported performance problems.

The Port Send Delay Time is shown instead of the Zero Buffer Credit Percentage by Node chart for some IBM FlashSystem storage systems, such as FlashSystem 9110.

Zero Buffer Credit Percentage by Node

The amount of time, as a percentage, that the port wasn't able to send frames between ports because of insufficient buffer-to-buffer credit. The amount of time value is measured from the last time that the node was reset. In Fibre Channel (FC) technology, buffer-to-buffer credit is used to control the flow of frames between ports.

Information about zero buffer credit is only collected and analyzed for 8 Gbps FC ports.

 The guideline value is 20%.

Tip: When you add a storage system, a default alert policy is assigned to the storage system. For example, when you add IBM SAN Volume Controller, the default policy for IBM SAN Volume Controller is automatically assigned to the storage system. To find out which alerts are in the default policy, click the Configuration menu and click Alert Policies. To see the alerts that are defined for the policy, double-click the default policy.

More actions

Review the following resources to find out:

- [Investigating the performance of storage resources.](#)
- [How to investigate the causes of slow drain.](#)
- [Defining alerts for attributes, capacity, and performance changes.](#)
- [How to define warning and critical thresholds for alerts.](#)

Restrictions

The following charts aren't available for storage systems that run IBM Spectrum Virtualize and use the iSCSI protocol to connect to storage systems:

- Overall Port Bandwidth Percentage by Port
- Node Utilization Percentage by Node
- Port Send Delay Time

Tutorial: Viewing the aggregated workload for an application

Bob is a storage administrator. Bob wants to easily evaluate the performance of the accounting application because the Accounts department is expanding to a new location and they want to replicate their data across both locations. Bob needs to work out the inter-site link capacity requirements.

About this task

Previously, Bob created an accounting application, Accounts Database, and specified the resources that the application uses.

Procedure

1. Bob clicks Applications on the dashboard to view only the Accounts Database resources.

Applications 17



2. Bob right-clicks the Accounts Db application on the Applications page, then clicks View Details.

Applications

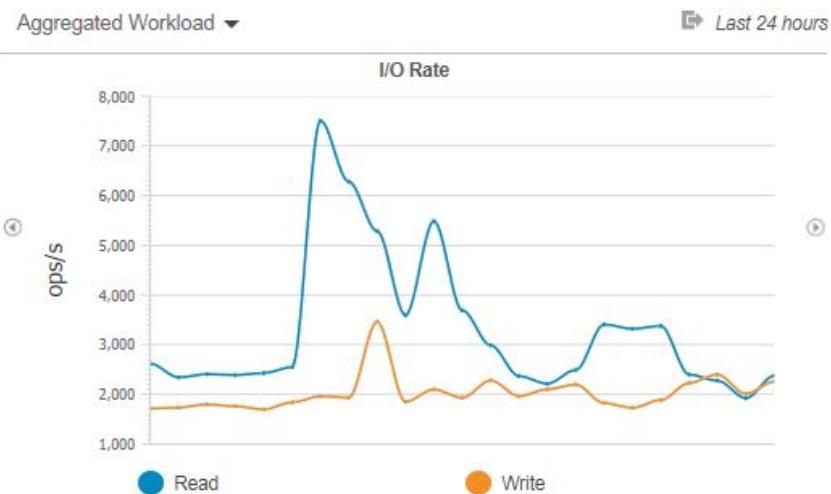
The screenshot shows the Applications page with the 'Capacity' tab selected. A table lists the application details:

Name	Block Capacity (GiB)	File Capacity (GiB)	Object Capacity (GiB)	Volumes	Servers	Hypervisors
Accounts DB	452.48	0.00	0.00	59	4	

A context menu is open over the 'Accounts DB' row, with 'View Details' highlighted. Other options in the menu include 'View Properties', 'View Performance', 'View Alert Definitions', 'View Capacity', 'Add to...', and 'Delete'.

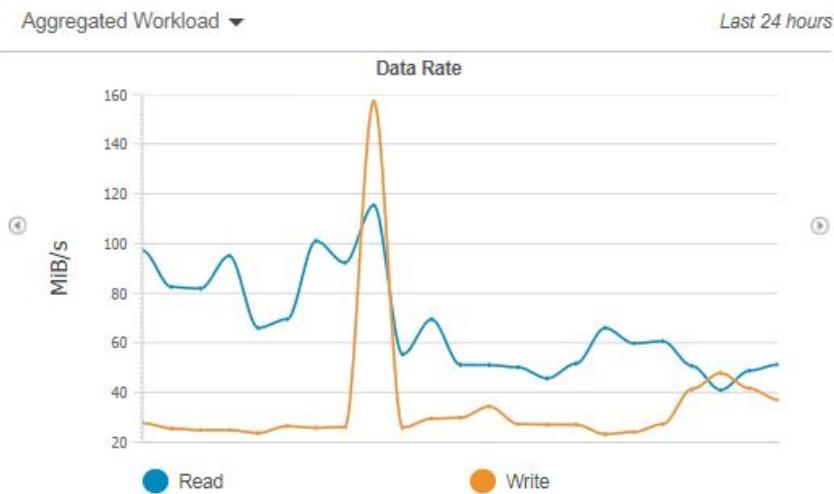
Bob can use the Aggregated Workload chart to quickly evaluate the throughput required for the link between both sites.

Overview



Bob can toggle between seeing the aggregated I/O rate and the data rate for the application using the arrow icons either side of the chart.

Overview

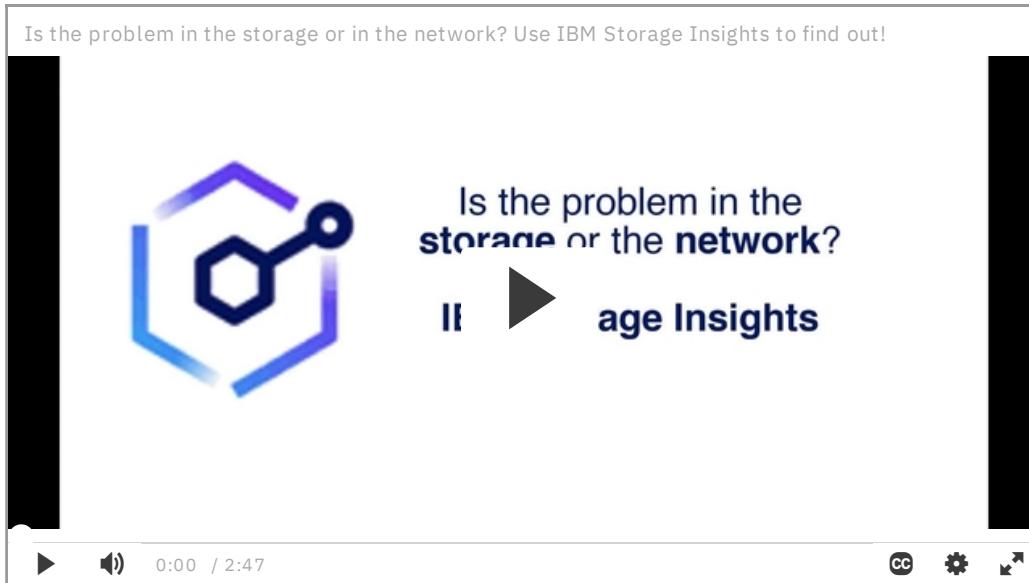


3. The rates are aggregated on the primary volumes associated with the application which allows Bob to accurately assess the required MiB/s throughput he will need between both locations.

Monitoring switches and fabrics through chassis

Detect and investigate switch and fabric issues that might affect the availability and performance of your storage. View and analyze performance metrics, such as response times, I/O rates, and data rates. You can also monitor the configuration, status, and health of your switches and fabrics.

Knowing where problems are occurring in your environment is critical to helping you solve problems with your storage. By monitoring switches and fabrics along with your storage devices, pinpointing those problems can be done more quickly. To see how it's done, check out this video.



Attention: You must add a chassis to IBM Storage Insights to collect metadata about its associated switches and fabrics. When you add a chassis, all its associated switches and fabrics are identified automatically. A single chassis can have multiple switches that belong to one or more fabrics.

- **[Switches](#)**

Use the Switches page to administer and monitor the configuration and status information that is collected about the Switches in your storage environment.

- **Fabrics**

Use the Fabrics page to administer and monitor the configuration and status information that is collected about the fabrics in your storage environment.

Switches

Use the Switches page to administer and monitor the configuration and status information that is collected about the Switches in your storage environment.

IBM Storage Insights subscribers: If you're using the free version of IBM® Storage Insights, some of the columns that are listed might not be available.

Information about switches

A switch is component in a SAN fabric that sends and receives FC requests from host servers to storage systems.

Tip: Exploit the metadata that is collected for you by adding or editing properties. When you see the edit icon (edit icon), it means that you can add a value or edit the existing value. Right-click the resource, click View Properties, and make your changes. You can use, for example, name and location properties in filters to refine the information in the reports that you create. When you define location information, IBM Support can investigate metadata collection issues more efficiently.

More detailed information than that provided in the hover help text is provided here for the following columns:

Acknowledged

The issue was resolved or the user decided that the issue did not need to be investigated.

Chassis

The name of the chassis where the switch is available. The name of the chassis was defined in an element manager or when the chassis was added to IBM Storage Insights.

Condition

The overall condition of the switch is determined by the most critical status of any one of the switch's internal resources.

Connected Ports

The number of ports that are connected to servers, switches, storage systems, or unmanaged resources.

Tip: Click the link in the Ports column to find out more about the connected ports.

Custom tag 1, 2, and 3

The user-defined text that you can add to provide more information about the switch. You can include this additional information or use the custom tags to filter the information that you want to share with your colleagues in reports.

Data Collection

The aggregated status for the collection of asset, configuration, and performance metadata. Two separate jobs are run to collect the metadata:

- A probe is run every day to collect asset and configuration metadata.
- A performance monitor is run every 5 minutes to collect performance metadata.

Because separate jobs are run to collect the metadata, both collection jobs must be successful to get a Running status.

Depending on the issue with collecting metadata, the following values are shown:

Degraded

Asset and configuration metadata or performance metadata is being collected, but the metadata might not be up-to-date or warning messages were generated when the metadata was being collected.

Failed

Asset and configuration metadata or performance metadata, or both can't be collected. The issue is being investigated and you'll be notified when the data collection service is resumed.

Not Connected

Asset and configuration metadata or performance metadata, or both can't be collected. If the data collection service isn't resumed, try these self-help options:

- Check that your switch is online and that your network is up and running.
- Check that your firewall is configured to allow outbound access over HTTPS port 443 to your instance of IBM Storage Insights Pro.
- Check that the server where the data collector was installed is online.
- Restart the data collector.
- Refresh your browser.

Not Monitored

Asset, configuration, and performance metadata cannot be collected from the switch because the correct connection details are not provided. To configure data collection for these switches, use the Configure Data Collection action and enter the

correct details.

If a data collector is deployed and you want to monitor the switch, click Resources > Switches, and then click Add Switch.

If a data collector isn't deployed, click Configuration > Data Collectors, and then click Deploy Data Collector. Then, add the connection details for the switch.

Multiple data collectors: If you deployed multiple data collectors, you don't have to choose which data collector collects the metadata from the switch. To collect the metadata from the switch, IBM Storage Insights Pro tests the response time for each data collector and chooses the data collector with the fastest response time.

Support: Subscribers are notified by email when issues with collecting data are detected. If an issue with collecting data persists and you can't resolve the issue, you can get help by submitting a post on the [IBM Storage Community](#). For other support options, see [Looking for help](#).

Domain ID

The domain ID of a switch. The ID is an 8-bit identifier with a range of 0-255.

Fabric

The name of the fabric where a switch is a member. The name of the fabric was defined in an element manager or when the fabric was added to for monitoring. If a name is not defined, the WWN of the fabric is used.

Firmware

The firmware version of the microcode on the chassis where a switch is defined.

IP Address

The IP address of the switch which can be in IPv4 or IPv6 format.

Last Successful Monitor

The last time that the performance information was refreshed.

Last Successful Probe

The most recent date and time when data was collected about a switch.

Links

The number of inter-switch links (ISLs) on the switch. An ISL is a single link between two ports on two different switches. An ISL is a member of a trunk that consists of all ISLs between two switches.

Location

The location of the switch, which can be defined when you add the switch for monitoring.

Mode

Mode is a configuration setting that is defined on the chassis. Mode can be either native or NPV.

Model

Manufacturer provides the model name of chassis.

Name

The logical name of the switch or the name that was defined by the user after the switch was added for monitoring. If the name isn't available, the worldwide name (WWN) of the switch is shown.

Performance Monitor Status

The status of the most recent run of a performance monitor. Use this value to quickly identify a performance monitor that failed or generated warning messages during processing. The following statuses might be displayed:

- Starting: The performance monitor is starting.
- Running: The performance monitor is running.
- Running with problems: The performance monitor is running, but encountered warning conditions during processing. Check the log to view the warning messages.
- Stopping: The performance monitor is stopping.
- Completed: The performance monitor completed data collection.
- Completed with warnings: The performance monitor completed, but encountered warning conditions during processing. Check the log to view the warning messages.
- Failed: The performance monitor encountered error conditions during processing and is no longer running. Check the log of a performance monitor to view its error messages.
- Canceled: The performance monitor was stopped and is no longer collecting performance data.
- Not running: The performance monitor is not running.
- Disabled: The performance monitor never ran. To start a probe, complete these steps:
 1. From the Resources menu, click Switches and select Chassis tab.
 2. Select and right-click the chassis that host the switch.
 3. Click Configure Data Collection and provide the IP address and credentials for the chassis that host the switches.
 4. Click Connect.

Ports

The number of ports on the switch.

Tip: Click the link to find out more about the ports, the resources it connects to, and its' links.

Principal Switch of Fabric

The name of the principal switch of the fabric when the switch was last probed. The fabric can change its principal switch dynamically when conditions require it.

Probe Status

The probe is run to collect asset and configuration information about your switch. If one of the following values is displayed, you might need to investigate or take remedial action:

- Failed: The asset and configuration information was not collected.
- Warning: Warning conditions were encountered when asset and configuration information was collected.
- Never probed: The asset and configuration information was not collected because the resource or device is offline. The asset and configuration information was not collected because the resource or device is offline.

Serial number

A number or alphanumeric identifier that is given by manufacturer to each chassis.

System UUID

A unique identifier that assigns to the switches when it is added to IBM Storage Insights.

Vendor

The name of the vendor or manufacturer of the switch.

WWN

The worldwide name (WWN) of the switch, which is a 64-bit unsigned name identifier that is unique.

- [**Switch details**](#)

View detailed information about the components and resources that are associated with a switch.

- [**Switch Internal Resources**](#)

Internal resources are components that are integrated with a switch. Components that you can view include trunks, switches, and ports.

- [**Switch Related Resources**](#)

Related resources are resources that are connected to a switch. Related resources that you can view include block storage systems, servers, switches, and resources that are not monitored but are connected to ports on a switch.

- [**Performance metrics for switches**](#)

Monitor the performance metrics that are collected for switches, switch ports, and Trunks.

- [**Chassis**](#)

Use the Chassis tab from switches page to administer and monitor the configuration and status information that is collected about the chassis in your storage environment.

- [**Chassis details**](#)

View detailed information about the components and resources that are associated with a chassis.

- [**Chassis Internal Resources**](#)

Internal resources are components that are integrated with a chassis. The components that you can view include switches, trunks, blades, and ports.

- [**Chassis Related Resources**](#)

Related resources are resources that are connected to a chassis. Related resources that you can view include fabrics, switches, chassis, block storage systems and servers.

- [**Tutorial: Creating an inventory report for switches**](#)

Create a report that shows the configuration and properties information about switches.

- [**Tutorial: Creating an inventory report for switch ports**](#)

Create a report that shows the configuration and properties information about switch ports.

- [**Tutorial: Creating an inventory report for chassis**](#)

Create a report that shows the configuration and properties information of a chassis.

Switch details

View detailed information about the components and resources that are associated with a switch.

To view the details page for a switch, click Resources > Switches. Then, right-click a switch in the list and select View Details.

General

Click an item to view key information about the switch.

- [**Overview**](#)

- [**Properties**](#)

- [**Alerts and Alert Definitions**](#)

Overview

Most Active Ports Receive

Use the Most Active Ports Receive charts to view the performance of ports with the most receive data over the past 24 hours. There are three charts in this carousel: Receive Data Rate, Receive Frame Rate, and Receive Bandwidth. Click the arrows  to cycle through the charts.

Use the chart information to quickly determine which ports that are receiving the most data. Hover over the chart lines to view the details of specific data points.

Most Active Ports Send

Use the Most Active Ports Send charts to view the performance of ports with the most send data in a switch over the past 24 hours.

There are three charts in this carousel: Send Data Rate, Send Frame Rate, and Send Bandwidth. Click the arrows  to cycle through the charts.

Use the chart information to quickly determine which ports are sending the most data. Hover over the chart lines to view the details of specific data points.

Port Congestion

Use the Port Congestion chart to view the performance of ports with the highest congestion over the past 24 hours. There are three charts in this carousel: Port Congestion Index, Zero Buffer Credit Rate, and Zero Buffer Credit Percentage. Click the arrows  to cycle through the charts.

Use the chart information to quickly determine which ports have the highest congestion. Hover over the chart lines to view the details of specific data points.

Most Problematic Ports

Use the Most Problematic Ports chart to view the performance of ports with the largest number of errors over the past 24 hours.

Use the chart information to quickly determine the ports with the largest number of errors. Hover over the chart lines to view the details of specific data points.

Tip:

- The charts show performance data that was collected in the last 24 hours. If no performance data was collected during that period the charts will be blank.
- To view different charts, click the name of a chart and select the chart that you want to view. Click the arrow icons  to cycle through the different charts that are available for each chart type.
- You can choose to display the charts in different positions on the page. For example, you can display the Zero Buffer Credit Rate and Zero Buffer Credit Percentage charts for Port Congestion at the same time in different positions on the page.
- If you do not clear browser cookies between login sessions, the selected charts are automatically displayed in the same positions the next time that you log on to the GUI and view the details of the resource.
- The chart selections you make in the details of one switch will be applied to all other switches when you view their details.

Properties

View the attributes of the switch, including general information about the switch, its connectivity, ports and links to other switches.

Alerts and Alert Definitions

View the alerts that were generated when certain conditions were detected on a switch on the Alerts page. Alerts are generated when the conditions that are specified on the Alert Definitions page are detected. Performance alerts can be defined for switches, ports, and trunks.

Use alert policies to manage the alert definitions and notification settings that apply to switches. The Default Switch alert policy is assigned to each switch identified on the chassis when a new chassis is added to IBM® Storage Insights. You can view, set, or create the alert policy for a switch from the Alert Definitions page. The actions that are available for alert policies depend on whether an alert policy is currently assigned to the switch. You can also create and assign alert policies from the Alert Policies page.

Alert policy status	Tasks available on Alert Definitions page
An alert policy is assigned	View the policy or set a different policy to manage the switch. Click View Policy or Set Policy from the Policy Actions menu.
No alert policy is assigned	Set a policy to manage the switch or create a policy from the existing alert definitions. Click Set Policy or Create Policy from the Policy Actions menu. If you don't want to use a policy, you can define alerts for a switch by clicking Edit Alert Definitions.

You can also view, set, or create the alert policy for a switch from the Alert Definitions pages.

Switch Internal Resources

Internal resources are components that are integrated with a switch. Components that you can view include trunks, switches, and ports.

Internal Resources

Use the Switch details page to view information about the following internal resources for switches that are monitored by IBM® Storage Insights.

- [Trunks](#)
- [Ports](#)

Tip: If performance data was collected for a switch, you can view detailed metrics that measure its performance and the performance of its ports. For example, right-click a port and select View Performance to view its total data rate and overall bandwidth percentage. For information about the performance view and the resources for which it is available, see [Performance view](#).

Trunks

Trunks include the following types of link:

Inter-switch link (ISL)

A link between two ports on different switches. The link is typically between two expansion ports (E_ports). Both of the switches operate in native mode.

N_Port Virtualization (NPV) link

A single physical link between a switch that is in native mode and an NPV switch. An NPV switch is a Cisco switch that is in NPV mode or a Brocade switch that is in Access Gateway mode. The port on the switch that is in native mode is a fabric port (F_port). The port on the switch that is in NPV mode or Brocade Access Gateway mode is a proxy node port (NP_port).

Expansion port (E_port) channel (also known as an ISL trunk)

A logical aggregation of ISLs.

Fabric port (F_port) channel (also known as an F_port trunk)

A logical aggregation of NPV links.

Port channel

A logical aggregation of links. If the port channel has no links, it is not possible to determine whether the port channel is an E_port channel or an F_port channel. In this case, the connection is referred to as a port channel.

Inter-chassis link (ICL) trunk

A logical aggregation of ICLs between the core routing blades of two Brocade director switches. The core blades have special ICL E_ports that are used only for links to core blades on other director switches.

To view information about ISLs, click Trunks. The number in parentheses shows the number of ISLs that are associated with the switch. For example, Trunks (2) indicates that there are two inter-switch links available on a switch.

The following information is available for ISLs, NPV links, ISL trunks, F_port trunks, and ICL trunks:

Status

The status values help you to decide whether you need to investigate or resolve issues with inter-switch links.

The following statuses might be displayed for the ISL, NPV link, ISL trunk, F_port trunk, or ICL trunk:

Acknowledged

Shows whether a user marked the status of an ISL as acknowledged. If the status of the ISL was reviewed, and the status is either resolved or can be ignored, the status is acknowledged. To acknowledge the status of an ISL, right-click the ISL in the list and select Acknowledge Status.

Error

The ISLs and NPV links have an error status because one or both of the ports have an error status.

ISL trunks, F_port trunks, and ICL trunks have an error status if half or more than half of the links in the trunk or channel have ports that have an error status.

Normal

ISLs and NPV links have a normal status if both of the ports have a normal status.

ISL trunks, F_port trunks, and ICL trunks have a normal status if half or more than half of the ports on the link have a normal status, all of the ports are configured correctly, and none of the links has an error status.

Unknown

The status of the ISL cannot be determined.

Unreachable

ISLs and NPV links have an unreachable status if both of the ports have an unreachable status.

ISL trunks, F_port trunks, and ICL trunks have an unreachable status if half or more than half of the ports on the link have an unreachable status, all of the ports are configured correctly, and none of the links has an error status.

Warning

ISLs and NPV links have a warning status if one or both of the ports have a warning status.

ISL trunks, F_port trunks, and ICL trunks have a warning status if less than half of the links have a port that has an error status. ISL trunks also have a warning status if half or more than half of the links have ports that have a warning status.

The following information is available for E_port channels and F_port channels:

Status

The status values help you to decide whether you need to investigate or resolve issues with port channels. The following statuses might be displayed for a port channel:

Error

One or both of the ports have an error status. If the port channel has no member ports, you get a no ports error.

Normal

Both of the ports have a normal status.

Port not in port channel

A port on a switch has a link to a port on another switch, but that switch is not configured to be in the port channel.

Port with no link

A port on one of the two switches in the port channel has no link.

Unknown

The status of the port channel cannot be determined.

Warning

One or both of the ports have a warning status.

Ports

Switch ports can be expansion ports (E_ports), fabric ports (F_ports), or fabric loop ports (FL_ports). To view information about ports, click Ports. The number in parentheses shows the number of ports that are associated with the switch. For example, Ports (6) indicates that there are six ports available on a switch. The following information is available for each port:

Acknowledged

Shows whether a user marked the status of a port as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when determining the status of related, higher-level resources.

For example, if the status of a port is Error, the status of the related switch is also Error. If the Error status for the port is acknowledged, then its status is not used to determine the overall status of the switch. In this case, if the other internal resources of the switch are Normal, then the status of the switch is also Normal.

Blade Slot

If the port is on a blade, this column shows the slot on a switch to which the blade is attached. If the port is on the switch, this column is blank.

Connected NPIV Ports

The number of ports that use NPIV and that are logically connected to the port. Ports must be online to be connected. Click the number of ports to view the properties notebook Connected NPIV Ports tab for the switch port. If IBM Storage Insights does not differentiate between physically connected ports and logically connected ports, the Connected NPIV Ports tab is not displayed. All of the connected ports are instead displayed in a table on the Connectivity tab.

Connected Port

The Port Name of the remote port that is physically connected to the switch port. Both ports must be online to be connected. Click the name to view the properties notebook Connectivity tab for the port. When the switch port has connections that use NPIV, the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports. If the physically connected port unregisters from the switch port, the fields on the Connectivity tab show the value Unknown.

Connected Resource

If the port is actively connected to another port, this column displays the name of the resource that is communicating with that port. The resource can be a switch, a server, or a storage system. This field can also display a port alias or a host connection name, if that information is available. For Cisco switch ports, the zone alias is displayed, if available. Cisco device aliases are not supported. When the switch port has connections that use N_Port ID Virtualization (NPIV), the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports. If a port has one connected resource with multiple names, either alias names or host names, the properties notebook for that port displays the Connected Resource Names tab. This tab shows the name and WWPN of each alias or host name. If a port has more than one connected resource, the ports table shows the number of connected resources for that port. Click the number to see a table that lists the names and WWPNs of the connected resources for that port. The following values might also be shown:

Blank

This column is blank if the port is disabled or does not have an active connection. A port can be enabled but offline if no resources have an active connection to it.

Unavailable

The value Unavailable is shown if a resource is attached to the port but IBM Storage Insights is not monitoring that resource. For example, if only the WWPN of the connected resource is known, the value Unavailable is shown.

Connected WWPN

The WWPN of the remote port that is connected to the port. When the switch port has connections that use NPIV, the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports.

Domain, Port

The domain ID of a switch, followed by the port index of a switch. In switches that have blades, the port index can differ from the port number.

Name

The name of the port. With Brocade switches, the name shown can be displayed as:

- the user-defined port name on the switch.
- the blade and port number, if the switch has blades.
- the port number, if the switch does not have blades.

Port Number

The number of the port.

Port Type

The type of port, such as E_PORT, F_PORT, or G_PORT. If this information is unknown, this column is blank.

Speed (Gbps)

The negotiated speed of a port.

State

The state of a port, such as Unavailable, Disabled, Online, and Enabled but offline. A port that is online means that the port is communicating with an attached resource. A port that is enabled but offline means that the port is enabled, but no resources are attached to it. It might not always be possible to determine the state of a port. For example, it is only possible to determine the state of ports on Brocade switches, and it sometimes not possible to determine the state of those ports. If it is not possible to determine the state of a port, the state of the port is Unavailable.

Status

The status of a Fibre Channel port. Use the status to determine the condition of a port, and if any actions must be taken. For example, if a port has an Error status, take immediate action to correct the problem. The following statuses might be displayed for a port:

- Error
- Operational
- Unknown
- Other
- Ok
- Degraded
- Stressed
- Predictive Failure
- Error
- Non-recoverable error
- Starting
- Stopping
- Stopped
- In service
- No contact
- Lost communication
- Aborted
- Dormant
- Supporting entity in error
- Completed
- Power® mode
- cpsoutofsync
- cpfailed
- cpsfailed

Switch

The logical name of the switch where a Fibre Channel port is located, or the name that was defined when the switch was added for monitoring. If neither name is available, IBM Storage Insights uses the WWN of the switch.

WWPN

The worldwide port name (WWPN) of a port. A WWPN is the unique 64-bit identifier for a port in a Fibre Channel fabric.

Switch Related Resources

Related resources are resources that are connected to a switch. Related resources that you can view include block storage systems, servers, switches, and resources that are not monitored but are connected to ports on a switch.

Related Resources

Use the Switch details page to view information about the related resources for switches that are monitored by IBM® Storage Insights.

- [Fabrics](#)
- [Block Storage Systems](#)
- [Servers](#)
- [Switches](#)
- [Chassis](#)

Fabrics

Click Fabrics to view information about the fabric in which the switch is a member.

Block Storage Systems

Click Block Storage Systems to view information about the storage systems that are connected to the switch. The number in parentheses shows the number of storage systems that are connected, for example, Block Storage Systems (2).

Servers

Click Servers to view information about the servers that are connected to the switch. The number in parentheses shows the number of servers that are connected, for example, Servers (4).

Switches

Click Switches to view information about the switches that are connected to the switch. The number in parentheses shows the number of switches that are connected, for example, Switches (6).

Chassis

Click Chassis to view information about the chassis in which the switch is available. The number in parentheses shows the number of chassis that are connected, for example, Chassis (6).

Performance metrics for switches

Monitor the performance metrics that are collected for switches, switch ports, and Trunks.

Performance metrics for switches are divided into the following categories:

- [Key port metrics](#)
- [I/O rate metrics](#)
- [Frame error rate metrics](#)
- [Port protocol error rate metrics](#)
- [Link error rate metrics](#)
- [Miscellaneous metrics](#)

Table 1. Key port metrics

Metric	Description
Bandwidth Percentage (Send)	The percentage of the port bandwidth that is used for send operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth Percentage (Receive)	The percentage of the port bandwidth that is used for receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Bandwidth Percentage (Overall)	The percentage of the port bandwidth that is used for send and receive operations. This value is an indicator of port bandwidth usage that is based on the speed of the port.
Data Rate (Send)	The average rate at which data is sent by the port. A send operation is a read operation that is processed, or a write operation that is initiated by the port. The rate is measured in MiB per second.
Data Rate (Receive)	The average rate at which data is received by the port. A receive operation is a write operation that is processed, or a read operation that is initiated by the port. The rate is measured in MiB per second.

Metric	Description
Data Rate (Total)	The average rate at which data is transferred through the port. The rate is measured in MIB per second and includes both send and receive operations.
Total Port Error Rate	The average number of times per second that an error was detected on the port. This rate is a summation of all the other error rates for the port.

Table 2. I/O rates

Metric	Description
Port Frame Rate (Send)	The average number of frames per second that are sent by the port.
Port Frame Rate (Receive)	The average number of frames per second that are received by the port.
Port Frame Rate (Total)	The average number of frames per second that are transferred. This value includes frames that are sent and received by the port.

Table 3. Frame error rates

Metric	Description
Bad EOF CRC Error Rate ¹	The percentage of nonsequential read operations that find data in the cache. You can use this value to understand throughput or response times. Low cache-hit percentages can increase response times because a cache miss requires access to the back-end storage resources.
CRC Error Rate	The percentage of nonsequential write operations that are handled in the cache.
Discarded Class 3 Frame Rate	The average number of class 3 frames per second that are discarded.
Error Frame Rate ¹	The average number of error frames per second that are received. An error frame is a frame that violates the Fibre Channel Protocol.
F-BSY Frame Rate ²	The average number of F-BSY frames per second that are generated. An F-BSY frame is issued by the fabric to indicate that a frame cannot be delivered because the fabric or destination N_port is busy.
F-RJT Frame Rate ²	The average number of F-RJT frames per second that are generated. An F-RJT frame is issued by the fabric to indicate that delivery of a frame was denied.
Long Frame Rate	The average number of frames that are received per second that are longer than 2140 octets. This number excludes start-of-frame bytes and end-of-frame bytes. The 2140 octet limit is calculated based on the assumption that a frame has 24 header bytes, 4 CRC bytes, and 2112 data bytes.
Short Frame Rate ²	The average number of frames that are received per second that are shorter than 28 octets. This number excludes start-of-frame bytes and end-of-frame bytes. The 28 octet limit is calculated based on the assumption that a frame has 24 header bytes, and 4 CRC bytes.

Notes:

1. This metric is only available for ports on Brocade switches.
2. This metric is only available for ports on Cisco switches.

Table 4. Port protocol error rates

Metric	Description
Class 3 Receive Timeout Frame Rate ¹	The average number of class 3 frames per second that were discarded after reception because of a timeout condition. The timeout condition occurs while a transmitting port waits for buffer credit from a port at the other end of the fibre. When you troubleshoot a SAN, use this metric to help identify port conditions that might slow the performance of the resources to which those ports are connected.
Class 3 Send Timeout Frame Rate ¹	The average number of class 3 frames per second that were discarded before transmission because of a timeout condition. The timeout condition occurs while the switch or port waits for buffer credit from the receiving port at the other end of the fibre. When you troubleshoot a SAN, use this metric to help identify port conditions that might slow the performance of the resources to which those ports are connected.
Credit Recovery Link Reset Rate	The estimated average number of link resets per second that a switch or port completed to recover buffer credits. This estimate attempts to disregard link resets that were caused by link initialization. When you troubleshoot a SAN, use this metric to help identify port conditions that might slow the performance of the resources to which those ports are connected.
Discarded Frame Rate ¹	The average number of frames per second that are discarded because host buffers are unavailable for the port.
Link Reset Received Rate	The average number of times per second that the port changes from an active (AC) state to a Link Recovery (LR2) state.
Link Reset Transmitted Rate	The average number of times per second that the port changes from an active (AC) state to a Link Recovery (LR1) state.

Metric	Description
Port Congestion Index	The estimated degree to which frame transmission was delayed due to a lack of buffer credits. This value is generally 0 - 100. The value 0 means there was no congestion. The value can exceed 100 if the buffer credit exhaustion persisted for an extended amount of time. When you troubleshoot a SAN, use this metric to help identify port conditions that might slow the performance of the resources to which those ports are connected.
Zero Buffer Credit Percentage	The amount of time, as a percentage, that the port was not able to send frames between ports because of insufficient buffer-to-buffer credit. The amount of time value is measured from the last time that the node was reset. In Fibre Channel technology, buffer-to-buffer credit is used to control the flow of frames between ports.
Zero Buffer Credit Rate	The average number of Zero Buffer Credit conditions per second that occurred. A Zero Buffer Credit condition occurs when a port is unable to send frames because of a lack of buffer credit since the last node reset. When you troubleshoot a SAN, use this metric to help identify port conditions that might slow the performance of the resources to which those ports are connected.
Notes:	<p>1. This metric is available only for ports on Brocade switches.</p>

Table 5. Link error rates

Metric	Description
Encoding Disparity	The average number of disparity errors per second that are received.
Invalid Link Transmission Rate	The average number of times per second that an invalid transmission word was detected by the port while the link did not experience any signal or synchronization loss.
Invalid Word Transmission Rate	The average number of bit errors per second that are detected.
Link Failure Rate	The average number of miscellaneous fibre channel link errors per second for ports. Link errors might occur when an unexpected Not Operational (NOS) is received or a link state machine failure was detected.
Loss of Signal Rate	The average number of times per second at which the port lost communication with its partner port. These types of errors usually indicate physical link problems, caused by faulty SFP modules or cables, or caused by faulty connections at the switch or patch panel. However, in some cases, this error can also occur when the maximum link distance between ports is exceeded, for the type of connecting cable and light source.
Loss of Sync Rate	The average number of times per second that the port lost synchronization with its partner port. These types of errors usually indicate physical link problems, caused by faulty SFP modules or cables, or caused by faulty connections at the switch or patch panel. However in some cases this can also occur due to mismatching port speeds between the partner ports, when auto-negotiation of link speed is disabled.
Primitive Sequence Protocol Error Rate	The average number of primitive sequence protocol errors per second that are detected. This error occurs when there is a link failure for a port.

Table 6. Miscellaneous port metrics

Metric	Description
Link Quality Percentage	The percentage is based on whether the port is an expansion port (E_port) or a fabric port (F_port), and on the numbers and types of errors that are detected by the port.
Port Frame Size (Overall)	The average frame transfer size. This value is measured in KiB and includes frames that are sent and frames that are received by the port.
Port Frame Size (Receive)	The average size of a frame, in KiB, that is received by the port.
Port Frame Size (Send)	The average size of a frame, in KiB, that is sent through the port.

Chassis

Use the Chassis tab from switches page to administer and monitor the configuration and status information that is collected about the chassis in your storage environment.

IBM Storage Insights subscribers: If you're using the free version of IBM® Storage Insights, some of the columns that are listed might not be available.

Information about Chassis

A Chassis is a physical container or hardware in which all the switches are defined. Each chassis can be logically partitioned as more than one switch.

Tip: Customize the information that is collected about the chassis by adding or editing properties.

More detailed information than that provided in the hover help text is provided here for the following columns:

Acknowledged

The issue was resolved or the user decided that the issue did not need to be investigated.

Condition

The overall condition of the chassis is determined by the most critical status of any one of the chassis internal resources.

Connected Ports

The number of ports that are connected to servers, switches, storage systems, or unmanaged resources.

Tip: Click the link in the Ports column to find out more about the connected ports.

Custom tag 1, 2, and 3

The user-defined text that you can add to provide more information about the chassis. You can include this additional information or use the custom tags to filter the information that you want to share with your colleagues in reports.

Data Collection

The aggregated status for the collection of asset, configuration, and performance metadata. Two separate jobs are run to collect the metadata:

- A probe is scheduled to run daily by default, and can be scheduled to run at intervals from one to 14 days between probes.
- A performance monitor is run every 5 minutes to collect performance metadata.

Because separate jobs are run to collect the metadata, both collection jobs must be successful to get a Running status.

Depending on the issue with collecting metadata, the following values are shown:

Degraded

Asset and configuration metadata or performance metadata is being collected, but the metadata might not be up-to-date or warning messages were generated when the metadata was being collected.

Failed

Asset and configuration metadata or performance metadata, or both can't be collected. The issue is being investigated and you'll be notified when the data collection service is resumed.

Not Connected

Asset and configuration metadata or performance metadata, or both can't be collected. If the data collection service isn't resumed, try these self-help options:

- Check that your chassis is online and that your network is up and running.
- Check that your firewall rules allow your Data Collector server(s) outbound access over HTTPS port 443 to the IBM Storage Insights service.
- Check that the server where the data collector was installed is online.
- Restart the data collector.
- Refresh your browser.

Not Monitored

Asset, configuration, and performance metadata can't be collected from the chassis because the connection details were not provided.

If a data collector is deployed and you want to monitor the chassis, click Resources > Switches, and then select Chassis tab and click Actions > Configure Data Collection.

Support: Subscribers are notified by email when issues with collecting metadata are detected. If an issue with collecting metadata persists, you can connect with experts and other users on the [IBM Community](#) website. For other support options, see [Looking for help](#).

Fabric

The name or a count of the fabrics associated with the switches configured on a chassis. When one fabric name is displayed, clicking the name will open the properties of the fabric. When multiple fabrics are detected, clicking the count will open a table listing the fabrics. If the name of a fabric is not defined the WWN of the fabric is displayed.

IP Address

The IP address of the chassis which can be in IPv4 or IPv6 format.

Last Successful Monitor

The last time that the performance information was refreshed.

Last Successful Probe

The most recent date and time when data was collected about a chassis.

Links

The number of inter-switch links (ISLs) on the chassis. This value is the sum of all ISLs in all trunks between this chassis and all the connected chassis.

Location

The location of the chassis, which can be defined after you add the chassis for monitoring.

Name

The name of the chassis or the name that was defined by the user after the chassis was added for monitoring.

Performance Monitor Status

The status of the most recent run of a performance monitor. Use this value to quickly identify a performance monitor that failed or generated warning messages during processing. The following statuses might be displayed:

- Starting: The performance monitor is starting.
- Running: The performance monitor is running.
- Running with problems: The performance monitor is running, but encountered warning conditions during processing. Check the log to view the warning messages.
- Stopping: The performance monitor is stopping.
- Completed: The performance monitor completed data collection.
- Completed with warnings: The performance monitor completed, but encountered warning conditions during processing. Check the log to view the warning messages.
- Failed: The performance monitor encountered error conditions during processing and is no longer running. Check the log of a performance monitor to view its error messages.
- Canceled: The performance monitor was stopped and is no longer collecting performance data.
- Not running: The performance monitor is not running.
- Disabled: The performance monitor never ran. To start a probe, complete these steps:
 1. From the Resources menu, click Switches and select Chassis tab.
 2. Select and right-click the chassis.
 3. Click Configure Data Collection and provide the IP address and credentials for the chassis.
 4. Click Connect.

Ports

The number of ports on the chassis.

Tip: Click the link to find out more about the ports, the storage resources it connects to, and its links.

Probe Status

The probe is run to collect asset and configuration information about your chassis. If one of the following values is shown, you might need to investigate or take remedial action:

- Failed: The asset and configuration information was not collected.
- Warning: Warning conditions were encountered when asset and configuration information was collected.
- Never probed: The asset and configuration information was not collected because the resource or device is offline.

Vendor

The name of the vendor or manufacturer of the chassis.

WWN

The worldwide name (WWN) of the chassis, which is a 64-bit unsigned name identifier that is unique.

Firmware

The firmware version of the microcode on the chassis.

Mode

Mode is a configuration setting that is defined on the chassis. Mode can be either native or NPV.

Model

Manufacturer provides the model name of chassis.

Serial number

A number or alphanumeric identifier that is given by manufacturer to each chassis.

System UUID

A unique identifier that assigned to the chassis when it is added to IBM Storage Insights.

Chassis details

View detailed information about the components and resources that are associated with a chassis.

To access the details page for a chassis, complete these steps:

1. Click Resources > Switches. A list of monitored switches is shown.
2. Click the Chassis tab.
3. Right-click a chassis in the list and select View Details.

General

Click an item to view key information about the chassis.

- [Overview](#)
- [Properties](#)
- [Alerts and Alert Definitions](#)

Overview

Most Active Ports Receive

Use the Most Active Ports Receive charts to view the performance of ports with the most receive data over the past 24 hours. There are three charts in this carousel: Receive Data Rate, Receive Frame Rate, and Receive Bandwidth. Click the arrows to cycle through the charts.

Use the chart information to quickly determine which ports that are receiving the most data. Hover over the chart lines to view the details of specific data points.

Most Active Ports Send

Use the Most Active Ports Send charts to view the performance of ports with the most send data in a chassis over the past 24 hours. There are three charts in this carousel: Send Data Rate, Send Frame Rate, and Send Bandwidth. Click the arrows to cycle through the charts.

Use the chart information to quickly determine which ports are sending the most data. Hover over the chart lines to view the details of specific data points.

Port Congestion

Use the Port Congestion chart to view the performance of ports with the highest congestion over the past 24 hours. There are three charts in this carousel: Port Congestion Index, Zero Buffer Credit Rate, and Zero Buffer Credit Percentage. Click the arrows to cycle through the charts.

Use the chart information to quickly determine which ports have the highest congestion. Hover over the chart lines to view the details of specific data points.

Most Problematic Ports

Use the Most Problematic Ports chart to view the performance of ports with the largest number of errors over the past 24 hours.

Use the chart information to quickly determine the ports with the largest number of errors. Hover over the chart lines to view the details of specific data points.

Tip:

- The charts show performance data that was collected in the last 24 hours. If no performance data was collected during that period the charts will be blank.
- To view different charts, click the name of a chart and select the chart that you want to view. Click the arrow icons to cycle through the different charts that are available for each chart type.
- You can choose to display the charts in different positions on the page. For example, you can display the Zero Buffer Credit Rate and Zero Buffer Credit Percentage charts for Port Congestion at the same time in different positions on the page.
- If you do not clear browser cookies between login sessions, the selected charts are automatically displayed in the same positions the next time that you log on to the GUI and view the details of the resource.
- The chart selections you make in the details of one chassis will be applied to all other chassis when you view their details.

Properties

View the attributes of the chassis, including general information about the chassis, the connectivity, switches, fabrics, ports, and links to other chassis.

Alerts and Alert Definitions

View the alerts that were generated when certain conditions were detected on a chassis on the Alerts page. Alerts are generated when the conditions that are specified on the Alert Definitions page are detected. The alerts that are available for a chassis are for properties that apply to the entire chassis, or blades within the chassis.

Use alert policies to manage the alert definitions and notification settings that apply to chassis. Default chassis alert policy is assigned when a new chassis is added to IBM® Storage Insights. You can view, set, or create the alert policy for a chassis from the Alert Definitions page. The tasks that you can do depend on whether the chassis is managed by an alert policy. You can also create and assign alert policies from the Alert Policies page.

Alert policy status	Tasks available on Alert Definitions page
An alert policy is assigned	View the policy or set a different policy to manage the chassis. Click View Policy or Set Policy from the Policy Actions menu.
No alert policy is assigned	Set a policy to manage the chassis or create a policy from the existing alert definitions. Click Set Policy or Create Policy from the Policy Actions menu. If you do not want to use a policy, you can define alerts for a chassis by clicking Edit Alerts Definitions.

Chassis Internal Resources

Internal resources are components that are integrated with a chassis. The components that you can view include switches, trunks, blades, and ports.

Internal Resources

Use the Chassis details page to view information about the following internal resources for chassis that are monitored by IBM® Storage Insights.

- [Switches](#)
- [Trunks](#)
- [Blades](#)
- [Ports](#)

Restriction: Chassis do not have view performance. But you can view the performance of chassis internal resources like switches, trunks, and ports. For example, right-click a port and select View Performance to view its total data rate and overall bandwidth percentage. For more information about the performance view and the resources for which it is available, see [Performance view](#).

Switches

A switch is a switching construct that exists on a chassis and corresponds to a virtual fabric. Multiple switches can be defined for a chassis. To view information about switches, click Switches. The number in parentheses shows the number of switches that are associated with the chassis. For example, Switches (6). The following information is available for each switch:

Acknowledged

The issue was resolved or the user decided that the issue did not need to be investigated.

Chassis

The name of the chassis where the switch is available. The name of the chassis was defined in an element manager or when the chassis was added to IBM Storage Insights.

Condition

The overall condition of the switch is determined by the most critical status of any one of the switch's internal resources.

Connected Ports

The number of ports that are connected to servers, switches, storage systems, or unmanaged resources.

Tip: Click the link in the Ports column to find out more about the connected ports.

Custom tag 1, 2, and 3

The user-defined text that you can add to provide more information about the switch. You can include this additional information or use the custom tags to filter the information that you want to share with your colleagues in reports.

Data Collection

The aggregated status for the collection of asset, configuration, and performance metadata. Two separate jobs are run to collect the metadata:

- A probe is run every day to collect asset and configuration metadata.
- A performance monitor is run every 5 minutes to collect performance metadata.

Because separate jobs are run to collect the metadata, both collection jobs must be successful to get a Running status.

Depending on the issue with collecting metadata, the following values are shown:

Degraded

Asset and configuration metadata or performance metadata is being collected, but the metadata might not be up-to-date or warning messages were generated when the metadata was being collected.

Failed

Asset and configuration metadata or performance metadata, or both can't be collected. The issue is being investigated and you'll be notified when the data collection service is resumed.

Not Connected

Asset and configuration metadata or performance metadata, or both can't be collected. If the data collection service isn't resumed, try these self-help options:

- Check that your switch is online and that your network is up and running.
- Check that your firewall is configured to allow outbound access over HTTPS port 443 to your instance of IBM Storage Insights Pro.
- Check that the server where the data collector was installed is online.
- Restart the data collector.
- Refresh your browser.

Not Monitored

Asset, configuration, and performance metadata cannot be collected from the switch because the correct connection details are not provided. To configure data collection for these switches, use the Configure Data Collection action and enter the correct details.

If a data collector is deployed and you want to monitor the switch, click Resources > Switches, and then click Add Switch.

If a data collector isn't deployed, click Configuration > Data Collectors, and then click Deploy Data Collector. Then, add the connection details for the switch.

Multiple data collectors: If you deployed multiple data collectors, you don't have to choose which data collector collects the metadata from the switch. To collect the metadata from the switch, IBM Storage Insights Pro tests the response time for each data collector and chooses the data collector with the fastest response time.

Support: Subscribers are notified by email when issues with collecting data are detected. If an issue with collecting data persists and you can't resolve the issue, you can get help by submitting a post on the [IBM Storage Community](#). For other support options, see [Looking for help](#).

Domain ID

The domain ID of a switch. The ID is an 8-bit identifier with a range of 0-255.

Fabric

The name of the fabric where a switch is a member. The name of the fabric was defined in an element manager or when the fabric was added to for monitoring. If a name is not defined, the WWN of the fabric is used.

Firmware

The firmware version of the microcode on the chassis where a switch is defined.

IP Address

The IP address of the switch which can be in IPv4 or IPv6 format.

Last Successful Monitor

The last time that the performance information was refreshed.

Last Successful Probe

The most recent date and time when data was collected about a switch.

Links

The number of inter-switch links (ISLs) on the switch. An ISL is a single link between two ports on two different switches. An ISL is a member of a trunk that consists of all ISLs between two switches.

Location

The location of the switch, which can be defined when you add the switch for monitoring.

Mode

Mode is a configuration setting that is defined on the chassis. Mode can be either native or NPV.

Model

Manufacturer provides the model name of chassis.

Name

The logical name of the switch or the name that was defined by the user after the switch was added for monitoring. If the name isn't available, the worldwide name (WWN) of the switch is shown.

Performance Monitor Status

The status of the most recent run of a performance monitor. Use this value to quickly identify a performance monitor that failed or generated warning messages during processing. The following statuses might be displayed:

- Starting: The performance monitor is starting.
- Running: The performance monitor is running.
- Running with problems: The performance monitor is running, but encountered warning conditions during processing. Check the log to view the warning messages.
- Stopping: The performance monitor is stopping.
- Completed: The performance monitor completed data collection.
- Completed with warnings: The performance monitor completed, but encountered warning conditions during processing. Check the log to view the warning messages.
- Failed: The performance monitor encountered error conditions during processing and is no longer running. Check the log of a performance monitor to view its error messages.
- Canceled: The performance monitor was stopped and is no longer collecting performance data.
- Not running: The performance monitor is not running.
- Disabled: The performance monitor never ran. To start a probe, complete these steps:
 1. From the Resources menu, click Switches and select Chassis tab.
 2. Select and right-click the chassis that host the switch.
 3. Click Configure Data Collection and provide the IP address and credentials for the chassis that host the switches.
 4. Click Connect.

Ports

The number of ports on the switch.

Tip: Click the link to find out more about the ports, the resources it connects to, and its' links.

Principal Switch of Fabric

The name of the principal switch of the fabric when the switch was last probed. The fabric can change its principal switch dynamically when conditions require it.

Probe Status

The probe is run to collect asset and configuration information about your switch. If one of the following values is displayed, you might need to investigate or take remedial action:

- Failed: The asset and configuration information was not collected.
- Warning: Warning conditions were encountered when asset and configuration information was collected.
- Never probed: The asset and configuration information was not collected because the resource or device is offline. The asset and configuration information was not collected because the resource or device is offline.

Serial number

A number or alphanumeric identifier that is given by manufacturer to each chassis.

System UUID

A unique identifier that assigns to the switches when it is added to IBM Storage Insights.

Vendor

The name of the vendor or manufacturer of the switch.

WWN

The worldwide name (WWN) of the switch, which is a 64-bit unsigned name identifier that is unique.

Trunks

Trunks include the following types of link:

Inter-switch link (ISL)

A link between two ports on different switches. The link is typically between two expansion ports (E_ports). Both switches operate in native mode.

N_Port Virtualization (NPV) link

A single physical link between a switch that is in native mode and an NPV switch. An NPV switch is a Cisco switch that is in NPV mode or a Brocade switch that is in Access Gateway mode. The port on the switch that is in native mode is a fabric port (F_port). The port on the switch that is in NPV mode or Brocade Access Gateway mode is a proxy node port (NP_port).

Expansion port (E_port) channel (also known as an ISL trunk)

A logical aggregation of ISLs.

Fabric port (F_port) channel (also known as an F_port trunk)

A logical aggregation of NPV links.

Port channel

A logical aggregation of links. If the port channel has no links, it is not possible to determine whether the port channel is an E_port channel or an F_port channel. In this case, the connection is referred to as a port channel.

Inter-chassis link (ICL) trunk

A logical aggregation of ICLs between the core routing blades of two Brocade director switches. The core blades have special ICL E_ports that are used only for links to core blades on other director switches.

To view information about trunks, click Trunks. The number in parentheses shows the number of trunks that are associated with the chassis. For example, Trunks (2) indicates that there are two trunks available on a chassis.

The following information is available for ISLs, NPV links, ISL trunks, F_port trunks, and ICL trunks:

Status

The status values help you to decide whether you need to investigate or resolve issues with trunks.

The following statuses might be displayed for the ISL, NPV link, ISL trunk, F_port trunk, or ICL trunk:

Acknowledged

Shows whether a user marked the status of an ISL as acknowledged. If the status of the ISL was reviewed, and the status is either resolved or can be ignored, the status is acknowledged. To acknowledge the status of an ISL, right-click the ISL in the list and select Acknowledge Status.

Error

The ISLs and NPV links have an error status because one or both of the ports have an error status.

ISL trunks, F_port trunks, and ICL trunks have an error status if half or more than half of the links in the trunk or channel have ports that have an error status.

Normal

ISLs and NPV links have a normal status if both of the ports have a normal status.

ISL trunks, F_port trunks, and ICL trunks have a normal status if half or more than half of the ports on the link have a normal status, all of the ports are configured correctly, and none of the links has an error status.

Unknown

The status of the ISL cannot be determined.

Unreachable

ISLs and NPV links have an unreachable status if both of the ports have an unreachable status.

ISL trunks, F_port trunks, and ICL trunks have an unreachable status if half or more than half of the ports on the link have an unreachable status, all of the ports are configured correctly, and none of the links has an error status.

Warning

ISLs and NPV links have a warning status if one or both of the ports have a warning status.

ISL trunks, F_port trunks, and ICL trunks have a warning status if less than half of the links have a port that has an error status. ISL trunks also have a warning status if half or more than half of the links have ports that have a warning status.

The following information is available for E_port channels and F_port channels:

Status

The status values help you to decide whether you need to investigate or resolve issues with port channels.

The following statuses might be displayed for a port channel:

Error

One or both of the ports have an error status. If the port channel has no member ports, you get a no ports error.

Normal

Both of the ports have a normal status.

Port not in port channel

A port on a chassis has a link to a port on another chassis that is not configured in the port channel.

Port with no link

A port on one of the two chassis in the port channel has no link.

Unknown

The status of the port channel cannot be determined.

Warning

One or both of the ports have a warning status.

Blades

To view information about the blades that are associated with a chassis, click Blades. The number in parentheses shows the number of blades that are associated with the chassis. For example, Blades (6) indicates that there are six blades that are installed in a chassis. The following information is available for each blade:

Acknowledged

Shows whether a user marked the status of a blade as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when determining the status of related, higher-level resources.

For example, if the status of a blade is Error, then the status of the related switch is also Error. If the Error status for the blade is acknowledged, then its status is not used to determine the overall status of the chassis. In this case, if the other internal resources of the chassis are Normal, then the status of the chassis is also Normal.

Blade Type

Shows the type of blade that is installed in chassis. Most commonly used blade types are listed here:

Switch blade

Switch blade has Fibre Channel (FC) ports.

Core Routing (CR) blade

CR blade interconnects all the port blades. CR blade provides ICL ports that allows interconnection with another chassis.

Control Processor (CP) blade

The CP blade contains the control plane for the chassis and hosts the Fabric OS that manages all hardware within the chassis.

A single active CP blade can control all the ports in the chassis.

Application blade

Application blade has a combination of FC ports and Ethernet ports.

Chassis

The name of the chassis where the blade is available. The name of the chassis was defined in an element manager or when the chassis was added to IBM Storage Insights.

Links

The number of inter-switch connections that the chassis has. Inter-switch connections are inter-switch links (ISLs), trunks, port channels, and single links to other chassis that are in Access Gateway mode.

Port Range

The range of ports for the ports that are components of the blade. For example, 0-15, 16-31. This value represents the port index relative to the chassis, not the port numbers relative to the blade.

Ports

The number of chassis ports on a blade.

Slot

The physical slot on a chassis to which a blade is attached.

Status

The status of a blade. The values include Normal, Warning, Error, Unreachable, and Unknown. Use the status to determine the condition of a blade, and if any actions must be taken. For example, if a blade has an Error status, take immediate action to correct the problem.

Ports

Chassis ports can be expansion ports (E_ports), fabric ports (F_ports), or fabric loop ports (FL_ports). To view information about ports, click Ports. The number in parentheses shows the number of ports that are associated with the chassis. For example, Ports (6) indicates that there are six ports available on a chassis. The following information is available for each port:

Acknowledged

Shows whether a user marked the status of a port as acknowledged. An acknowledged status indicates that the status was reviewed and is either resolved or can be ignored. An acknowledged status is not used when determining the status of related, higher-level resources.

For example, if the status of a port is Error, the status of the related switch is also Error. If the Error status for the port is acknowledged, then its status is not used to determine the overall status of the chassis. In this case, if the other internal resources of the chassis are Normal, then the status of the chassis is also Normal.

Blade Slot

If the port is on a blade, this column shows the slot on a chassis to which the blade is attached. If the port is on the switch, this column is blank.

Connected Resource

If the port is actively connected to another port, this column displays the name of the resource that is communicating with that port. The resource can be a switch, a server, or a storage system. This field can also display a port alias or a host connection name, if that information is available. For Cisco switch ports, the zone alias is displayed, if available. Cisco device aliases are not supported. When the switch port has connections that use N_Port ID Virtualization (NPIV), the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports. If a port has one connected resource with multiple names, either alias names or host names, the properties notebook for that port displays the Connected Resource Names tab. This tab shows the name and WWPN of each alias or host name. If a port has more than one connected resource, the ports table shows the number of connected resources for that port. Click the number to view the list of names and WWPNs of the connected resources for that port. The following values are also displayed:

Blank

This column is blank if the port is disabled or does not have an active connection. A port can be enabled but offline if it does not have an active connection with any resource.

Unavailable

The value Unavailable is shown if a resource is attached to the port but IBM Storage Insights is not monitoring that resource. For example, if only the WWPN of the connected resource is known, the value Unavailable is shown.

Connected WWPN

The WWPN of the remote port that is connected to the port. When the switch port has connections that use NPIV, the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports.

Domain

The domain ID of a chassis.

Name

The name of the port. With Brocade chassis, the name shown can be displayed as:

- the user-defined port name on the chassis.
- the blade and port number, if the chassis has blades.
- the port number, if the chassis does not have blades.

Port Index

The number of ports on a chassis. In chassis that have blades, the port index can differ from the port number.

Port Number

The number of the port.

Port Type

The type of port, such as E_PORT, F_PORT, or G_PORT. If this information is unknown, this column is blank.

Speed (Gbps)

The negotiated speed of a port.

State

The state of a port, such as Unavailable, Disabled, Online, and Enabled but offline. A port that is online means that the port is communicating with an attached resource. A port that is enabled but offline means that the port is enabled, but no resources are attached to it. It might not always be possible to determine the state of a port. For example, it is only possible to determine the state of ports on Brocade chassis, and it sometimes not possible to determine the state of those ports. If it is not possible to determine the state of a port, the state of the port is Unavailable.

Status

The status of a Fibre Channel port. Use the status to determine the condition of a port, and if any actions must be taken. For example, if a port has an Error status, take immediate action to correct the problem. The following statuses might be displayed for a port:

- Error
- Operational
- Unknown
- Other
- Ok
- Degraded
- Stressed
- Predictive Failure
- Error
- Non-recoverable error
- Starting
- Stopping
- Stopped
- In service
- No contact
- Lost communication
- Aborted
- Dormant
- Supporting entity in error
- Completed
- Power® mode
- cpsoutofsync
- cpfailed
- cpsfailed

Switch

The name of the switch where a Fibre Channel port is located, or the name that was defined when the switch was added for monitoring. If neither name is available, IBM Storage Insights uses the WWN of the switch.

WWPN

The worldwide port name (WWPN) of a port. A WWPN is the unique 64-bit identifier for a port in a Fibre Channel fabric.

For NPV switches, information is also available about the routes from ports that are connected to a server, or storage system to ports that are connected to fabrics. You can view the internal routes from Fibre Channel ports to proxy node ports, that is, from F_ports to NP_ports.

Chassis Related Resources

Related resources are resources that are connected to a chassis. Related resources that you can view include fabrics, switches, chassis, block storage systems and servers.

Related Resources

Use the chassis details page to view information about the related resources for chassis that are monitored by IBM® Storage Insights.

- [Fabrics](#)
- [Switches](#)
- [Chassis](#)
- [Block Storage Systems](#)
- [Servers](#)

Fabrics

Click Fabrics to view information about the fabrics that are connected to the chassis. The number in parentheses shows the number of fabrics that are connected, for example, Fabrics (2).

Switches

Click Switches to view information about the switches that are connected to the chassis. The number in parentheses shows the number of switches that are connected, for example, Switches (6).

Chassis

Click Chassis to view information about the chassis that are connected to the chassis. The number in parentheses shows the number of chassis that are connected, for example, Chassis (6).

Block Storage Systems

Click Block Storage Systems to view information about the storage systems that are connected to the chassis. The number in parentheses shows the number of storage systems that are connected, for example, Block Storage Systems (2).

Servers

Click Servers to view information about the servers that are connected to the chassis. The number in parentheses shows the number of servers that are connected, for example, Servers (4).

Tutorial: Creating an inventory report for switches

Create a report that shows the configuration and properties information about switches.

Procedure

1. Click Reports > Create Report.
2. In the Inventory Reports section, click the Switches report.
3. Enter the unique name of the report.
Did you know: When you create a report, you can also use the features in the table view to customize the report.
 - You can drag the column headings to reorder the information that you want to show in the report.
 - You can click the column heading in the table view to sort the values in the column. For example, click the Fabrics column heading to sort the report in the order of fabrics.
4. Select the columns that you want to include in the report.
5. To refine the information that you want to share, you can add up to four filters.
For example, you can create filters to show switches that do not have the Not Monitored condition.
6. Click Apply Filter.
7. Send the report now or schedule the report to be shared at a regular frequency for example, weekly or monthly. You can optionally attach CSV, HTML, or PDF files to the report.

Results

The report is generated at Reports > Inventory Report section.

Related information

- ➔ [IBM Spectrum Control interoperability matrix for switches](#)

Tutorial: Creating an inventory report for switch ports

Create a report that shows the configuration and properties information about switch ports.

About this task

Share the information that is collected about ports with your colleagues such as:

- The ports in a particular switch.
- The type of port, its WWPN, domain, and its connected ports.
- The servers or storage systems that the port connects to.

Procedure

1. Click Reports, and then click Create Report.
2. In the Inventory Reports section, pick the report Switch Ports.
3. Enter the unique name of the report.
Did you know: When you create the report, you can also use the features in the table view to customize the report.
 - You can drag the column headings to reorder the information that you want to show in the report.
 - You can click the column heading in the table view to sort the values in the column. For example, click the Switch column heading to sort the ports by switches.
4. Select the columns that you want to include in the report.
5. To refine the information that you want to share, you can add up to four filters.
For example, you can create filters to show ports by switch or ports by the resources that they are connected.
6. Click Apply Filter.
7. Send the report now or schedule the report to be sent regularly, such as every week, or month. You can optionally attach CSV, HTML, or PDF files to the report.

Results

The report is generated at Reports > Inventory Report section.

Tutorial: Creating an inventory report for chassis

Create a report that shows the configuration and properties information of a chassis.

Procedure

1. Click Reports > Create Report.
2. In the Inventory Reports tab, select the report Chassis.
3. Enter the unique name of the report.
Did you know: When you create the report, you can also use the features in the table view to customize the report.
 - You can drag the column headings to reorder the information that you want to show in the report.
 - You can click the column heading in the table view to sort the values in the column. For example, click the Fabrics column heading to sort the report in the order of fabrics.
4. Select the columns that you want to include in the report.
5. To refine the information that you want to share, you can add up to four filters.
For example, you can create a filter to show the chassis that do not have the Not Monitored condition
6. Click Apply Filter.
7. Send the report now or schedule the report to be shared at a regular frequency for example, weekly or monthly.
You can optionally attach CSV, HTML, or PDF files to the report.

Results

The report is generated at Reports > Inventory Report section.

Fabrics

Use the Fabrics page to administer and monitor the configuration and status information that is collected about the fabrics in your storage environment.

IBM Storage Insights subscribers: If you're currently using the free version of IBM® Storage Insights, some of the columns that are listed might not be available. Also, you must have a data collector that is deployed and connected to view information, such as configuration and status information.

Information about fabrics

A fabric is a network of hubs, switches, adapter endpoints, and connecting cables that support a communication protocol between devices.

You can exploit the metadata that is collected by adding or editing property values. When you see this icon , it means that you can add or edit this value. Just right-click the resource, and click View Properties. You can use, for example, name and location properties in filters to refine the information in the reports that you create. When you define location information, IBM Support can investigate metadata collection issues more efficiently.

More detailed information than that provided in the hover help text is provided here for the following columns:

Acknowledged

The issue causing the condition of the fabric to be Error or Warning was acknowledged by the user.

Active Zone Set

The name of the zone set that is active in the collection of zone sets for the fabric.

Condition

The overall condition of the fabric is determined by the most critical status of any one of the fabric's internal resources.

Connected Switch Ports

The number of switch ports that are online and connected.

Custom tag 1, 2, and 3

The user-defined text that you can add to provide more information about the fabric and include in the reports you create about your fabrics.

Fabric Type

The vendor of the switches in the fabric.

Links

The number of inter-switch links (ISLs) on the switch. An ISL is a single link between two ports on two different switches. An ISL is a member of a trunk that consists of all ISLs between two switches.

Location

The location of the fabric, which can be defined by editing the properties for a fabric.

Name

The name of the fabric from the switch. If no fabric name is set on the switch it is the worldwide name (WWN).

NPV Switches

The number of switches that forward FC service requests to uplink switches. In Brocade fabrics, these switches are enabled in Access Gateway mode.

Principal Switch of Fabric

The name of the principal switch in the fabric. The fabric can change its principal switch dynamically.

Switch Ports

The total number of switch ports, which includes the number of switch ports that are online and connected to other ports, and the number of switch ports that are not online.

Switches

The number of switches in the fabric.

WWN

The worldwide name (WWN) of the fabric, which is a 64-bit, unsigned name identifier that is unique.

- [**Fabric details**](#)

View detailed information about the components and resources that are associated with a fabric.

- [**Fabric Internal Resources**](#)

Internal resources are the components that exist in a fabric. Components that you can view include blades, Trunks, ports, switches, and zone sets.

- [**Fabric Related Resources**](#)

Related resources are resources that are associated with a fabric. Related resources that you can view include servers, storage systems, and resources that are not monitored but are associated with a fabric.

- [**Tutorial: Creating a report about fabrics**](#)

Share a report with your colleagues that shows the health, status, and the number of components, such as switches and ports, in your fabrics.

Fabric details

View detailed information about the components and resources that are associated with a fabric.

To view the details page for a fabric, click Resources > Fabrics. Then right-click a fabric in the list and select View Details.

General

Click an item to view key information about the fabric.

- [**Overview**](#)

- [Properties](#)
- [Alerts and Alert Definitions](#)

Overview

Most Active Ports Receive

Use the Most Active Ports Receive section to view a visual summary of the most active ports in a switch that are used for receiving messages. Each bar in the chart displays the total number of bandwidth or frames received through a specific port in the switch. To cycle through the information for the last hour, last day, and last week, click the arrows next to the time period.

Use the chart information to quickly determine if there is a port that is saturated in terms of receiving bandwidth. For more information, hover over areas in the charts that are not labeled.

Most Active Ports Send

Use the Most Active Ports Send section to view a visual summary of the most active ports in a switch that are used for sending messages. Each bar in the chart displays the total number of bandwidth or frames sent through a specific port in the switch. To cycle through the information for the last hour, last day, and last week, click the arrows next to the time period.

Use the chart information to quickly determine if there is a port that is saturated in terms of sending bandwidth. For more information, hover over areas in the charts that are not labeled.

Port Congestion

Use the Port Congestion section to view a visual summary of the switch ports that are congested. To cycle through the error information for the last hour, last day, and last week, click the arrows next to the time period.

For more information, hover over areas in the charts that are not labeled.

Most Problematic Ports

Use the Most Problematic Ports section to view a visual summary of the switch ports with the largest number of errors. To cycle through the error information for the last hour, last day, and last week, click the arrows next to the time period.

Use the chart information to quickly determine the switch ports with the largest number of errors and the types of errors that occurred. For more information, hover over areas in the charts that are not labeled.

Tip:

- To view different charts, click the name of a chart and select the chart that you want to view. Click the arrow icons to cycle through the different charts that are available for each chart type.
- You can display multiple charts of the same type in different positions on the page. For example, you can display the Total Frame Rate and Total Data Rate charts for the Most Active Ports chart type at the same time in different positions on the page.
- The selected charts are automatically displayed in the same positions the next time that you log on to the GUI and view the details of the resource.

Properties

View the attributes of the fabric, including information about its status and connectivity.

Alerts and Alert Definitions

View the alerts that were generated when certain conditions were detected on a fabric on the Alerts page. Alerts are generated when the conditions that are specified on the Alert Definitions page are detected.

Use alert policies to manage the alert definitions and notification settings that apply to fabrics. You can view, set, or create the alert policy for a chassis from the Alert Definitions page. The tasks that you can do depend on whether the fabric is managed by an alert policy. You can also create and assign alert policies from the Alert Policies page.

Alert policy status	Tasks available on Alert Definitions page
An alert policy is assigned	View the policy or set a different policy to manage the fabric. Click View Policy or Set Policy from the Policy Actions menu.
No alert policy is assigned	Set a policy to manage the fabric or create a policy from the existing alert definitions. Click Set Policy or Create Policy from the Policy Actions menu. If you do not want to use a policy, you can define alerts for fabric by clicking Edit Alerts Definitions.

Fabric Internal Resources

Internal resources are the components that exist in a fabric. Components that you can view include blades, Trunks, ports, switches, and zone sets.

Internal Resources

Use the Fabrics details page to view information about the following internal resources for fabrics that are monitored by IBM® Storage Insights.

- [Trunks](#)
- [Ports](#)
- [Switches](#)
- [Zone Sets](#)

Trunks

Trunks include the following types of link:

Inter-switch link (ISL)

A link between two ports on different switches. The link is typically between two expansion ports (E_ports). Both of the switches operate in native mode.

N_Port Virtualization (NPV) link

A single physical link between a switch that is in native mode and an NPV switch. An NPV switch is a Cisco switch that is in NPV mode or a Brocade switch that is in Access Gateway mode. The port on the switch that is in native mode is a fabric port (F_port). The port on the switch that is in NPV mode or Brocade Access Gateway mode is a proxy node port (NP_port).

Expansion port (E_port) channel (also known as an ISL trunk)

A logical aggregation of ISLs.

Fabric port (F_port) channel (also known as an F_port trunk)

A logical aggregation of NPV links.

Port channel

A logical aggregation of links. If the port channel has no links, it is not possible to determine whether the port channel is an E_port channel or an F_port channel. In this case, the connection is referred to as a port channel.

Inter-chassis link (ICL) trunk

A logical aggregation of ICLs between the core routing blades of two Brocade director switches. The core blades have special ICL E_ports that are used only for links to core blades on other director switches.

To view information about ISLs, click Trunks. The number in parentheses shows the number of ISLs that are associated with the fabric. For example, Trunks (2) indicates that there are two inter-switch links available on a fabric.

The following information is available for ISLs, NPV links, ISL trunks, F_port trunks, and ICL trunks:

Status

The status values help you to decide whether you need to investigate or resolve issues with inter-switch links.

The following statuses might be displayed for the ISL, NPV link, ISL trunk, F_port trunk, or ICL trunk:

Acknowledged

Shows whether a user marked the status of an ISL as acknowledged. If the status of the ISL was reviewed, and the status is either resolved or can be ignored, the status is acknowledged. To acknowledge the status of an ISL, right-click the ISL in the list and select Acknowledge Status.

Error

The ISLs and NPV links have an error status because one or both of the ports have an error status.

ISL trunks, F_port trunks, and ICL trunks have an error status if half or more than half of the links in the trunk or channel have ports that have an error status.

Normal

ISLs and NPV links have a normal status if both of the ports have a normal status.

ISL trunks, F_port trunks, and ICL trunks have a normal status if half or more than half of the ports on the link have a normal status, all of the ports are configured correctly, and none of the links has an error status.

Unknown

The status of the ISL cannot be determined.

Unreachable

ISLs and NPV links have an unreachable status if both of the ports have an unreachable status.

ISL trunks, F_port trunks, and ICL trunks have an unreachable status if half or more than half of the ports on the link have an unreachable status, all of the ports are configured correctly, and none of the links has an error status.

Warning

ISLs and NPV links have a warning status if one or both of the ports have a warning status.

ISL trunks, F_port trunks, and ICL trunks have a warning status if less than half of the links have a port that has an error status. ISL trunks also have a warning status if half or more than half of the links have ports that have a warning status.

The following information is available for E_port channels and F_port channels:

Status

The status values help you to decide whether you need to investigate or resolve issues with port channels.

The following statuses might be displayed for a port channel:

Error

One or both of the ports have an error status. If the port channel has no member ports, you get a no ports error.

Normal

Both of the ports have a normal status.

Port not in port channel

A port on a switch has a link to a port on another switch, but that switch is not configured to be in the port channel.

Port with no link

A port on one of the two switches in the port channel has no link.

Unknown

The status of the port channel cannot be determined.

Warning

One or both of the ports have a warning status.

Ports

Switch ports can be expansion ports (E_ports), fabric ports (F_ports), or fabric loop ports (FL_ports). To view information about the ports on the switches in your storage area network (SAN) fabric, click Ports. The number in parentheses shows the number of ports on the switches in the fabric. For example, Ports (6) indicates that there are six ports in the fabric. The following information is available for each port that is associated with the fabric.

Blade Slot

If the port is on a blade, this column displays the physical slot on the switch to which the blade is attached. If the port is on a switch, then this column has no value.

Domain, Port

The domain ID of a switch, followed by the port index of a switch. In switches that have blades, the port index can differ from the port number.

FC Port ID

A 24-bit ID that uniquely identifies a fabric endpoint, such as an F port for a storage system or an N port for a server.

Connected Resource

If the port is actively connected to another port, this column displays the name of the resource that is communicating with that port. The resource can be a switch, a server, or a storage system. This field can also display a port alias or a host connection name, if that information is available. For Cisco switch ports, the zone alias is displayed, if available. Cisco device aliases are not supported. When the switch port has connections that use N_Port ID Virtualization (NPIV), the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports. If a port has one connected resource with multiple names, either alias names or host names, the properties notebook for that port displays the Connected Resource Names tab. This tab shows the name and WWPN of each alias or host name. If a port has more than one connected resource, the ports table shows the number of connected resources for that port. Click the number to see a table that lists the names and WWPNs of the connected resources for that port. The following values might also be shown:

Blank

This column is blank if the port is disabled or does not have an active connection. A port can be enabled but offline if no resources have an active connection to it.

Unavailable

The value Unavailable is shown if a resource is attached to the port but IBM Storage Insights is not monitoring that resource. For example, if only the WWPN of the connected resource is known, the value Unavailable is shown.

Connected Port

The Port Name of the remote port that is physically connected to the switch port. Both ports must be online to be connected. Click the name to view the properties notebook Connectivity tab for the port. When the switch port has connections that use NPIV, the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports. If the physically connected port unregisters from the switch port, the fields on the Connectivity tab show the value Unknown.

Connected WWPN

The WWPN of the remote port that is connected to the port. When the switch port has connections that use NPIV, the number of connections is displayed if IBM Storage Insights does not differentiate between physically connected ports and logically connected ports.

Port Number

The ID of a port, starting with the domain ID of the associated switch.

State

The state of a port, such as Unavailable, Disabled, Online, and Enabled but offline. A port that is online means that the port is communicating with an attached resource. A port that is enabled but offline means that the port is enabled, but no resources are attached to it. It might not always be possible to determine the state of a port. For example, it is only possible to determine the state

of ports on Brocade switches, and it sometimes not possible to determine the state of those ports. If it is not possible to determine the state of a port, the state of the port is Unavailable.

Port Type

The type of a port, such as E Port, F Port, or G Port. If this information is unknown, the column does not contain a value.

Speed (Gbps)

The current negotiated speed of a port.

Status

The status of a Fibre Channel port. Statuses include Normal, Warning, Error, and Unknown. Use the status to determine the condition of a port, and if any actions must be taken. For example, if a port has an Error status, take immediate action to correct the problem.

Switch

The logical name of the switch that the port is on, or the name that was defined when the switch was added for monitoring. If neither name is available, IBM Storage Insights uses the WWN of a switch.

WWPN

The World Wide Port Name (WWPN) of a port. A WWPN is the unique 64-bit identifier for a port in a Fibre Channel fabric.

Switches

To view information about the switches in the fabric, click Switches. The number in parentheses shows the number of switches in the fabric. For example, Switches (6). The following information is available for each switch that is associated with the fabric.

Acknowledged

The issue was resolved or the user decided that the issue did not need to be investigated.

Chassis

The name of the chassis where the switch is available. The name of the chassis was defined in an element manager or when the chassis was added to IBM Storage Insights.

Condition

The overall condition of the switch is determined by the most critical status of any one of the switch's internal resources.

Connected Ports

The number of ports that are connected to servers, switches, storage systems, or unmanaged resources.

Tip: Click the link in the Ports column to find out more about the connected ports.

Custom tag 1, 2, and 3

The user-defined text that you can add to provide more information about the switch. You can include this additional information or use the custom tags to filter the information that you want to share with your colleagues in reports.

Data Collection

The aggregated status for the collection of asset, configuration, and performance metadata. Two separate jobs are run to collect the metadata:

- A probe is run every day to collect asset and configuration metadata.
- A performance monitor is run every 5 minutes to collect performance metadata.

Because separate jobs are run to collect the metadata, both collection jobs must be successful to get a Running status.

Depending on the issue with collecting metadata, the following values are shown:

Degraded

Asset and configuration metadata or performance metadata is being collected, but the metadata might not be up-to-date or warning messages were generated when the metadata was being collected.

Failed

Asset and configuration metadata or performance metadata, or both can't be collected. The issue is being investigated and you'll be notified when the data collection service is resumed.

Not Connected

Asset and configuration metadata or performance metadata, or both can't be collected. If the data collection service isn't resumed, try these self-help options:

- Check that your switch is online and that your network is up and running.
- Check that your firewall is configured to allow outbound access over HTTPS port 443 to your instance of IBM Storage Insights Pro.
- Check that the server where the data collector was installed is online.
- Restart the data collector.
- Refresh your browser.

Not Monitored

Asset, configuration, and performance metadata cannot be collected from the switch because the correct connection details are not provided. To configure data collection for these switches, use the Configure Data Collection action and enter the correct details.

If a data collector is deployed and you want to monitor the switch, click Resources > Switches, and then click Add Switch.

If a data collector isn't deployed, click Configuration > Data Collectors, and then click Deploy Data Collector. Then, add the connection details for the switch.

Multiple data collectors: If you deployed multiple data collectors, you don't have to choose which data collector collects the metadata from the switch. To collect the metadata from the switch, IBM Storage Insights Pro tests the response time for each data collector and chooses the data collector with the fastest response time.

Support: Subscribers are notified by email when issues with collecting data are detected. If an issue with collecting data persists and you can't resolve the issue, you can get help by submitting a post on the [IBM Storage Community](#). For other support options, see [Looking for help](#).

Domain ID

The domain ID of a switch. The ID is an 8-bit identifier with a range of 0-255.

Fabric

The name of the fabric where a switch is a member. The name of the fabric was defined in an element manager or when the fabric was added to for monitoring. If a name is not defined, the WWN of the fabric is used.

Firmware

The firmware version of the microcode on the chassis where a switch is defined.

IP Address

The IP address of the switch which can be in IPv4 or IPv6 format.

Last Successful Monitor

The last time that the performance information was refreshed.

Last Successful Probe

The most recent date and time when data was collected about a switch.

Links

The number of inter-switch links (ISLs) on the switch. An ISL is a single link between two ports on two different switches. An ISL is a member of a trunk that consists of all ISLs between two switches.

Location

The location of the switch, which can be defined when you add the switch for monitoring.

Mode

Mode is a configuration setting that is defined on the chassis. Mode can be either native or NPV.

Model

Manufacturer provides the model name of chassis.

Name

The logical name of the switch or the name that was defined by the user after the switch was added for monitoring. If the name isn't available, the worldwide name (WWN) of the switch is shown.

Performance Monitor Status

The status of the most recent run of a performance monitor. Use this value to quickly identify a performance monitor that failed or generated warning messages during processing. The following statuses might be displayed:

- Starting: The performance monitor is starting.
- Running: The performance monitor is running.
- Running with problems: The performance monitor is running, but encountered warning conditions during processing. Check the log to view the warning messages.
- Stopping: The performance monitor is stopping.
- Completed: The performance monitor completed data collection.
- Completed with warnings: The performance monitor completed, but encountered warning conditions during processing. Check the log to view the warning messages.
- Failed: The performance monitor encountered error conditions during processing and is no longer running. Check the log of a performance monitor to view its error messages.
- Canceled: The performance monitor was stopped and is no longer collecting performance data.
- Not running: The performance monitor is not running.
- Disabled: The performance monitor never ran. To start a probe, complete these steps:
 1. From the Resources menu, click Switches and select Chassis tab.
 2. Select and right-click the chassis that host the switch.
 3. Click Configure Data Collection and provide the IP address and credentials for the chassis that host the switches.
 4. Click Connect.

Ports

The number of ports on the switch.

Tip: Click the link to find out more about the ports, the resources it connects to, and its' links.

Principal Switch of Fabric

The name of the principal switch of the fabric when the switch was last probed. The fabric can change its principal switch dynamically when conditions require it.

Probe Status

The probe is run to collect asset and configuration information about your switch. If one of the following values is displayed, you might need to investigate or take remedial action:

- Failed: The asset and configuration information was not collected.
- Warning: Warning conditions were encountered when asset and configuration information was collected.

- Never probed: The asset and configuration information was not collected because the resource or device is offline. The asset and configuration information was not collected because the resource or device is offline.

Serial number

A number or alphanumeric identifier that is given by manufacturer to each chassis.

System UUID

A unique identifier that assigns to the switches when it is added to IBM Storage Insights.

Vendor

The name of the vendor or manufacturer of the switch.

WWN

The worldwide name (WWN) of the switch, which is a 64-bit unsigned name identifier that is unique.

Zone Sets

To view information about the zone sets on the fabric, click Zone Sets. The number in parentheses shows the number of zone sets on the fabric. For example, Zone Sets (4). The following information is available for each zone set on the fabric.

Note: For Cisco fabrics, IBM Storage Insights displays only the active zone set.

Active

If this zone set property is Yes, then the zone set is active.

Description

The user-defined description of the zone set.

Zones

The number of zones in the zone set.

Note: The number of zones visible to IBM Storage Insights includes zones that have not been added to the active zone set list. In this case, the number of zones reported may differ from the number of zones on the active zone set list maintained by the fabric. In this case, check for zones that have been created on switches but not yet committed to the active zone set list.

Zone Set Name

The user-defined name of the zone set. The name must be unique within the fabric.

Fabric Related Resources

Related resources are resources that are associated with a fabric. Related resources that you can view include servers, storage systems, and resources that are not monitored but are associated with a fabric.

Related Resources

Use the Fabrics details page to view information about the related resources for fabrics that are monitored by IBM® Storage Insights.

- [Servers](#)
- [Block Storage Systems](#)
- [Switches](#)
- [Chassis](#)

Servers

Click Servers to view information about the servers that are connected to the fabric. The number next to Servers shows the number of servers that are connected. For example, Servers (4).

Block Storage Systems

Click Block Storage Systems to view information about the storage systems that are connected to the chassis. The number in parentheses shows the number of storage systems that are connected, for example, Block Storage Systems (2).

Switches

Click Switches to view information about the switches that are connected to the fabric. The number in parentheses shows the number of switches that are connected, for example, Switches (6).

Chassis

Click Chassis to view information about the chassis in which the fabric is available. The number in parentheses shows the number of chassis that are connected, for example, Chassis (6).

Tutorial: Creating a report about fabrics

Share a report with your colleagues that shows the health, status, and the number of components, such as switches and ports, in your fabrics.

About this task

From any table view in the IBM® Storage Insights GUI, you can create, schedule, and send reports by email to your colleagues.

In this tutorial, you create a report about the fabrics that you added for monitoring.

Procedure

1. From the Resources menu, click Fabrics.
2. Click Create Report.
3. Enter the unique name of the report and click Next.
4. Customize the information that is shown in the report and then click Next.
Ensure that your colleagues get the information that they need in the report. You can remove information that your colleagues don't need. And, you can rearrange columns by dropping the columns where you want them to appear in the report.
5. Add a filter.
For example, you can add a filter to show information by location and by fabric type.
6. Schedule the delivery of the report.

Results

The report is generated at Reports > Custom Report section.

Monitoring the status and condition of resources

Monitor the operational condition of storage systems, fabrics, and switches and the status of their internal resources. You can also view the status of Fibre Channel ports for disk controllers that are associated with a server. Use this information to identify potential problem areas in a storage environment.

Table 1. Monitoring the status and condition of resources

	Explanation	Steps to view status or condition
Status	<p>The status of a resource that is reported when data is collected by IBM® Storage Insights Pro. For example:</p> <ul style="list-style-type: none">• If the cooling fans in a storage system are stopped and the internal temperature is too high, an error status  is reported by that storage system.• If a disk on a storage system is starting, a warning status  is reported for that disk by the storage system. <p>Tip: The status of internal resources is used to determine the operational condition of the associated top-level resources.</p>	<ol style="list-style-type: none">1. In the menu bar, go to the resource type that you want to view. For example, if you want to view the status of switches, go to Resources > Switches.2. Right-click a resource and select View Details. A status icon is shown next to the image of its related resource and its internal resources.

	Explanation	Steps to view status or condition
Condition	<p>The overall operational condition of a storage system. This condition represents the most critical status that was detected on the resource itself and on its internal resources.</p> <p>For example, if an error status was detected on a storage system pool, an error icon  is shown for the overall condition of the storage system. If no errors, warnings, or unreachable statuses were detected on a resource or on its internal resources, then a green symbol is shown for the condition of the storage system.</p>	<p>Dashboard view In the menu bar, go to Dashboard > Operations. The icons that show error and warning conditions for the block storage systems are displayed in the tiles.</p> <p>Resource list pages In the menu bar, go to the resource type that you want to view. For example, if you want to view the condition of block storage systems, go to Resources > Block storage systems.</p> <p>The overall condition of a resource is displayed in the Condition column, and aggregated in the condition icons at the top left corner of its details page.</p>

IBM Storage Insights Pro provides a number of different icons to help you quickly determine the health of resources.

Table 2. Possible statuses and conditions of resources

Icon	Health	Explanation
	Error	A serious problem was detected on a resource or on its internal resources. Resolve these problems as soon as possible.
	Error - Acknowledged	<p>An Error status was detected and acknowledged. An Error - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.</p> <p>An acknowledged status is not used when determining the condition of related, higher-level resources. For example, if the status of a volume is Error, the condition of the associated storage system is also Error. If the Error status of the volume is acknowledged, its status is not used to determine the overall condition of the storage system.</p>
	Unreachable	A resource is not responding to requests from the IBM Storage Insights Pro server. This status might be caused by a problem with the data collector.
	Unreachable - Acknowledged	<p>An Unreachable status was detected and acknowledged. An Unreachable - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.</p> <p>An acknowledged status is not used when determining the condition of related, higher-level resources. For example, if the status of a disk is Unreachable, the condition of the associated block storage system is also unreachable. If the Unreachable status of the disk is acknowledged, its status is not used to determine the overall condition of the block storage system.</p>
	Warning	A Warning status represents potential problems on a resource or on its internal resources. This status is not critical.
	Warning - Acknowledged	<p>A Warning status was detected and acknowledged. A Warning - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.</p> <p>A Warning - Acknowledged status is not used when determining the condition of related, higher-level resources. For example, if the status of a disk is Warning, the condition of the associated block storage system is also Warning. If the Warning status of the disk is acknowledged, its status is not used to determine the overall condition of the block storage system.</p>
	Normal	No warnings or errors were detected on a monitored resource.
	Unknown	A resource is known to IBM Storage Insights Pro but is not monitored. To change an Unknown status, ensure data is being collected for the resource.

- How the condition of a resource is determined**

The operational condition of a resource represents the most critical status that was detected on the resource itself and on its internal resources.

- Viewing the condition of specific types of resources**

Use resource list pages as a central location for viewing the condition of storage systems, fabrics, and switches.

- Viewing the status of resources**

Use detail pages to view the status of storage systems, fabrics, and switches and the status of their internal resources. The status of a resource is reported to IBM Storage Insights Pro when data is collected.

- Acknowledging the condition of top-level resources**

A summary of the conditions for storage systems, fabrics is available in the Dashboard view and on resource list pages. You can

acknowledge the condition of a top-level resource so that its condition is not shown as Error, Unreachable, or Warning on those pages.

- **Acknowledging the status of internal resources**

The statuses of internal resources are used to determine the condition of the associated storage systems, fabrics, and switches. Sometimes these statuses might represent problems that commonly occur or are known, but can be ignored. In such cases, you can acknowledge the status of an internal resource so that it is not used to determine the condition of a top-level resource.

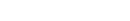
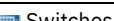
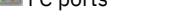
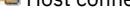
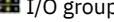
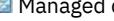
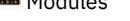
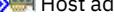
How the condition of a resource is determined

The operational condition of a resource represents the most critical status that was detected on the resource itself and on its internal resources.

To determine the condition of top-level resources, such as storage systems, fabrics, and switches, IBM® Storage Insights Pro uses the status of those resources and the status of their internal resources.

The statuses of the following internal resources are used to calculate the overall condition of a top-level resource.

Table 1. Internal resources that are used to determine the condition of top-level resources

Top-level resource	Internal resources that are used to determine the condition of a top-level resource
Fabric	 Trunks  Switches  Ports  Zone Sets
Switch	 Trunks  Ports
Chassis	 Switches  Trunks  Blades  Ports
Block storage system	 Disks  Drives  External disks  FC ports  Host connections  I/O groups  IP ports  Managed disks  Modules  Nodes  Pools  RAID arrays  Device adapters  Host adapters  Volumes

Top-level resource	Internal resources that are used to determine the condition of a top-level resource
File storage system	 <ul style="list-style-type: none"> ■ Network shared disks ■ Nodes
Object storage system	 <ul style="list-style-type: none"> ■ Network shared disks ■ Nodes

The following statuses of internal resources are used to help calculate the condition of top-level resources:

- Normal
- Warning
- Error

Tip: Statuses that are acknowledged are not used to calculate the overall condition of a top-level resource.

Internal resources for a top-level resource might have different statuses. IBM Storage Insights Pro uses the most critical status of an internal resource to help determine the overall condition of a top-level resource. For example, in a storage system, a port might have an Error status, a pool might have a Warning status, and multiple controllers might have an Unknown status. In this case, if the storage system itself has a normal status, its overall condition is Error because it is the most critical status that was detected on internal resources.

The following table shows some of the possible combinations of statuses and the resulting, overall condition for a top-level resource.

Table 2. Propagation of the statuses for resources

Error	Unreachable ¹	Warning	Normal	Unknown ²	Resulting condition for a top-level resource
				X	 Unknown
			X		 Normal
			X	X	 Normal
		X			 Warning
		X		X	 Warning
		X	X	X	 Warning
	X				 Unreachable
	X			X	 Unreachable
	X		X	X	 Unreachable
	X	X	X	X	 Unreachable
X					 Error
X				X	 Error
X			X	X	 Error
X		X	X	X	 Error
X	X	X	X	X	 Error

Note:

1. The Unreachable status applies only to top-level resources.
2. The Unknown status of an internal resource is not used to determine the condition of a top-level resource.

Viewing the condition of specific types of resources

Use resource list pages as a central location for viewing the condition of storage systems, fabrics, and switches.

Procedure

-
1. In the menu bar, go to the type of top-level resource that you want to view.
For example, if you want to view the condition of block storage systems, go to Resources > Block storage systems.
 2. To view the total number of different conditions that were detected for the type of resource, check the condition icons on the resource list page.
The number next to the icon represents how many occurrences of each condition were detected.
For example, if 15 storage systems are monitored, but five storage systems have internal resources with a warning status, two storage systems have internal resources with an unreachable status, and three storage systems have internal resources with an error status, the following condition information is displayed:
 - 5 Normal
 - 5 Warning
 - 2 Unreachable
 - 3 Error
 3. To view the condition for specific resources, check the Condition column in the list of resources.
 4. Optional: Click the Search icon to filter the list so that only resources with a specified condition are shown.
You can use filtering to identify the resources with the most serious conditions in your environment.
 5. Optional: Select Condition.
 6. Optional: In the Choose Value list, select the condition on which you want to filter.
The list of resources is automatically refreshed and only resources with the filtered status are shown. For example, select Warning to view only the resources with a Warning condition.

Viewing the status of resources

Use detail pages to view the status of storage systems, fabrics, and switches and the status of their internal resources. The status of a resource is reported to IBM® Storage Insights Pro when data is collected.

About this task

The status of a resource is different to the operational condition that is calculated for top-level resources:

- *Condition* is determined by propagating the statuses of resources and is only shown for top-level resources.
 - *Status* represents the status of a resource as reported by its hardware and is shown for top-level resources and internal resources.
- The following examples illustrate statuses that might be reported by a resource:
- If the cooling fans in a storage system are stopped and the internal temperature is too high, an error status is reported by that storage system.
 - If a disk on a storage system is starting, a warning status is reported for that disk by the storage system.

Tip: View condition to identify which top-level resources might be encountering problems. View status to identify the specific resources that are causing the problems in a top-level resource.

Procedure

1. In the menu bar, go to the resource type that you want to view.
For example, if you want to view the status of block storage systems and their internal resources, go to Resources > Block storage systems.
2. Right-click a resource and select View Details.
3. To view the status of the top-level resource, view the status icon that is displayed next to its image on the page.
4. To view the aggregated status of an internal resource, view the status icon that is displayed next to its image in the Internal Resources section.
If a resource has a status other than normal, an icon is displayed for the most critical status.
For example, if a storage system has three pools with an error status and two pools with a warning status, the error status icon is shown for pools in the Internal Resources section:
 Pools (5)
5. To view the status of a specific internal resource, click the name of that internal resource in the Internal Resources section.

A list of the monitored internal resources is displayed. For example, on the details page for a block storage system, click Disks (5) to view a list of the five disks that are associated with the storage system.

6. Check the Status column to view the status for each internal resource.

Tip: When you view information about some internal resources, the Status column might show values that are more specific than Error, Unreachable, Warning, Unreachable, Unknown, and Normal. Use this additional status to determine the cause of the problem for an internal resource.

For example, in the Internal Resources section on the details page for a storage system, an error status might be shown for managed disks:



When you view the list of managed disks, the Status column might show an Offline status for a specific managed disk. When a managed disk is reported as offline, an error status icon indicates that status.

Acknowledging the condition of top-level resources

A summary of the conditions for storage systems, fabrics is available in the Dashboard view and on resource list pages. You can acknowledge the condition of a top-level resource so that its condition is not shown as Error, Unreachable, or Warning on those pages.

Procedure

1. In the menu bar, go to the type of resource that has a condition you want to acknowledge.

For example, if you want to acknowledge the condition of a block storage system, go to Resources > Block storage systems.

2. In the list of resources, locate the resource with the Error, Unreachable, or Warning condition that you want to acknowledge.

3. Right-click the resource and select Mark Condition as Acknowledged.

A window shows that the condition for the specified resource was acknowledged.

4. Optional: To acknowledge the condition of multiple resources at the same time, press Ctrl and click each resource. To select a series of resources, select the first resource, and then press Shift and click the last resource. When the resources are selected, right-click a row in the list and select Mark Condition as Acknowledged.

5. Click Close.

Results

When you acknowledge the condition of a top-level resource, the following actions are taken:

Dashboard view

- The condition of an acknowledged resource is not used to determine the number of errors displayed for that resource on the Operations dashboard view. For example, if you acknowledge the unreachable condition for a block storage system, the condition is not used to determine the number of errors displayed.

Resource details page

- The condition icons at the top of the page are updated. For example, if 10 block storage systems have Unreachable conditions, and you acknowledge one of them, the total number Unreachable conditions decreases by one and the number of Unreachable - Acknowledged conditions increases by one. The following information is updated at the top of the Block storage systems page:

9 Unreachable 1 Unreachable - Acknowledged

- The value in the Condition column for the resource is updated to show an acknowledged condition. For example, if you acknowledge the Unreachable condition for a block storage system, the following value is shown in the Condition column:

Unreachable

Related reference

- [How the condition of a resource is determined](#)

Acknowledging the status of internal resources

The statuses of internal resources are used to determine the condition of the associated storage systems, fabrics, and switches. Sometimes these statuses might represent problems that commonly occur or are known, but can be ignored. In such cases, you can acknowledge the status of an internal resource so that it is not used to determine the condition of a top-level resource.

About this task

For example, if the status of a volume is Error, the condition of the associated storage system is also Error. If the Error status of the volume is acknowledged, its status is not used to determine the overall condition of its storage system. In this case, if the other internal resources of the storage system are Normal, then the condition of the storage system is also Normal.

Procedure

1. In the menu bar, go to the type of resource in which the internal resource is located.

For example, if you want to acknowledge the status of internal resources for block storage systems, go to Resources > Block storage systems.

2. Right-click a resource and select View Details.

For example, if you want to acknowledge the status of a disk on a block storage system, right-click that block storage system and select View Details.

3. In the Internal Resources section of the resource details page, click the name of the internal resource.

For example, if you want to acknowledge the status of a disk on a block storage system, click Disks.

4. Right-click the resource and select Mark Condition as Acknowledged.

A window shows that the status for the specified resource was acknowledged. For example, if you want to acknowledge the status of a disk, right-click the disk and select Mark Condition as Acknowledged.

5. Optional: To acknowledge multiple resources at the same time, press Ctrl and click each resource. To select a series of resources, select the first resource, and then press Shift and click the last resource. When the resources are selected, right-click a row in the list and select Mark Condition as Acknowledged.

6. Click Close.

The status of the related, top-level resource might take several minutes to update.

Results

When you acknowledge the status of an internal resource, the following actions occur:

- The status of the internal resource is no longer used to determine the condition of the associated top-level resource.
- The status icons at the top of the page for the internal resource are updated.

For example, if you acknowledge the Error status for a pool on a block storage system, the total number of Error statuses decreases by one and the number of Error - Acknowledged statuses increases by one on the Pools page. If originally there were five pools with Error statuses, the following updated status information is shown:

 4 Error  1 Error - Acknowledged

Related reference

- [How the condition of a resource is determined](#)

Opening the management GUI for the storage system

Access the management GUI or element manager for the storage system.

Before you begin

The storage system must be monitored by IBM® Storage Insights Pro and it must have a management GUI that is web-based or can be accessed with Java™ Web Start.

About this task

For DS8000® storage systems, extra steps are required if the firmware version of the storage system is lower than R6.2.

Procedure

1. From the Resources menu, click Block Storage Systems or File Storage Systems.
 2. Right-click the storage system and click Launch Storage System GUI.
Alternatively, click View Details and select Launch Storage System GUI, from the Actions list.
- **[Opening the management GUI for DS8000 storage systems](#)**
To open the management GUI for DS8000 with firmware versions lower than R6.2, you must configure the connection to the storage system.

Opening the management GUI for DS8000 storage systems

To open the management GUI for DS8000® with firmware versions lower than R6.2, you must configure the connection to the storage system.

About this task

If the firmware version of the DS8000 type of storage system is lower than R6.2, you must complete extra steps before you can open the management GUI.

Procedure

1. To check the firmware version, complete these steps:
 - a. From the Resources menu, click Block Storage Systems.
 - b. Right-click the storage system and click View Properties.
 - c. Check the version in the Firmware field.
2. Choose one of the following options:

Option	Description
The firmware version is higher than R6.2	Go to Step 7.
The firmware version is lower than R6.2	Go to Step 3.
3. Download and start the PuTTY utility.
PuTTY is a free implementation of Telnet and SSH for Windows and UNIX.
[Download PuTTY: Go to <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>.](http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html)
4. On the Session page in the PuTTY tool, complete the following steps:
 - a. In the Host Name (or IP address field), enter the IP address of the Hardware Management Console (HMC) for DS8000.
Find the IP address: The IP address of the storage system is shown on the General tab of the Properties page. To open the Properties page for the storage system, right-click the storage system and click View Properties.
 - b. Select SSH as the Connection type, and then click Open.
5. Enter the user name and password for logging on to the HMC.
6. Run the following command: `touch /opt/esshmc/data/config/ntvbrsen`.
7. Right-click the storage system and click Launch Storage System GUI.

Opening, updating, and tracking IBM Support tickets

Get hardware and software issues resolved by opening and updating tickets for IBM® Support. Log packages are automatically added to new tickets.

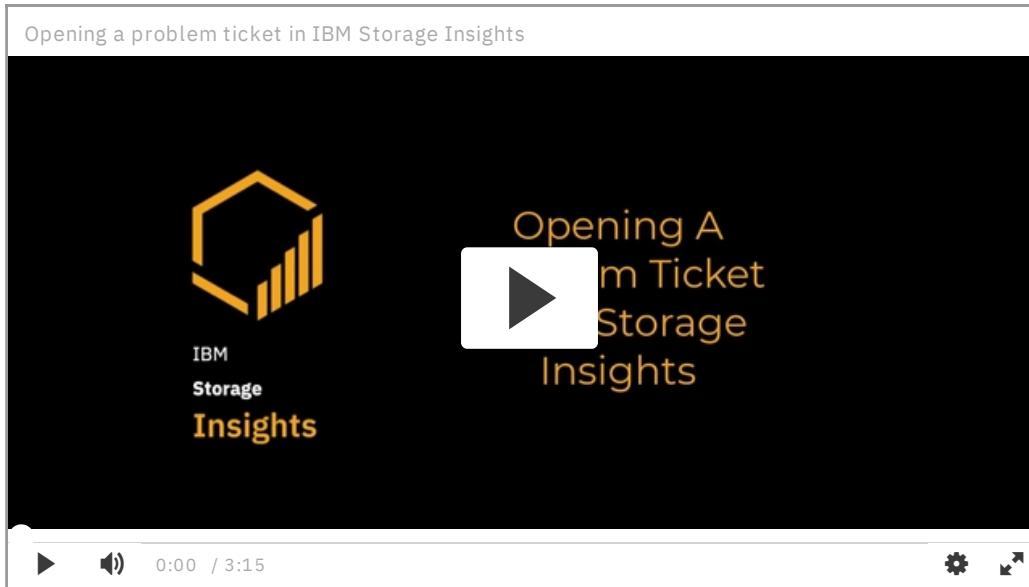
You can open tickets for IBM Support about storage systems in your storage environment. You can also update those tickets with a new log package or support package and add a note or an attachment to the ticket.

The following table shows the tasks that you can do with tickets.

Task	Steps
------	-------

Task	Steps
Open a ticket for a resource	<p>1. Choose one of the following options:</p> <ul style="list-style-type: none"> • IBM Storage Insights Pro: Click Dashboards > Operations. • IBM Storage Insights: Click Dashboards. <p>2. Choose one of the following options:</p> <ul style="list-style-type: none"> • In the tile view, click the More icon in the tile for the resource . Click Get Support, then click Create Ticket. • In the table view, right-click the storage system, select Get Support, and click Create Ticket. <p>IBM Premium Support service: If you are eligible for Premium Support, it's recommended that you call IBM Support or open a support case at https://www.ibm.com/mysupport/ to access that service for your issue. Ensure that you have your Direct Access Code (DAC) number ready so IBM can best assist you.</p>
Update a ticket with a new log package	<p>1. Choose one of the following options:</p> <ul style="list-style-type: none"> • IBM Storage Insights Pro: Click Dashboards > Operations. • IBM Storage Insights: Click Dashboards. <p>2. Choose one of the following options:</p> <ul style="list-style-type: none"> • In the tile view, click the More icon in the tile for the resource . Click Get Support, then click Update Ticket. Select or type the ticket number, then click Next. • In the tile view, click the tile for the resource. Click the Tickets tab, click the ticket, then click Add Log Package to Ticket. • In the table view, right-click the storage system, select Get Support, and click Update Ticket. Select or type the ticket number, then click Next.
View the open tickets for a resource	<p>1. Choose one of the following options:</p> <ul style="list-style-type: none"> • IBM Storage Insights Pro: Click Dashboards > Operations. • IBM Storage Insights: Click Dashboards. <p>2. Choose one of the following options:</p> <ul style="list-style-type: none"> • In the tile view, click the tile for the resource. • In the table view, right-click the storage system and click View Details. <p>3. Click the Tickets tab.</p>

Watch a short video about how to open a ticket for an IBM storage system in IBM Storage Insights.



Tips:

- When you open a ticket for a FlashSystem V9000, a hardware ticket is opened.
- You can give IBM Support permission to collect and upload log packages for the resource without contacting you every time. To set this permission, click Configuration > Settings. Then click Edit in the IBM Support Log Permissions section.
- The maximum size for attachments to a ticket is 20 MB. Log packages are separate from attachments because they are added automatically to a ticket and aren't restricted to 20 MB.
- You can view the ticket history of resources. The closed tickets are listed on the left side of the Tickets section.
- After you create or update a ticket, a task is added to the list of running tasks on the page banner. If the task fails, the task is added to the list of failed tasks on the page banner. You can retry or cancel tasks that failed.
- You cannot open tickets for IBM Cloud Object Storage systems in IBM Storage Insights.

- [Call Home and IBM Support tickets](#)
The ticket tasks that you can do depend on the type of storage system and on whether Call Home is enabled for the storage system.
- [Information that you add to tickets](#)
To help IBM Support resolve your tickets promptly, provide relevant information in the tickets.

Related reference

- [Call Home and IBM Support tickets](#)
-

Call Home and IBM Support tickets

The ticket tasks that you can do depend on the type of storage system and on whether Call Home is enabled for the storage system.

For storage systems that run IBM Spectrum Virtualize and XIV® storage systems, you can complete the following ticket tasks:

- Create tickets with a log package added automatically.
- Update tickets with log package added automatically.
- Add notes or attachments to existing tickets.

For DS8000® R8.1 and later storage systems that have Call Home enabled, you can complete the same tasks. However, if you do not have Call Home enabled, a log package is not added automatically when you create a ticket, and you cannot automatically update the log package in the ticket.

For DS8000 R8.0 and earlier storage systems, you can create tickets but log packages are not added automatically. You can add notes or attachments to existing tickets. Whether Call Home is enabled does not affect the tasks available.

Information that you add to tickets

To help IBM® Support resolve your tickets promptly, provide relevant information in the tickets.

Specify the type of log package for tickets, depending on the resource that the ticket is for. Select an appropriate severity level for tickets. Add relevant information to summaries and descriptions in tickets. You can also add a note and attach files to tickets.

Tip: The maximum size for attachments to a ticket is 20 MB. Log packages are separate from attachments because they are added automatically to a ticket and aren't restricted to 20 MB.

Types of log package

When you open a ticket for a resource that runs IBM Spectrum Virtualize, you can select from four types of log package to add to the ticket. For more information about the types of log package, see  [What Data Should You Collect for a Problem on SVC or Storwize Systems](#).

Severity level

After you assign a severity level to a ticket, you can discuss the severity level with IBM Support, and the severity level might be updated, based on the business impact of the problem. For more information about how the severity level of a ticket is determined, see the  [IBM Software Support Handbook](#).

Summaries and descriptions

Use the following sample summaries and descriptions to help you write summaries and descriptions that help IBM Support to resolve your tickets promptly.

Hardware ticket

Ticket detail	Sample
Short summary	Got error 1195. Node is missing from system. Logged yesterday June 25 around 6am EST, no unusual activities before the event.
Problem description	The node stopped working. The physical unit cannot receive power. Send an IBM service representative if service onsite is needed.

Simple software ticket

Ticket detail	Sample
Short summary	Got error 2030.
Problem description	The software restarted Node 2 for some reason and now the node shows software error 2030.
Complex software ticket	
Ticket detail	Sample
Short summary	Seeing high latency on hosts A and B related to volumes X and Y.
Problem description	Problem started this morning.

Identifying the locations of devices

Identify the locations of devices that are monitored by IBM® Storage Insights. You can also apply custom tags to more easily identify, sort, or group devices based on location or another attribute that you specify.

About this task

In large or distributed environments, it can be a challenge to manually keep track of all the physical locations where your devices reside. This challenge might be especially true in organizations with data centers that span multiple time zones and countries. In IBM Storage Insights, when you add a device for monitoring, it automatically tracks the locations and time zones of devices for you.

Use the following steps to identify the location and time zone of devices that are being monitored. You can also apply custom tags to better filter or sort the devices in the GUI or in an external application if the data is shared or exported.

Procedure

1. In the menu bar, select the device type.
For example, if you want to identify the locations of block storage systems, go to Resources > Block Storage Systems.
2. Right-click a device and select View Properties.
3. On the General tab, scroll down until you see the Time Zone and Location values. Use these values to identify where a device resides.
To further refine location information, such as differentiating devices in the same geographic location but separate data centers, you can apply up to three custom tags.
4. Optional: To apply a custom tag to a device, click Edit.
5. Optional: Enter a value in a Custom Tag field and click Save.
Use custom tags to help you more easily identify, sort, or group devices. For example, you might enter values like Data Center X or Data Center Y, depending on the location of a device.
Tip: You can bulk apply custom tags to multiple devices at the same time. For example, on the Block Storage Systems page, click Ctrl + click or Shift + click to select multiple storage systems. Then, right-click the selected storage systems, click Edit Properties, and enter values in the Custom Tag fields.

Example

After custom tags are applied to devices, you can sort, filter, group, and export the devices based on those tags.

For example, on the Block Storage Systems page, you can sort the list so that storage systems with a specific custom tag, such as Data Center X, are shown at the top of the list. To sort the list, right-click any of the column headings and select the check box next to Custom Tag 1. Then, click the Custom Tag 1 column to sort the list.

You can also filter the list to only show storage systems with a specific custom tag. To filter the list, enter that custom tag value in the Filter text box and press Enter. Only the storage systems with custom tags that match or partially match the filter text are shown on the page. You can also complete the following actions:

- To group the filtered storage systems, click Ctrl + click or Shift + click to select them. Then, right-click the selected storage systems, click Add to General Group, and follow the prompts.
- To export the filtered storage systems to a file, select Actions > Export and select the file format that you want to use.

Related concepts

- [Customizing lists](#)

Related tasks

- [Exporting information to a file](#)
- [Creating general groups and adding resources](#)

Monitoring notifications

Monitor notifications of Call Home events that occur on your devices to see which devices in your storage environment need your attention.

Use the Notifications dashboard to view notifications of Call Home events sent by your devices. For each notification, you can view details such as the severity, the time it occurred, the device, and internal resource on which it occurred. You can acknowledge notifications and create reports about them. You can also use the filter tags on the upper part of the dashboard to quickly filter your notifications.

Tip: For your reference, notifications are kept for 6 months before they're automatically removed from IBM® Storage Insights.

Viewing notifications

To view lists of notifications, complete the actions in the following table:

View the notifications for	Steps
All monitored devices	Click Dashboards > Notifications.
A specific monitored device	<ol style="list-style-type: none">From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. Or, for fabrics and switches, click, Fabrics or Switches, respectively.Right-click a storage system, fabric, or switch in the list and click View Details.Click Notifications in the General section.

Customizing the lists of notifications

Click the filter tags on the upper part of the dashboard to quickly filter your notifications by severity or acknowledgment status. To show notifications of a particular severity or status, click the appropriate tag. The tag is displayed in color. To hide those notifications, click the tag again. The tag is displayed without color.

For example, to show only notifications that have an error or warning severity, click Error and Warning. The Error and Warning tags are active and are displayed in color, as shown in the following screen capture:

Unacknowledged Notifications: 1,534 ✖ 276 Error ⚠ 30 Warning ⓘ 1,228 Informational | ⓘ 273 Acknowledged

You can also use the list of notifications to filter events, sort rows, and show, hide, and reorder columns. For more information about customizing the list, see [Filtering lists](#), [Sorting lists](#), and [Showing, hiding, and reordering columns in lists](#).

Viewing details of notifications

To view the details of an event notification, double-click the event. The event details are displayed in a pane.

Click another event to display its details. Alternatively, click the close icon .

Exporting notifications

You can export notifications from the table that displays events to a file. For more information about exporting information to a file, see [Exporting information to a file](#).

Types of events monitored

You can monitor events that are sent by devices to IBM, that is, Call Home events.

Restrictions:

- You might see some events in the element manager of your device that are not displayed in IBM Storage Insights. Those events are not displayed because devices don't send all events to IBM Storage Insights.
- Devices don't send the same events to IBM Storage Insights. For example, SAN Volume Controller devices send Health Checker events, but DS8000® devices don't.
- **Acknowledging notifications**
Some events are caused by conditions that occur regularly and can be ignored. You can acknowledge the notifications of those events to indicate that the events were reviewed and don't require immediate attention.
- **Creating notification reports**
Create notification reports to inform managers in your organization about events in your storage environment. Notification reports can also alert storage administrations or your IT department about devices that need your attention or actions that need to be taken.

Acknowledging notifications

Some events are caused by conditions that occur regularly and can be ignored. You can acknowledge the notifications of those events to indicate that the events were reviewed and don't require immediate attention.

Procedure

1. Choose how to acknowledge a notification:

Option	Description
Acknowledge notifications in the Notifications dashboard	a. Click Dashboards > Notifications. b. Select the notifications and click Acknowledge.
Acknowledge notifications for a specific monitored device	a. From the Resources menu, click Block Storage Systems, File Storage Systems, or Object Storage Systems. b. Right-click a storage system in the list and click View Details. c. Click Notifications in the General section. d. Select the notifications and click Acknowledge.

If some of the notifications that you selected are already acknowledged, those notifications remain acknowledged.

2. Optional: To unacknowledge a notification, right-click the notification then click Unacknowledge Notification.

Creating notification reports

Create notification reports to inform managers in your organization about events in your storage environment. Notification reports can also alert storage administrations or your IT department about devices that need your attention or actions that need to be taken.

Procedure

1. Click Dashboards > Notifications.
2. Click Create Report.
3. Enter a unique name for the report, then click Next.
4. Select and reorder the columns for the report, then click Next.
5. Add filters to specify the events that want to include in the report, then click Next.
6. Enter an email address to send the report to and a schedule for the report, then click Save and Send.

Alerting

Specify conditions that trigger alerts and the actions to take when those alerts are triggered, such as notify an email address. Use alert policies to define those alert conditions and notification settings for a group of resources. You can also define alerts and use alert policies for switches and fabrics.

IBM Storage Insights Pro only: You must subscribe to IBM® Storage Insights Pro to define and modify alert definitions and to create and modify alert policies. This functionality is not available in IBM Storage Insights. For a list of functions that are available in each version, see [IBM Storage Insights vs IBM Storage Insights Pro](#).

Alerting functions examine the attributes, capacity, and performance of resources. If the conditions that are defined for alerts are met, the actions that are specified for the alert are taken. Typically, the actions include sending a notification. For example, if the status of a SAN

Volume Controller storage system changes to Error, an alert is displayed in the Alerts dashboard in the GUI, and an email might be sent to a storage administrator.

You can manage alerts in your storage environment in the following ways:

- Use alert policies to manage the alert definitions and notification settings that apply to different sets of resources. For example, you can use one alert policy for the storage systems in your test environment, and another for the storage systems in your production environment. Here are some important points about alert policies:
 - Alert policies manage one type of resource only. For example, if you have SAN Volume Controller and FlashSystem 900 storage systems in your storage environment, you cannot have both types of resource in one alert policy.
 - A resource can be managed by only one alert policy.
 - When you add a resource to be monitored by IBM Storage Insights Pro, it is added to a default alert policy automatically.
 - If a resource is managed by a policy, the resource cannot have alert definitions and notification settings that are independent of the policy. The alert definitions and notification settings that apply to the resource come from the policy.
 - It is not a requirement for resources to be managed by an alert policy. A resource can have its own alert definitions and notification settings, independent of an alert policy.
 - When you add a resource to be monitored by IBM Storage Insights Pro, it is added to a default alert policy automatically.
 - If you add a resource to a policy, any existing alert definitions for the resource are replaced by the alert definitions in that policy. You can't restore the original alert definitions for a resource after you move it into the policy.
- To store a copy of the original alert definitions for a resource before you move it into a policy, create a policy based on the alert configuration of the resource. Then, move the resource to another policy. If you want to reapply the original alert definitions later, you can add the resource to the policy with the original alert configuration.
- Define alert conditions and notification settings for individual resources. It is not a requirement for resources to be managed by an alert policy. A resource can have its own alert definitions and notification settings, independent of an alert policy.
- Define alerts and notification settings for applications and general groups. Use applications or general groups to manage alerts for groups of resource components such as volumes or pools. For example, you might want to define alerts on the response time for volumes in an application, depending on the response time requirements of the application. In this case, it is not useful to configure volume response time thresholds for the entire storage system because the storage system might serve many different applications with different needs.

Tips:

- You can view, acknowledge, and remove alert notifications when you have the Monitor role. To create alerts, you need to be assigned the Administrator role.
- For your reference, alert notifications are retained for 4 weeks before they're automatically removed from IBM Storage Insights Pro.
- If multiple alerts are triggered by the same violations on the same device at the same time, only one consolidated alert is displayed on the Alerts dashboard.

- **How alerts work**

Alerting functions examine the attributes, capacity, and performance of resources. If the conditions that are defined for alerts are met, the actions that are specified for the alert are taken. Typically, the actions include sending a notification. For example, if the status of a SAN Volume Controller storage system changes to Error, an alert is displayed in the Alerts page in the GUI, and an email might be sent to a storage administrator. For alerting on switches and fabrics, asset, configuration, status, and performance information is examined.

- **Viewing and administering alerts**

Use the Alerts page to view, evaluate, and manage the alert notifications that were generated when certain conditions were detected on monitored resources. All alert notifications are shown, so you can monitor and address the critical storage events in your environment from a central location. This includes alerts for switches and fabrics.

- **Viewing and administering alert definitions**

View and administer the alert definitions and notification settings for alert policies, resources, applications, and general groups. You can also view and administer alert definitions for switches and fabrics.

- **Alert policies**

Use the Alert Policies page as a central location to view and manage all your alert policies.

- **Defining alerts for attributes, capacity, and performance changes**

Define how you are alerted to changes in your storage environment. You can define alerts for changes in the attributes, capacity, and performance of your monitored storage resources.

- **Defining custom alerts for resources**

You can define alerts that are triggered when two or more changes occur in the attributes, capacity, and performance of resources.

- **Defining alerts for applications**

Define alerts for changes in the configuration, attributes, and performance of the servers, volumes, filesets, and shares in your application.

- **Defining alerts for general groups**

Define alerts for changes in the configuration, attributes, and performance of the resources in your general groups.

- **Defining notification settings for alerts**

You can define the alert notification settings to determine the actions that are taken when alert conditions are detected for a resource. The settings are applied to all of the alert definitions that are specified for the resource.

- **Triggering conditions for alerts**

Define alerts so that IBM Storage Insights Pro notifies you when changes to the configuration, status, capacity, and performance of a resource or group are detected. Such changes are the *triggering conditions* for the alert. The specific conditions that can trigger alerts depend on the type of resources that you are monitoring.

How alerts work

Alerting functions examine the attributes, capacity, and performance of resources. If the conditions that are defined for alerts are met, the actions that are specified for the alert are taken. Typically, the actions include sending a notification. For example, if the status of a SAN Volume Controller storage system changes to Error, an alert is displayed in the Alerts page in the GUI, and an email might be sent to a storage administrator. For alerting on switches and fabrics, asset, configuration, status, and performance information is examined.

Triggering conditions for alerts

The conditions that trigger alert notifications depend on the type of resource that you are monitoring. In general, the following types of conditions can trigger alerts:

- An attribute or configuration of a resource changed
- The capacity of a resource fell outside a specified range
- The performance of a resource fell outside a specified range
- The storage infrastructure was changed, such as a new or removed resource
- Data is not being collected for a resource

[Learn more](#) about the conditions that can trigger alerts for each type of resource.

Event processing

Conditions that generate alerts are detected when data is collected from storage systems and during event processing. By default, the metadata that is collected from storage systems is refreshed every 24 hours. For some storage systems such as IBM Spectrum Accelerate and the XIV®, events are polled every minute from the resource. For IBM Spectrum Scale, status change events are polled frequently, typically within minutes. For other resources, events are subscription-based, where the resource itself or a data source such as a CIM agent sends the events to IBM Storage Insights Pro when conditions change on the resource.

Examples of storage systems that use subscription-based event processing include SAN Volume Controller, Storwize® V7000, Storwize V7000 Unified, and FlashSystem V9000. For these storage systems, a probe is automatically run when many events are received from the storage system in a short time period. To avoid performance bottlenecks, probes are run only every 20 minutes.

Determining which type of alert to use

To determine whether to define alerts in alert policies, for individual resources, or for the set of resources that are included in an application or general group, follow these guidelines:

Which type of alerts to use?	Scenario	 Learn more
Alerts defined in alert policies	You want to manage alert conditions and notification settings for a group of resources of the same type. For example, if you have several SAN Volume Controller storage systems in your environment, you can create an alert policy so that the alert definitions are the same for all of the SAN Volume Controller systems. If you have some SAN Volume Controller systems in a test environment, and some in a production environment, you can use one alert policy for the test environment, and another for the production environment.	•

Which type of alerts to use?	Scenario	 Learn more
Resource alerts	<p>You want to receive alert notifications about changes for a specific resource, or its internal resources. For example, for a storage system, you can alert on the attributes of the system itself, and on the attributes of its volumes, pools, ports, and other internal resources.</p> <p>If you define an alert for a resource, for example, a performance alert for the ports on a storage system, the alert threshold value applies to all of the ports on the storage system. You cannot apply different alert thresholds to internal resources of the same type on a resource.</p>	<ul style="list-style-type: none"> • Defining alert definitions for general attributes and capacity changes • Defining alert definitions for performance changes • Defining custom alerts for resources
Application alerts	<p>Use application alerts in the following scenarios:</p> <ul style="list-style-type: none"> • You want to receive alert notifications for all the resources of a certain type in an application. For example, if your application uses multiple storage systems, you can define the storage system alerts once for the application and the alerts apply to all the storage systems. If you later add more storage systems to the application, the existing application alerts apply to those storage systems also. • You want to apply different thresholds to internal resources of the same type on a storage system. For example, you have production applications and test applications that use volumes on a SAN Volume Controller. The production applications require response times of 6 milliseconds or less while the test applications can tolerate response times up to 30 milliseconds. You can use application alerts to set separate response time thresholds for volumes used by the different applications, depending on the needs of that application. 	<ul style="list-style-type: none"> • Application alerts for attribute and capacity changes • Application alerts for performance metrics • Defining custom alerts for applications
General group alerts	<p>Use general group alerts in the following scenarios:</p> <ul style="list-style-type: none"> • You want to receive alert notifications about changes for a subset of the resources of a particular type. For example, you can detect when the ports that are used for replication on your SAN Volume Controller have insufficient buffer-to-buffer credit. Alert notifications are not generated for ports that are not used for replication. • You want to receive alert notifications about changes for a group of resources that are logically related. You can group all the storage systems at a specific location or all the servers that use a particular operating system. For example, you can receive alert notifications when the used capacity of any of your Linux® servers exceeds 80%. 	<ul style="list-style-type: none"> • General group alerts for attribute and capacity changes • General group alerts for performance metrics • Defining custom alerts for general groups

Tip: If a resource is in both an alert policy and a general group, the alert definitions for both the policy and the group are applied.

Viewing and administering alerts

Use the Alerts page to view, evaluate, and manage the alert notifications that were generated when certain conditions were detected on monitored resources. All alert notifications are shown, so you can monitor and address the critical storage events in your environment from a central location. This includes alerts for switches and fabrics.

Tips:

- For file storage systems and object storage systems, alerts are triggered when probes collect metadata.
- You can view, acknowledge, and remove alert notifications when you have the Monitor role. To create alerts, you need to be assigned the Administrator role.
- For your reference, alert notifications are retained for 4 weeks before they're automatically removed from IBM® Storage Insights Pro.

Information about alerts

To view the Alerts page, go to Dashboards > Alerts. The following information is shown for each alert:

Acknowledged By

The name of the user that acknowledged an alert. If the alert is not acknowledged, this column is blank.

Alert Name

The name of the alert as defined by its creator.

Alert Creator

The user name of the person who created the alert.

Alert Category

Alerts are organized into the following categories:

- Fabric
- Other
- Performance
- Server
- Storage System
- Job
- Application
- General Group
- Custom

The IBM Storage Insights Pro alert category relates to the server on which the product is installed.

Alert Source

The alert policy, resource, application, or general group that contains the alert definition that triggered the alert.

Condition

The condition on a resource that triggered an alert.

ID

A unique number that is assigned to an alert.

Occurrence Time

The date and time when the alert condition was detected on the storage resource. Alerts are detected when data is collected about a storage resource.

Occurrences

The number of times the alert condition was detected on the storage resource.

Policy

Shows whether an alert was triggered from an alert definition in an alert policy. If the alert was triggered from a policy, the name of the policy is displayed in the Source column.

Resources

The storage resources where an alert condition was detected. Depending on where the alert was detected, the following information is shown:

- The name of the top-level resource that triggered the alert.
- The name of the internal resource that triggered an alert, if only one internal resource triggered it.
- The number and type of internal resource that triggered an alert, if multiple internal resources of the same type triggered it.
For example, "45 Volumes".
- "Multiple" is shown if more than one type of internal resource triggered the alert.

Severity

Use this value to help determine the priority in which you resolve alerts. For example, critical alerts represent serious problems that were detected on a resource. Resolve these problems as soon as possible. The following severities are shown for alerts:

Icon	Status	Description
	Critical	An alert with a Critical severity represents a serious problem on a resource or on its internal resources. Resolve these problems as soon as possible. Review the condition that triggered an alert for more information about the problem.

Icon	Status	Description
	Critical - Acknowledged	An alert with a Critical severity was acknowledged. A Critical - Acknowledged severity indicates that an alert was reviewed and is either resolved or can be ignored.
	Warning	An alert with a Warning severity represents potential problems on a resource or on its internal resources. Resolve these problems after you fix any critical alerts. Review the condition that triggered an alert for more information about the problem.
	Warning - Acknowledged	An alert with a Warning severity was acknowledged. A Warning - Acknowledged severity indicates that an alert was reviewed and is either resolved or can be ignored.
	Informational	An alert with an Informational severity does not represent a problem, but is intended to provide information about actions related to a resource.
	Informational - Acknowledged	An alert with an Informational severity was acknowledged. An Informational - Acknowledged severity indicates that an alert was reviewed and can be ignored.

System

The name of the storage resource where an alert condition was detected. Click the link to view more details about the resource.

Violation

If the alert was triggered by only one violation, this column shows the value of the attribute that was detected by the data collection.

This value is compared against the triggering condition for the attribute to determine whether an alert is generated.

If the alert was triggered by more than one violation, the value in this column is "Multiple".

Actions

Use the following actions to manage alert notifications:

Refresh

To refresh the list of alerts with the latest information, click Refresh. By default, IBM Storage Insights Pro updates the list automatically every 15 minutes.

View Alert

To view the details of an alert, double-click the alert. The alert details are displayed in a pane.

Click another alert to display its details. Alternatively, click the close icon .

If the alert affects multiple internal resources, double-click the alert to see which resources are affected.

To view summary details of multiple alerts, press Ctrl and click the alerts, then right-click the alerts and click View Alerts.

For performance alerts, the details include performance information about the resource where the violation was detected. The performance information is organized into the following sections:

Performance chart

A performance chart shows the historical performance of the resource that violated a threshold. The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

The horizontal line shows the value that triggered the alert; the vertical line shows when the violation occurred. The default time range of the chart spans 2 hours before and 2 hours after the violation occurred.

Capacity chart

A capacity chart shows the trending of capacity usage over time for the resource that violated the threshold. The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

The horizontal line shows the value that triggered the alert; the vertical line shows when the violation occurred. The time range of the chart starts 30 days before the violation occurred and ends at the current time.

For example, if you define an alert to notify you when available capacity falls below a certain threshold, the chart will show how the amount of available capacity trended over the previous 30 days until it reached that threshold. By viewing that historical information, you can get an idea of how your available capacity might trend in the future and thus better plan for your future capacity needs.

Tip: To access the full performance or capacity view for an alert, click the icon on the chart.

Removing alerts

Remove alerts when you no longer require to view them in the user interface. By default, alerts are automatically removed based on retention settings that were defined when IBM Storage Insights Pro was configured. However, you can use the following actions to manually remove alerts from the alerts home page and the alert lists for the related storage resources:

- To remove specific alerts, click the rows for the alerts and select Remove alerts from the Actions menu.
- To remove all alerts, select Remove all alerts from the Actions menu.
- To remove alerts that were acknowledged, select Remove acknowledged alerts from the Actions menu. This action is only available if there are acknowledged alerts in the list.

Acknowledging alerts

Mark alerts as acknowledged if the conditions that triggered the alerts were reviewed but are not yet resolved. A visual indicator is shown next to an acknowledged alert so you can quickly identify the other alerts in the list that must still be reviewed and addressed. Acknowledged alerts are removed from the summary totals on the dashboard, but are retained in the alerts home page and in the alert lists for the related resources.

- To acknowledge an alert, double-click the alert then click Acknowledge in the alert details pane.
 - To acknowledge multiple alerts, press Ctrl and click the alerts. Right-click the alerts and click View Alerts. Review the summary details of the alerts in the details pane, then click Acknowledge.
- Tip: To select alerts that are next to each other, click the first alert then press Shift and click the last alert.
- To acknowledge all alerts in the list at the same time, select Acknowledge all alerts from the Actions menu. This action is only available if there are unacknowledged alerts in the list.
 - To acknowledge only the informational alerts, select Acknowledge informational alerts from the Actions menu. Mark informational alerts as acknowledged to ensure that more serious conditions, such as warnings and critical errors, can be identified quickly in the list. If you select this action on a page for a specific storage resource, only the informational alerts for that storage resource are marked as acknowledged. For example, if you acknowledge all informational alerts on the Alerts tab of the [Fabrics](#) page, only the information alerts that are related to fabrics are changed to acknowledged. This action is only available if there are informational alerts in the list.

Marking alerts as unacknowledged

To indicate that previously acknowledged alerts are now unacknowledged, press Ctrl and click the rows for the alerts. Then click Unacknowledge in the alert details pane. When alerts are unacknowledged, they are included again in the summary totals, and their related icons are updated to reflect that they are now unacknowledged.

Export

Save information about the alerts to a PDF, CSV, or HTML file. The information that you export to a file is organized according to the sorting, filtering, and column order that is defined for a list. For example, if you do not filter the list, information about all the displayed alerts is exported. For information about exporting to a file, see [Exporting information to a file](#).

Hide Select/Show Select/Deselect All

Hide or show the actions for selecting all or clearing all the alerts that are shown in the list. To hide or show these actions, right-click the heading row in the list of alerts and select Show Select/Hide Select/Deselect All. When not hidden, the icons for these actions are shown next to Refresh.

Select All

Click this action to select all the alerts in the list.

Deselect All

Click this action to clear all the alerts in the list.

Customizing the lists of alerts

To hide alert notifications of a particular severity or acknowledgment status, click the appropriate tag. For example, to hide informational and warning alerts, click Informational and Warning. To hide acknowledged alerts, click Acknowledged. To show the alerts again, click the appropriate tag again.

You can also filter the list of alerts, sort rows, and show, hide, and reorder columns. For more information about customizing the list, see [Filtering lists](#), [Sorting lists](#), and [Showing, hiding, and reordering columns in lists](#).

Other pages where you can view and administer alerts

Use the actions in the following table to view and administer the alert notifications for resources, applications, and general groups:

Table 1. Viewing and administering alerts

Actions	Steps
Remove alerts. Learn more	<ol style="list-style-type: none"> 1. For resources, go to the resource list page for the resource. For applications, go to Groups > Applications. For general groups, go to Groups > General Groups. 2. Right-click a resource, application, or general group and click View Details. 3. Click Alerts in the General section. 4. Right-click one or more alerts and click Remove alerts. 5. Click Remove. <p>To remove all alerts go to Dashboards > Alerts, and then click Remove all alerts in the Actions menu.</p>

Actions	Steps
Acknowledge alerts. Learn more	<ol style="list-style-type: none"> For resources, go to the resource list page for the resource. For applications, go to Groups > Applications. For general groups, go to Groups > General Groups. Right-click a resource, application, or general group and click View Details. Click Alerts in the General section. Click an alert and select Acknowledge alerts from the Actions menu. To select two or more alerts, press Ctrl when you click the alerts. To select alerts that are next to each other, click the first alert and then Shift and click the last alert. <p>Alternatively, to acknowledge multiple alerts, press Ctrl and click the alerts. Right-click the alerts and click View Alerts. Review the summary details of the alerts in the details pane, then click Acknowledge.</p> <p>To acknowledge all alerts, go to Dashboards > Alerts, and then click Acknowledge all alerts in the Actions menu.</p>
View all the alerts for resources, applications, and groups.	Go to Dashboards > Alerts.
View all the alerts for a specific resource type.	<ol style="list-style-type: none"> Go to the resource list page for the resource type that you want to view. For example, go to Network > Switches. Click the Alerts tab.
View the alerts for a specific resource.	<ol style="list-style-type: none"> Go to the resource list page for the resource that you want to view. For example, go to Resources > Block Storage Systems. Right-click a resource and click View Details. Click Alerts in the General section.
View the alerts for a specific application.	<ol style="list-style-type: none"> Go to Groups > Applications . Right-click an application and click View Details . Click Alerts in the General section.
View the alerts for a specific general group.	<ol style="list-style-type: none"> Go to Groups > General Groups . Right-click a general group and click View Details. Click Alerts in the General section.
Create an alert policy. Learn more	<ol style="list-style-type: none"> Go to Configuration > Alert Policies. To create a policy with default alert definitions, click Create Policy. To create a policy by copying an existing policy, select the policy to copy, then click Actions > Copy Policy.
Modify an alert policy. Learn more	<ol style="list-style-type: none"> Go to Configuration > Alert Policies. To modify a policy, double-click the policy.

Viewing and administering alert definitions

View and administer the alert definitions and notification settings for alert policies, resources, applications, and general groups. You can also view and administer alert definitions for switches and fabrics.

Viewing and administering alert definitions

Table 1. Viewing and administering alert definitions

Actions	Steps
Create alert definitions in an alert policy. Learn more	<ol style="list-style-type: none"> Go to Configuration > Alert Policies. To create a policy with default alert definitions, click Create Policy. To create a policy by copying an existing policy, select the policy to copy, then click Actions > Copy Policy.

Actions	Steps
<p>Modify alert definitions and notification settings in an alert policy. Learn more</p>	<ol style="list-style-type: none"> 1. Go to Configuration > Alert Policies. 2. To modify a policy, double-click the policy. 3. To edit the alert definitions, click Edit Alert Definitions on the Alert Definitions tab. 4. To edit the notification settings, click Edit Policy Notifications. <p>Restriction: You cannot modify the default alert policies.</p>
<p>Define and edit the alert definitions or notification settings for a resource that is not managed by an alert policy.</p> <p>Learn more about defining alerts for resources</p> <p>Learn more about modifying notification settings</p>	<ol style="list-style-type: none"> 1. Go to the list page for the resource. 2. Double-click the resource for which you want to define alerts. 3. To edit the alert definitions, click Alert Definitions in the General section of the resource details page, then click Edit Alert Definitions. 4. To edit the notification settings, click Edit Notifications.
<p>Define and edit the alert definitions for an application or general group. Learn more</p>	<ol style="list-style-type: none"> 1. For applications, go to Groups > Applications. For general groups, go to Groups > General Groups. 2. Right-click an application or general group and click View Alert Definitions.
<p>Disable an alert definition for a resource, application, or general group.</p>	<ol style="list-style-type: none"> 1. Go to the list page for the resource. 2. Right-click the resource for which you want to disable an alert, then click View Alert Definitions. 3. Click Edit Alert Definitions. 4. Click the check mark to remove the check mark from the alert definition. 5. Click Save Changes.

Alert policies

Use the Alert Policies page as a central location to view and manage all your alert policies.

To view the Alerts Policies page, click Configuration > Alert Policies.

The Alert Policies page lists the default policies for your monitored resources and custom policies that you create. The page shows the following information for each alert policy:

- The types of resource that are allowed in the policy.
- The number of resources that are managed. To see which policies you are using, you can sort the list of policies by the number of resources.
- The number of alerts that are defined.
- Any email addresses that are specified to be notified about alerts instead of the default policy contacts.

You can manage the alert definitions and notification settings of the following types of resource using policies:

- Block storage systems
- File storage systems
- Object storage systems
- Servers
- Switches
- Fabrics

Here are some important points about alert policies:

- Alert policies manage one type of resource only.
- A resource can be managed by only one alert policy.
- It is not a requirement for resources to be managed by an alert policy. A resource can have its own alert definitions and notification settings, independent of an alert policy.
- If a resource is managed by a policy, the resource cannot have alert definitions and notification settings that are independent of the policy. The alert definitions and notification settings that apply to the resource come from the policy.
- When you add a resource to be monitored by IBM® Storage Insights Pro, it is added to a default alert policy automatically.
- Default policies with alerts already configured are available. You can create copies of the default policies and assign resources to the new policies. Your alerts are configured with the default settings.
- If you add a resource to a policy, any existing alert definitions for the resource are replaced by the alert definitions in that policy. You can't restore the original alert definitions for a resource after you move it into the policy.

To store a copy of the original alert definitions for a resource before you move it into a policy, create a policy based on the alert configuration of the resource. Then, move the resource to another policy. If you want to reapply the original alert definitions later, you can add the resource to the policy with the original alert configuration.

The Resources by Policy page lists the resources and the policies that manage the resources.

Tip: If you have different types of switches in your storage environment, you can manage the alert definitions for the different types of switch with different policies. Create the policies from the existing alert definitions in your switches. Alternatively, create copies of the default switch policy and edit the definitions to suit your requirements.

[Video] How to create alert policies

Watch a short video about how create an alert policy and view alert notifications in IBM Storage Insights Pro.



- [Viewing alert policies](#)

View alert policies to see the policy name, alert definitions, notification settings, and the resources that are managed by the policy. Resources include storage systems, servers, switches, and fabrics.

- [Creating alert policies](#)

Create alert policies to manage the alert conditions for multiple resources. If resources that are managed by the alert policy violate alert conditions, alerts are displayed on the Alerts page and users can be notified.

- [Modifying alert policies](#)

Modify alert policies to change the policy name, alert definitions, notification settings, and the resources that are managed by the policy.

- [Deleting alert policies](#)

You can delete alert policies if the policies are not in use in your storage environment. When you delete an alert policy, any resources that were managed by the policy retain their alert definitions and notification settings, but the resource is no longer managed by the policy.

Viewing alert policies

View alert policies to see the policy name, alert definitions, notification settings, and the resources that are managed by the policy. Resources include storage systems, servers, switches, and fabrics.

Procedure

1. In the menu bar in the GUI, go to Configuration > Alert Policies.
2. To view the details of a policy, double-click the policy.
3. Optional: Click the Resources by Policy tab to see a list of the resources in your storage environment, and the policies that manage those resources.

Creating alert policies

Create alert policies to manage the alert conditions for multiple resources. If resources that are managed by the alert policy violate alert conditions, alerts are displayed on the Alerts page and users can be notified.

About this task

You can create an alert policy in the following ways:

- Use the default alert definitions for the type of resource that is managed by the policy.
- Copy an existing policy. For example, you can copy a default policy, then assign resources to the new policy. The alerts in the policy are configured with the default settings.
- Create a policy using the alert definitions and notification settings for a specific resource. The new policy is not linked to the policy from which it is copied. If the original policy is updated, the new policy is not updated.

Procedure

1. To create a policy, choose one of the following options:

Option	Description
Create a policy with default alert definitions	a. Go to Configuration > Alert Policies. b. Click Create Policy. c. Type a name for the policy. d. Select the type of resource that the policy will manage. You might need to specify more details for the resource. For example, if you select Storage System as the type of resource, you must specify the type of storage system.
Create a policy by copying an existing policy	a. Go to Configuration > Alert Policies. b. Click Actions > Copy Policy.
Create a policy based on the alert definitions of a resource	a. Go to the details page for that resource. For example, to create an alert policy from a FlashSystem 9100, click Resources > Block Storage Systems. Alternatively, for a switch, go to Network > Switches. b. Right-click the resource, then click View Alert Definitions. c. Click Create Policy from the Policy Actions menu. d. Type a name for the policy.

2. Optional: Select the resources to add to the policy.
3. Click Create or click Copy, depending on which option you chose in step 1.

Results

If you created a policy by copying an existing policy, the alert definitions in the new policy are the same as those in the policy that you copied.

If you selected resources to add to the policy, those resources are now managed by the new policy. The alert definitions and notification settings in the policy are automatically applied to the resources that you selected.

Modifying alert policies

Modify alert policies to change the policy name, alert definitions, notification settings, and the resources that are managed by the policy.

About this task

Restrictions:

- You cannot modify a default policy.
- You cannot modify the type of resource that a policy manages.

Procedure

1. In the menu bar in the GUI, go to Configuration > Alert Policies.
2. To modify a policy, double-click the policy.
3. To change the alert definitions, notification settings, or the name of the policy, choose one of the following options:

Option	Description
Change the alert definitions	Click Edit Alert Definitions on the Alert Definitions tab.
Change the notification settings	Click Edit Policy Notifications.
Change the name of the policy	Click Change Policy Name next to the title of the policy.

What to do next

You can also change which resources are managed by a policy, and change a resource to be managed by a different policy.

- **[Modifying which resources are managed by an alert policy](#)**

Add resources to an alert policy if you want the resources to use the alert definitions and notification settings of the policy. You can also remove resources from an alert policy.

- **[Adding a resource for management by an alert policy](#)**

Add or move resources to alert policies if you want the resources to use the alert definitions and notification settings of the policy.

- **[Removing resources from alert policies](#)**

Remove a resource from an alert policy if you do not want the alert definitions and notification settings for the resource to be managed by the policy. When you remove a resource from an alert policy, the resource retains its alert definitions and notification settings, but the resource is no longer managed by the policy.

Related tasks

- [Defining alert definitions for general attributes and capacity changes](#)
- [Defining alert definitions for performance changes](#)
- [Defining custom alerts for resources](#)

Modifying which resources are managed by an alert policy

Add resources to an alert policy if you want the resources to use the alert definitions and notification settings of the policy. You can also remove resources from an alert policy.

About this task

If the resource that you add is already in another policy, the alert definitions and notification settings for that policy no longer apply. The alerts for the resource are managed by the new policy.

When you remove a resource from an alert policy, the resource retains the alert definitions and notification settings from the policy, but the resource is no longer managed by the policy.

Procedure

1. In the menu bar in the GUI, go to Configuration > Alert Policies.
2. To modify a policy, double-click the policy.
3. Click the Resources tab. The resources tab lists all the resources that are managed by the alert policy.
4. Click Edit Resources.
The resources tab lists all the resources in your storage environment that *can be* managed by the alert policy. For resources that are already managed by the policy, a check mark is displayed.
5. To add a resource to the policy, check the In Policy column.
6. To remove a resource from the policy, remove the check mark.
7. Click Save Changes.

What to do next

Important: If you add a resource to a policy, any existing alert definitions for the resource are replaced by the alert definitions in that policy. You can't restore the original alert definitions for a resource after you move it into the policy.

To store a copy of the original alert definitions for a resource before you move it into a policy, create a policy based on the alert configuration of the resource. Then, move the resource to another policy. If you want to reapply the original alert definitions later, you can add the resource to the policy with the original alert configuration.

Related tasks

- [Creating alert policies](#)
-

Adding a resource for management by an alert policy

Add or move resources to alert policies if you want the resources to use the alert definitions and notification settings of the policy.

About this task

The Resources by Policy page lists all resources in your storage environment and the alert policy that manages the resource.

You can also set a resource to be not managed by any policy. The resource retains its alert definitions and notification settings, but the resource is no longer managed by the policy.

Procedure

1. In the menu bar in the GUI, go to Configuration > Alert Policies.
2. Click the Resources by Policy tab.
3. Click the type of resource that you want to add or move. For example, click Block Storage Systems or Servers.
4. Select the resources that you want to add or move in the list of resources. The resources must all be of the same type. For example, select only SAN Volume Controller block storage systems.
5. Click Actions > Set Policy.
6. Select the policy that you want to manage the resource, then click Set.
Alternatively, to set the resource to be not managed by any policy, select No Policy then click Set.

What to do next

Tip: You can also add or move a resource to an alert policy from the details page for the resource. For example, to add a block storage system to a policy, go to Resources > Block Storage Systems. Double-click the storage system on the resource list page. Click Alert Definitions, then click Policy Actions > Set Policy.

Important: If you add a resource to a policy, any existing alert definitions for the resource are replaced by the alert definitions in that policy. You can't restore the original alert definitions for a resource after you move it into the policy.

To store a copy of the original alert definitions for a resource before you move it into a policy, create a policy based on the alert configuration of the resource. Then, move the resource to another policy. If you want to reapply the original alert definitions later, you can add the resource to the policy with the original alert configuration.

Related tasks

- [Creating alert policies](#)
-

Removing resources from alert policies

Remove a resource from an alert policy if you do not want the alert definitions and notification settings for the resource to be managed by the policy. When you remove a resource from an alert policy, the resource retains its alert definitions and notification settings, but the resource is no longer managed by the policy.

About this task

The Resources by Policy page lists all resources in your storage environment and the alert policy that manages the resource.

Procedure

1. In the menu bar in the GUI, go to Configuration > Alert Policies.
2. Click the Resources by Policy tab.
3. Click the type of resource that you want to remove. For example, click Block Storage Systems or Servers.

4. Select the resources that you want to remove in the table of resources. The resources must all be of the same type. For example, select only SAN Volume Controller block storage systems.
5. Click Actions > Set Policy.
6. Select No Policy, then click Set.

Deleting alert policies

You can delete alert policies if the policies are not in use in your storage environment. When you delete an alert policy, any resources that were managed by the policy retain their alert definitions and notification settings, but the resource is no longer managed by the policy.

About this task

Restriction: You cannot delete the default alert policies that are provided with the system.

Procedure

1. In the menu bar in the GUI, go to Configuration > Alert Policies.
2. Select the policies that you want to remove, then click Actions > Remove Policy.

Defining alerts for attributes, capacity, and performance changes

Define how you are alerted to changes in your storage environment. You can define alerts for changes in the attributes, capacity, and performance of your monitored storage resources.

- **[Defining alert definitions for general attributes and capacity changes](#)**

You can define alerts that are triggered when the attributes or capacity of a resource changes. Attributes represent the key properties and configuration of a resource, such as status, versions, removals, discoveries, and data collection status. Capacity represents storage statistics such as available capacity, used capacity, drive capacity, reserved capacity, and more.

- **[Defining alert definitions for performance changes](#)**

You can define alerts that are triggered when the performance of a resource falls outside a specified threshold.

Defining alert definitions for general attributes and capacity changes

You can define alerts that are triggered when the attributes or capacity of a resource changes. Attributes represent the key properties and configuration of a resource, such as status, versions, removals, discoveries, and data collection status. Capacity represents storage statistics such as available capacity, used capacity, drive capacity, reserved capacity, and more.

About this task

By default, asset, capacity, and configuration metadata is aggregated and collected daily. Define alerts to track changes to storage system attributes and capacity, and to server, switch, and fabric attributes.

Procedure

1. To define alerts for resources, choose one of the following options:

Option	Steps
Define alerts for a policy	<ol style="list-style-type: none">a. Go to Configuration > Alert Policies. Attention: Default alert policy cannot be edited. To create the editable alert policy, right-click the default alert policy and select Copy Policy. The copied policy can be edited as needed.b. Double-click the policy.c. Click Edit Alert Definitions on the Alert Definitions tab.

Option	Steps
Define alerts for a resource that is not managed by a policy	<p>a. Go to the resource list page for the resource. For example, to define alerts for a block storage system, go to Resources > Block Storage Systems. To define alerts for a switch, go to Resources > Switches.</p> <p>b. Right-click the resource for which you want to define alerts, then click View Alert Definitions.</p> <p>c. Click Edit Alert Definitions.</p>

2. Click the type of resource that you want to alert on. For example, click Storage System.

3. Click the category of the attributes that you want to alert on.

Category	Description
General	Attributes for the key properties of a resource, such as status, version changes, removals, discoveries, state, and data collection status.
Capacity	Attributes for capacity statistics of a resource, such as available capacity, used capacity, drive capacity, reserved capacity, and more.

Restriction: Not all categories are available for some resources.

4. To enable the alert for an attribute, click the check mark for the attribute.

The advanced options for the alert, such as notification frequency, are displayed.

5. Specify the conditions for generating an alert for an attribute.

Conditions can include operators such as *greater than or equal to*, *less than or equal to*. Conditions can also include storage values and time values.

For example, for a capacity attribute such as Available Capacity, you can specify that an alert is generated when the amount of available capacity on a resource's pools is less than or equal to 50 GiB.

Available Capacity

Operator	Value	Unit
<input type="button" value="<="/> <input type="button" value=">"/>	50	<input type="button" value="^"/> <input type="button" value="v"/> GiB <input type="button" value=">"/>

Tips:

- Not all attributes require conditions to generate an alert. For example, you can enable an alert for the Deleted Volume attribute, but you don't need to specify any conditions.
- Some attributes use operators such as *is*, *is not*, *contains*, and *changes*. For example, for the Firmware attribute for a DS8000® you can select the operator Contains and enter R5 in the value field. An alert is triggered if the firmware is at the R5 level rather than at a later version such as R6.1, R6.2, or R6.3. You can use this alert definition if you want to be notified when the firmware for a storage system is reverted to a previous version.

6. Optional: Click View History to view a chart of the capacity of the resource. Use the chart to evaluate the current and historical capacity trend of a resource to help determine the threshold value for an alert.

The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

To customize the chart, click Top 10 or Bottom 10 to show resources according to their capacity, click a time period, and change the start and end dates for the data that is displayed.

7. Assign a severity to an alert.

Assigning a severity can help you more quickly identify and address the critical conditions that are detected on resources. The severity that you assign depends on the guidelines and procedures within your organization. Default assignments are provided for each alert.

Option	Description
 Critical	Alert is critical and needs to be resolved. For example, alerts that notify you when the amount of available capacity on a file system falls below a specified threshold.
 Warning	Alerts that are not critical, but represent potential problems. For example, alerts that notify you when the status of a data collection job is not normal.
 Informational	Alerts that might not require any action to resolve and are primarily for informational purposes. For example, alerts that are generated when a new pool is added to a storage system.

8. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

9. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

10. Optional:  Duplicate an alert.

Use this action when you want to define another alert for the same attribute but with different conditions and settings.

Duplicating alerts can be helpful in the following situations:

- When you want to generate separate warning alerts and critical alerts for different conditions on the same attribute. For example, for a capacity attribute such as Available Capacity, you might want to define the following alerts:
 - Define a warning alert  to be generated when the amount of available capacity on a resource's pools is less than or equal to 50 GiB.
 - Duplicate the alert, but this time, specify a critical severity  when the amount of available capacity on a resource's pools is less than or equal to 10 GiB.
- When you want to send alert notifications to different people based on the severity of an alert. In the previous example for the Available Pool Space attribute, you can configure the notification settings so that warning alerts are sent to junior administrators, while critical alerts are sent to more senior administrators.

11. Click Save Changes.

Results

To view all the alerts generated by IBM® Storage Insights Pro, go to Dashboards > Alerts in the GUI.

Related reference

- [Alert notifications](#)

Defining alert definitions for performance changes

You can define alerts that are triggered when the performance of a resource falls outside a specified threshold.

Procedure

1. To define alerts for resources, choose one of the following options:

Option	Steps
Define alerts for a policy	<ol style="list-style-type: none">Go to Configuration > Alert Policies. Attention: Default alert policy cannot be edited. To create the editable alert policy, right-click the default alert policy and select Copy Policy. The copied policy can be edited as needed.Double-click the policy.Click Edit Alert Definitions on the Alert Definitions tab.
Define alerts for a resource that is not managed by a policy	<ol style="list-style-type: none">Go to the resource list page for the resource. For example, to define alerts for a block storage system, go to Resources > Block Storage Systems. To define alerts for a switch, go to Resources > Switches.Right-click the resource for which you want to define alerts, then click View Alert Definitions.Click Edit Alert Definitions.

2. Click the type of resource that you want to alert on. For example, click Storage System or Switch.
3. Click the Performance category.
4. To enable the alert for a performance metric, click the check mark for the metric. If the metric that you want is not displayed, click Add Metrics then select the metric you want.
5. Specify the conditions for generating an alert.
Conditions include an operator and a threshold value.
 - Select an operator.
An operator determines whether an alert is triggered when the performance of a resource is *greater than or equal to* or *less than or equal to* the specified threshold value.
 - Enter a threshold value.
For example, to trigger an alert if the Total I/O Rate for a storage system is greater than or equal to 500 ops/s, enter the value 500.
- Tips for threshold values:
 - IBM® Storage Insights Pro provides recommended values for threshold values that do not vary much between environments. For example, the default threshold values for Port Send Bandwidth Percentage are greater than or equal to 75% for warning alerts, and greater than or equal to 85% for critical alerts. However, for metrics that measure throughput and response times, thresholds can vary because of workload, model of hardware, amount of cache memory, and other factors. In these cases, there are no recommended values. To help determine threshold values for a resource, collect performance data over time to establish a baseline of the normal and expected performance behavior for that resource. After you determine a set of baseline values, define alerts to trigger if the measured performance behavior falls outside the normally expected range.

- For some metrics, lower values might indicate more stress and higher values might indicate idle behavior. For example, a lower threshold value for the Cache Holding Time Threshold metric might indicate a performance problem.
6. Optional: Click View History to view a chart of the performance of the resource. Use the chart to evaluate the current and historical performance of a resource to help determine the threshold value for an alert.
- The chart displays a horizontal color line at the specified threshold value. The color of the line indicates the severity of the alert:
- Critical alert: red
 - Warning alert: yellow
 - Information alert: blue
- For multi-conditional alerts, the chart displays a horizontal line for each condition that shows the threshold value and severity.

To customize the chart, click Top 10 or Bottom 10 to show resources according to their performance, click a time period, and change the start and end dates for the data that is displayed.

7. Assign a severity to an alert.

Assigning a severity can help you more quickly to identify and address the critical conditions that are detected on resources. The severity that you assign depends on the guidelines and procedures within your organization. Default assignments are provided for each alert.

Option	Description
 Critical	Assign this severity to alerts that are critical and need to be resolved. For example, assign a critical severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 85%.
 Warning	Assign this severity to alerts that are not critical, but represent potential problems. For example, assign a warning severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 75% but less than 85%.
 Informational	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes.

8. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

9. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

10. Optional: Duplicate an alert.

Use this action when you want to define another alert for the same metric but with different conditions and settings.

Duplicating alerts can be helpful in the following situations:

- When you want to generate separate warning alerts and critical alerts for different thresholds on the same metric. For example, for the CRC Error Rate metric for ports, you might want to define the following alerts:
 - Define a warning alert  to be generated when the number of frames per second that are received with cyclic redundancy check (CRC) errors is greater than or equal to 0.01 counts per second.
 - Duplicate the alert, but this time, specify a critical severity  when the CRC error rate is greater than or equal to 0.03 counts per second.
- When you want to send alert notifications to different people based on the severity of an alert. In the previous example for the CRC Error Rate metric, you can configure the notification settings so that warning alerts are sent to junior administrators, while critical alerts are sent to more senior administrators to resolve.

11. Click Save Changes.

Results

To view all the alerts generated by IBM Storage Insights Pro, go to Dashboards > Alerts in the GUI.

Tip: If data is already being collected, when you add, modify, or remove a performance alert for a resource, changes are applied dynamically.

Related reference

- [Alert notifications](#)

Defining custom alerts for resources

You can define alerts that are triggered when two or more changes occur in the attributes, capacity, and performance of resources.

About this task

To define a custom alert, select the general attributes, capacity, and performance metrics that you want to combine to trigger an alert, and specify their conditions and threshold values. You can combine conditions for the resource and its internal resources into a custom alert. The alert is triggered when the conditions for the attributes and capacity of the resource are met, and the performance of the resource falls outside the threshold values.

For example, you can create a custom alert that notifies you when the overall response time for the volumes on a SAN Volume Controller system is worse than 20 milliseconds per operation *and* the system CPU utilization on the nodes on the system is greater than 70%. The Overall Response Time is a metric that measures the average number of milliseconds that it takes to service each I/O operation on a volume. The System CPU Utilization is a metric that measures the average percentage of time that the processors on nodes are busy doing system I/O tasks.

Procedure

1. To define alerts for resources, choose one of the following options:

Option	Steps
Define alerts for a policy	<ol style="list-style-type: none">a. Go to Configuration > Alert Policies. Attention: Default alert policy cannot be edited. To create the editable alert policy, right-click the default alert policy and select Copy Policy. The copied policy can be edited as needed.b. Double-click the policy.c. Click Edit Alert Definitions on the Alert Definitions tab.
Define alerts for a resource that is not managed by a policy	<ol style="list-style-type: none">a. Go to the resource list page for the resource. For example, to define alerts for a block storage system, go to Resources > Block Storage Systems. To define alerts for a switch, go to Resources > Switches.b. Right-click the resource for which you want to define alerts, then click View Alert Definitions.c. Click Edit Alert Definitions.

2. Click Custom.

3.  Click the create alert icon, then enter a name for the alert.

4. Assign a severity to the alert.

Assigning a severity can help you more quickly identify and address the critical conditions that are detected on resources. The severity that you assign depends on the guidelines and procedures within your organization.

Option	Description
 Critical	Assign this severity to alerts that are critical and need to be resolved. For example, assign a critical severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 85%. The default severity for custom alerts is critical.
 Warning	Assign this severity to alerts that are not critical, but represent potential problems. For example, assign a warning severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 75% but less than 85%.
 Informational	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes.

5. Select a component, category, and group for the alert.

For example, select Storage System, Capacity, and Available Capacity.

6. To generate an alert for a general or capacity attribute, specify the conditions for the alert.

Conditions can include operators such as *greater than or equal to*, *or less than or equal to*. Conditions can also include storage values and time values.

For example, for a capacity attribute such as Available Capacity, you can specify that an alert is generated when the amount of available capacity on a resource's pools is less than or equal to 50 GiB.

Available Capacity

Operator	Value	Unit
<=	50	GiB

Tips:

- Not all attributes require conditions to generate an alert. For example, you can enable an alert for the Deleted Volume attribute, but you don't need to specify any conditions.
- Some attributes use operators such as *is*, *is not*, *contains*, and *changes*. For example, for the Firmware attribute for a DS8000® you can select the operator Contains and enter R5 in the value field. An alert is triggered if the firmware is at the R5 level rather than at a later version such as R6.1, R6.2, or R6.3. You can use this alert definition if you want to be notified when the firmware for a storage system is reverted to a previous version.

7. Optional: Click View History to view a chart of the capacity of the resource. Use the chart to evaluate the current and historical capacity trend of a resource to help determine the threshold value for an alert.
- The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:
- Critical alert: red
 - Warning alert: orange
 - Information alert: blue
- To customize the chart, click Top 10 or Bottom 10 to show resources according to their capacity, click a time period, and change the start and end dates for the data that is displayed.
8. To generate an alert for a performance metric, specify the conditions for the alert.
- Conditions include an operator and a threshold value.
- a. Select an operator.
An operator determines if an alert is triggered when the performance of a resource is *greater than or equal to* or *less than or equal to* the specified threshold value.
 - b. Enter a threshold value.
For example, to trigger an alert if the Total I/O Rate for a storage system is greater than or equal to 500 ops/s, enter the value 500.
- Tips for threshold values:
- IBM® Storage Insights Pro provides recommended values for threshold values that do not vary much between environments. For example, the default threshold values for Port Send Bandwidth Percentage are greater than or equal to 75% for warning alerts, and greater than or equal to 85% for critical alerts. However, for metrics that measure throughput and response times, thresholds can vary because of workload, model of hardware, amount of cache memory, and other factors. In these cases, there are no recommended values. To help determine threshold values for a resource, collect performance data over time to establish a baseline of the normal and expected performance behavior for that resource. After you determine a set of baseline values, define alerts to trigger if the measured performance behavior falls outside the normally expected range.
 - For some metrics, lower values might indicate more stress and higher values might indicate idle behavior. For example, a lower threshold value for the Cache Holding Time Threshold metric might indicate a performance problem.
9. Optional: Click View History to view a chart of the performance of the resource. Use the chart to evaluate the current and historical performance of a resource to help determine the threshold value for an alert.
- The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:
- Critical alert: red
 - Warning alert: orange
 - Information alert: blue
- To customize the chart, click Top 10 or Bottom 10 to show resources according to their performance, click a time period, and change the start and end dates for the data that is displayed.
10. Duplicate an alert.
Use this action to add a second and subsequent condition to the alert.
11. Repeat steps [5 - 10](#) to add more conditions to the alert.
12. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.
Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:
- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
 - Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.
13. Optional: Click View Additional Options to specify how frequently you are notified of alerts.
Use these settings to avoid triggering too many alerts for some conditions.
14. Click Save Changes.

Results

To view all the alerts generated by IBM Storage Insights Pro, go to Dashboards > Alerts in the GUI.

- [Scenarios for custom alerts](#)

Create custom alerts with one or more conditions that trigger when all the conditions are met for a given resource. By creating a custom alert, you can detect multiple configuration, capacity, and performance conditions together to determine whether an urgent situation occurred in your storage or SAN fabric.

Related reference

- [Alert notifications](#)

Scenarios for custom alerts

Create custom alerts with one or more conditions that trigger when all the conditions are met for a given resource. By creating a custom alert, you can detect multiple configuration, capacity, and performance conditions together to determine whether an urgent situation occurred in your storage or SAN fabric.

The requirements of your environment determine the custom alerts that you create. For example, your storage systems might run critical production applications on tier 1 storage. In this case, you don't want the performance of the tier 1 storage to fall below a certain threshold. To be notified when that situation occurs, you can create a custom alert that checks if the overall response time of tier 1 storage is too high. Tip: You can define alerts for storage systems, servers, fabrics, and switches and their internal resources. However, the resources in an alert must be along the same data path. For example, if you create an alert for a storage system volume, resources along the same data path include the pool of which that volume is part and the host that maps the volume. Switch ports that are used to access that volume are also in the same data path.

Use the following example scenarios as guides to help you create custom alerts for your environment.

- [Receive alerts when the response time of storage on a specific tier is too high](#)
- [Receive alerts when the response time of volumes is too high during times of active I/O](#)
- [Receive alerts when the response time of volumes is too high, but do not generate these alerts when batch and backup jobs are running](#)
- [Receive alerts if a port is being used for both inter-node communication and host I/O exchanges](#)
- [Receive alerts for link resets that are not associated with link initialization](#)
- [Receive alerts for invalid word transmissions that are not associated with link initialization](#)

Receive alerts when the response time of storage on a specific tier is too high

Your storage systems run both critical production applications and noncritical test applications. The production applications use tier 1 storage, while the test applications use storage on tiers 2 and 3.

To ensure consistent, top performance for tier 1 storage, you want to be notified when its response time is higher than 6ms/op so that you can resolve the bottleneck. However, to avoid too many alerts, you do not want to receive notifications when the response time of tier 2 or 3 storage exceeds 6ms/op.

Solution

Define a custom alert that checks if the volumes used by an application are in Tier 1 pools and if their Overall Response Time is higher than 6 ms/op.

For a storage system, set up a custom alert with the following attributes and conditions:

High response time for tier 1 stor

Severity

Component Category Attribute

Pools	General	Tier
-------	---------	------

Condition Value

Is	1	< >
----	---	-----

Component Category Attribute

Volumes	Performance	Overall Response Time
---------	-------------	-----------------------

Operator Value

>=	6	ms/op
----	---	-------

Attribute	Condition
Overall Response time (Custom > Volumes > Performance)	Greater than or equal to (>=) 6 ms/op
Tier (Custom > Pools > General)	Tier 1

Receive alerts when the response time of volumes is too high during times of active I/O

You care about high read response times on your volumes, but they can be caused by cache misses when there is only a trickle of I/O.

Solution

Define a custom alert with volume-level thresholds that combines checks for response times and I/O.

Response time with workload

Severity



Component	Category	Attribute
Volumes	Performance	Overall Response Time

Operator Value

>=	10	ms/op	-	+
----	----	-------	---	---

Component	Category	Attribute
Volumes	Performance	Total I/O Rate - overall

Operator Value

>=	50	ops/s	-	+
----	----	-------	---	---

Attribute	Condition
Overall Response time (Custom > Volumes > Performance)	Greater than or equal to (\geq) 10 ms/op
Total I/O Rate - overall (Custom > Volumes > Performance)	Greater than or equal to (\geq) 50 ms/op

Receive alerts when the response time of volumes is too high, but do not generate these alerts when batch and backup jobs are running

To ensure the consistent, top performance of your volumes, you want to be notified when their response times are becoming too high. However, to avoid too many alerts, you do not want to receive notifications when batch and backup jobs are running on your storage. You understand that these jobs can cause an expected spike in response times and do not require action on your part.

Solution

Define a custom alert that checks if the Read Response Time of volumes exceeds an amount that is more than expected in your environment and the Read Transfer Size is less than 256 KiB/op. Typically, read transfer sizes greater than 256KiB/op indicate that batch or backup jobs are running in the background.

For a storage system, set up a custom alert with the following attributes and conditions:

Slow performance of volumes

Severity

Component	Category	Attribute
Volumes	Performance	Read Response Time

Operator Value
 20 ms/op

Component	Category	Attribute
Volumes	Performance	Read Transfer Size

Operator Value
 256 KiB/op

Attribute	Condition
Read Response Time (Custom > Volumes > Performance)	Greater than or equal to (>=) 20 ms/op
Read Transfer Size (Custom > Volumes > Performance)	Less than or equal to (<=) 256 KiB/op

Receive alerts if a port is being used for both inter-node communication and host I/O exchanges

You want to avoid potential bottlenecks by ensuring that storage system ports aren't being used for both inter-node communication in the local cluster and for I/O exchanges to host computers. You can also use this custom alert to check for adherence to best practices that are related to configuring ports for nodes with 8 or more ports. It does not apply to nodes that contain only 4 ports.

Solution

Define a custom alert that checks if the I/O rate for ports indicates exchanges between local nodes and hosts. For a storage system, set up a custom alert with the following attributes and conditions:

Dual use ports

Severity

Component	Category	Attribute
FC Ports	Performance	Total Port to Host I/O...

Operator Value
 0.01 ops/s

Component	Category	Attribute
FC Ports	Performance	Total Port to Local No...

Operator Value
 0.01 ops/s

Attribute	Condition
Total Port-to-Host I/O Rate (Custom > Ports > Performance)	Greater than or equal to (>=) .01 ops/s

Attribute	Condition
Total Port-to-Local Node I/O Rate (Custom > Ports > Performance)	Greater than or equal to (\geq) .01 ops/s

Tip: Optionally, you can define other custom alerts to be notified of this situation, depending on your storage requirements. For example:

Attribute	Condition
Total Port-to-Disk I/O Rate (Custom > Ports > Performance)	Greater than or equal to (\geq) .01 ops/s
Total Port-to-Local Node I/O Rate (Custom > Ports > Performance)	Greater than or equal to (\geq) .01 ops/s
Total Port-to-Remote I/O Rate (Custom > Ports > Performance)	Greater than or equal to (\geq) .01 ops/s

Receive alerts for link resets that are not associated with link initialization

You want to identify link resets that are generated in response to hardware failures or link congestion. Link Resets generated by link initialization are ignored.

Solution

Define a custom alert that checks if link resets occur and if those resets are not associated with a link initialization. For a switch, set up a custom alert with the following attributes and conditions:

Link reset not initialized

Severity

(
(
(

Component	Category	Attribute
FC Ports	Performance	Loss of Sync Rate

Operator Value

<=

0

cnt/s

-

+

Component	Category	Attribute
FC Ports	Performance	Loss of Signal Rate

Operator Value

<=

0

cnt/s

-

+

Component	Category	Attribute
FC Ports	Performance	Link Reset Received ...

Operator Value

>=

0.01

cnt/s

-

+

Attribute	Condition
Link Reset Received Rate (Custom > Ports > Performance)	Greater than or equal to (\geq) .01 cnt/s
OR	
Link Reset Transmitted Rate (Custom > Ports > Performance)	
Sync Loss (Custom > Ports > Performance)	Less than or equal to (\leq) 0 cnt/s
Signal Loss (Custom > Ports > Performance)	Less than or equal to (\leq) 0 cnt/s

Receive alerts for invalid word transmissions that are not associated with link initialization

You want to identify invalid transmission words that are generated because of poor link quality. Poor or marginal link quality can be caused by a bad SFP, HBA, or cable. Invalid transmission words that are generated by link initialization are ignored.

Solution

Define a custom alert that checks if invalid word transmissions occur and if those resets are not associated with a link initialization. For a switch, set up a custom alert with the following attributes and conditions:

Invalid word transmission not ini

Severity


Component	Category	Attribute
FC Ports	Performance	Loss of Sync Rate

Operator Value
≤ 0 cnt/s

Component	Category	Attribute
FC Ports	Performance	Loss of Signal Rate

Operator Value
≤ 0 cnt/s

Component	Category	Attribute
FC Ports	Performance	Invalid Transmission ...

Operator Value
≥ 0.01 cnt/s

Attribute	Condition
Invalid Transmission Words (Custom > Ports > Performance)	Greater than or equal to (>=) .01 cnt/s
Sync Loss (Custom > Ports > Performance)	Less than or equal to (<=) 0 cnt/s
Signal Loss (Custom > Ports > Performance)	Less than or equal to (<=) 0 cnt/s

Defining alerts for applications

Define alerts for changes in the configuration, attributes, and performance of the servers, volumes, filesets, and shares in your application.

About this task

You can quickly identify and address the critical conditions that are detected on the servers, volumes, filesets, and shares in your application by using alerts. Application alerts can be helpful in the following situations:

- When you want to apply different thresholds to internal resources of the same type on a storage system.
For example, you have production applications and test applications that use volumes on a SAN Volume Controller. The production applications require response times of 6 milliseconds or less while the test applications can tolerate response times up to 30 milliseconds. You can use application alerts to set separate response time thresholds for volumes used by the different applications, depending on the needs of that application.
- When you want to quickly define alerts for multiple resources of the same type. You can define alerts once for the application and the alerts apply to all the resources of that type in the application.
For example, if your application uses multiple servers, you can define the server alerts once for the application and the alerts apply to all the servers. If you later add more servers to the application, the existing application alerts apply to those servers also.

Tips for working with alerts in application hierarchies:

- When you define an application alert for a resource such as a volume, the alert applies to all the resources of that type that belong to that application and all child applications.
- If you define an application alert for a resource such as a server, and the server also belongs to child applications, the alert is generated once at the parent application level. Separate alerts are not generated for each of the child applications that contain the server.
- If a child application has the same alert as a parent application but with different conditions, separate alerts are generated for the child application for the different alert conditions.
- [Defining application alerts for attribute and capacity changes](#)**
You can define alerts that are triggered when the attributes or capacity of the servers, volumes, filesets, or shares in an application change.
- [Defining application alerts for performance metrics](#)**
You can define alerts that are triggered when the performance of the volumes that belong to an application fall outside a specified threshold.
- [Defining custom alerts for applications](#)**
Define a custom alert to combine multiple conditions from multiple resources for an application in a single alert. By creating a custom alert, you can analyze multiple configuration, capacity, and performance conditions together to determine whether an urgent situation occurred on the storage systems, volumes, filesets, and shares in an application.

Defining application alerts for attribute and capacity changes

You can define alerts that are triggered when the attributes or capacity of the servers, volumes, filesets, or shares in an application change.

About this task

Attributes represent the key properties and configuration of a resource, such as status, removals, discoveries, and data collection status. Capacity represents storage statistics such as available and used file system capacity, drive capacity, and volume used capacity.

Procedure

To define an application alert for attribute and capacity changes, complete these steps:

- In the menu bar, select Groups > Applications.
- Right-click an application in the list and click View Alert Definitions.
- Click Edit Alert Definitions.
- Click the type of resource that you want to set an alert for. You can set an alert for one or more of the attributes of servers, volumes, filesets, or shares.
- Click the category of the attributes that you want to set an alert for.

Category	Description
General	Attributes for the key properties of a resource, such as status, removals, discoveries, and data collection status.
Capacity	Attributes for capacity statistics of a resource, such as used capacity, available file system capacity, drive capacity, and volume used capacity.

- To enable the alert for an attribute, click the check mark for the attribute.
- Specify the conditions for generating an alert for an attribute.
Conditions can include operators such as *greater than or equal to*, *less than or equal to*. Conditions can also include storage values and time values.
For example, for a capacity attribute such as Available Capacity, you can be alerted when the amount of available capacity on a volume is less than or equal to 50 GiB.

Available Capacity

Operator	Value	Unit
<=	50	GiB

Tip: Not all attributes require conditions to generate an alert. For example, you can enable an alert for the New Fileset attribute for an IBM Spectrum Scale, but you don't need to specify any conditions.

- Assign a severity to an alert to help you more quickly identify and address the critical conditions that are detected on resources. The severity that you assign depends on the guidelines and procedures within your organization. Default assignments are provided for each alert.

Option	Description

Option	Description
 Critical	Assign this severity to alerts that are critical and must be resolved. For example, assign a critical severity to alerts that notify you when the amount of available capacity on a file system falls below a specified threshold.
 Warning	Assign this severity to alerts that are not critical, but represent potential problems. For example, assign a warning severity to alerts that notify you when the status of a data collection job is not normal.
 Informational	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes. For example, assign an informational severity to alerts that are generated when a new fileset is added to a storage system.

9. Optional: Click View History to view a chart of the capacity of the resource. Use the chart to evaluate the current and historical capacity trend of a resource to help determine the threshold value for an alert.

The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

To customize the chart, click Top 10 or Bottom 10 to show resources according to their capacity, click a time period, and change the start and end dates for the data that is displayed.

10. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

11. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

12. Optional: Click the icon  to duplicate an alert.

Use this action when you want to define another alert for the same attribute but with different criteria and settings.

Duplicating alerts can be helpful in the following situations:

- When you want to generate separate warning alerts and critical alerts for different conditions on the same attribute. For example, for a capacity attribute such as Available Capacity, you might want to define the following alerts:

- Define a warning alert  to be generated when the amount of available capacity on a resource's disks is less than or equal to 50 GiB.
- Duplicate the alert, but this time, specify a critical severity  when the amount of available capacity on a resource's disks is less than or equal to 10 GiB.
- When you want to send alert notifications to different people based on the severity of an alert.

In the previous example for the Available Capacity attribute, you can configure the notification settings so that warning alerts are sent to junior administrators, while critical alerts are sent to more senior administrators to resolve.

13. Click Save Changes.

Related reference

- [Alert notifications](#)

Defining application alerts for performance metrics

You can define alerts that are triggered when the performance of the volumes that belong to an application fall outside a specified threshold.

About this task

To define an application alert for performance metrics, select the metric that you want to measure for the volumes in an application and specify a threshold value. When the performance of a volume falls outside the threshold, an alert is generated. For example, by using the Read Response Time metric you can define an alert that notifies you when the response time for a volume exceeds 20 milliseconds per read operation.

Procedure

To define an application alert for performance metrics, complete these steps:

1. In the menu bar, select Groups > Applications.
 2. Right-click an application in the list and click View Alert Definitions.
 3. Click Edit Alert Definitions.
 4. Click Volumes and then click Performance.
 5. Click Add Metrics.
 6. Select one or more metrics to alert on and click OK.
 7. To enable the alert for a performance metric, click the check mark for the metric.
 8. Specify the conditions for generating an alert.
Conditions include an operator and a threshold value.
 - a. Select an operator.
An operator determines if an alert is triggered when the performance of a resource is *greater than or equal to* or *less than or equal to* the specified threshold value.
 - b. Enter a threshold value.
For example, to trigger an alert if the Total I/O Rate for a storage system is greater than or equal to 500 ops/s, enter the value 500.
- Tips for threshold values:
- IBM® Storage Insights Pro provides recommended values for threshold values that do not vary much between environments. For example, the default threshold values for Port Send Bandwidth Percentage are greater than or equal to 75% for warning alerts, and greater than or equal to 85% for critical alerts. However, for metrics that measure throughput and response times, thresholds can vary because of workload, model of hardware, amount of cache memory, and other factors. In these cases, there are no recommended values. To help determine threshold values for a resource, collect performance data over time to establish a baseline of the normal and expected performance behavior for that resource. After you determine a set of baseline values, define alerts to trigger if the measured performance behavior falls outside the normally expected range.
 - For some metrics, lower values might indicate more stress and higher values might indicate idle behavior. For example, a lower threshold value for the Cache Holding Time Threshold metric might indicate a performance problem.

9. Assign a severity to an alert.

Assigning a severity can help you more quickly identify and address the critical performance conditions that are detected on volumes. The severity that you assign depends on the guidelines and procedures within your organization. Default assignments are provided for each alert.

Option	Description
 Critical	Assign this severity to alerts that are critical and must be resolved. For example, you might assign a critical severity to alerts that notify you when the average Read Response Time for volumes is greater or equal to 20 ms/op.
 Warning	Assign this severity to alerts that are not critical, but represent potential problems. For example, you might assign a warning severity to alerts that notify you when the average Read Response Time for volumes is greater than 10 ms/op but less than 20 ms/op.
 Informational	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes.

10. Optional: Click View History to view a chart of the performance of the resource. Use the chart to evaluate the current and historical performance of a resource to help determine the threshold value for an alert.

The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

To customize the chart, click Top 10 or Bottom 10 to show resources according to their performance, click a time period, and change the start and end dates for the data that is displayed.

11. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

12. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

13. Optional: Click the icon to duplicate an alert.

Use this action when you want to define another alert for the same metric but with different criteria and settings.

Duplicating alerts can be helpful in the following situations:

- When you want to generate separate warning alerts and critical alerts for different thresholds on the same metric. For example, for the Read Response Time metric for volumes, you might want to define the following alerts:
 - Define a warning alert  to be generated when the average time that it takes to service each read operation is greater than or equal to 10 milliseconds.

- Duplicate the alert, but this time, specify a critical severity  when the average time is greater than or equal to 20 milliseconds.
- When you want to send alert notifications to different people based on the severity of an alert. In the previous example for the Read Response Time metric, you can configure the notification settings so that warning alerts are sent to junior administrators, while critical alerts are sent to more senior administrators to resolve.

14. Click Save Changes.

Related reference

- [Alert notifications](#)

Defining custom alerts for applications

Define a custom alert to combine multiple conditions from multiple resources for an application in a single alert. By creating a custom alert, you can analyze multiple configuration, capacity, and performance conditions together to determine whether an urgent situation occurred on the storage systems, volumes, filesets, and shares in an application.

About this task

For example, you can create a custom alert that notifies you when the used capacity on both volumes and filesets is greater than a specified amount.

Tip: In a custom alert, the resource types that you specify conditions for must be associated with the same type of top-level resource. For example, if you include conditions for storage system volumes, you can also include additional conditions for filesets and shares, but you cannot include conditions for servers.

Procedure

1. In the menu bar, select Groups > Applications.
2. Right-click an application in the list and click View Alert Definitions.
3. Click Edit Alert Definitions.
4. Click Custom.
5.  Click the create alert icon, then enter a name for the alert.
6. Assign a severity to the alert.

Assigning a severity can help you more quickly identify and address the critical conditions that are detected on resources. The severity that you assign depends on the guidelines and procedures within your organization.

Option	Description
 Critical	Assign this severity to alerts that are critical and need to be resolved. For example, assign a critical severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 85%. The default severity for custom alerts is critical.
 Warning	Assign this severity to alerts that are not critical, but represent potential problems. For example, assign a warning severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 75% but less than 85%.
 Informational	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes.

7. Select a component, category, and group for the alert.

For example, select Volumes, Capacity, and Used Capacity.

8. For general and capacity attributes, specify the criteria for generating an alert.

Use criteria such as greater than or equal to, less than or equal to, storage values, and time measurements to customize the conditions under which attributes generate alerts.

For example, for a capacity attribute such as Used Capacity, you can specify that an alert is generated when the amount of used capacity on a resource is more than or equal to 75%. The operator (less than or equal to) + a specified amount of space (75) + the unit of measurement (%) is the criteria that determines if an alert is generated.

Tips:

- Not all attributes require criteria for generating alerts. The category and type of an attribute determines whether you can specify criteria and the options that you can select.
- Some attributes can use the operators such as *is*, *is not*, and *changes*. For example, for the Used Inodes attribute for a fileset, select the operator changes to be notified if the current number of used inodes for a fileset changes.

9. Optional: Click View History to view a chart of the capacity of the resource. Use the chart to evaluate the current and historical capacity trend of a resource to help determine the threshold value for an alert.

The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

To customize the chart, click Top 10 or Bottom 10 to show resources according to their capacity, click a time period, and change the start and end dates for the data that is displayed.

10. For performance attributes, click Add Metrics. Specify the criteria for generating an alert.

Criteria includes an operator and a threshold value.

a. Select an operator.

An operator determines if an alert is triggered when the performance of a resource is *greater than or equal to* or *less than or equal to* the specified threshold value.

b. Enter a threshold value.

For example, to trigger an alert if the Total I/O Rate for a volume is greater than or equal to 500 ops/s, enter the value 500.

Tips for threshold values:

- For metrics that measure throughput and response times, thresholds can vary because of workload, model of hardware, amount of cache memory, and other factors. In these cases, there are no recommended values. To help determine threshold values for a resource, monitor performance data over time to establish a baseline of the normal and expected performance behavior for that resource. After you determine a set of baseline values, define alerts to trigger if the measured performance behavior falls outside the normally expected range.
- For some metrics, lower values might indicate more stress and higher values might indicate idle behavior. For example, a lower threshold value for the Cache Holding Time Threshold metric might indicate a performance problem.

11. Optional: Click View History to view a chart of the performance of the resource. Use the chart to evaluate the current and historical performance of a resource to help determine the threshold value for an alert.

The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

To customize the chart, click Top 10 or Bottom 10 to show resources according to their performance, click a time period, and change the start and end dates for the data that is displayed.

12. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

13. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

14. Add another condition to the custom alert and repeat steps 7 - 11.

If you do not want to add another condition, continue to the next step.

15. Click Save Changes.

Related reference

- [Alert notifications](#)

Defining alerts for general groups

Define alerts for changes in the configuration, attributes, and performance of the resources in your general groups.

Before you begin

Before you can define general group alerts for a resource type, you must first add resources of that type to the group or one of its subgroups. For example, if you want to set an alert for the performance of a storage system, you must first add one or more storage systems to your general group or one of its subgroups. Or, to set an alert for the attributes of a switch, you must first add one or more switches to your general group or one of its subgroups.

About this task

Tips for working with alerts in general group hierarchies:

- When you edit the alert definitions for a general group, you can edit the alert definitions for its subgroups at the same time. The resources for all subgroups of the general group are shown when you edit the alert definitions for a parent general group.
- If you define a general group alert for a resource such as a server, and the server also belongs to subgroups, the alert is generated once at the parent group level. Separate alerts are not generated for each of the subgroups that contain the server.
- If a subgroup has the same alert as a parent group but with different conditions, separate alerts are generated for the subgroup for the different alert conditions.
- [Defining general group alerts for attribute and capacity changes](#)**
You can define alerts that are triggered when the attributes or capacity of the resources that belong to a general group change.
- [Defining general group alerts for performance metrics](#)**
You can define alerts that are triggered when the performance of the storage systems or switches that belong to a general group fall outside a specified threshold.
- [Defining custom alerts for general groups](#)**
Define a custom alert to combine multiple conditions from multiple resources for a general group in a single alert. By creating a custom alert, you can analyze multiple configuration, capacity, and performance conditions together to determine whether an urgent situation occurred on the resources in a group.

Defining general group alerts for attribute and capacity changes

You can define alerts that are triggered when the attributes or capacity of the resources that belong to a general group change.

Before you begin

Attributes represent the key properties and configuration of a resource, such as status, removals, discoveries, and data collection status. Capacity represents storage statistics such as available and used file system capacity, drive capacity, and volume used capacity.

Procedure

To define a general group alert for attribute and capacity changes, complete these steps:

- In the menu bar, select Groups > General Groups.
- Right-click a general group in the list and click View Alert Definitions.
- Click Edit Alert Definitions.
- Click the type of resource that you want to set an alert for.
You can set an alert for one or more of the attributes of the resource itself or its internal resources.

For example, for a switch, you can set an alert for the attributes of the switch itself and for the attributes of the blades, ISLs, and ports.

- Click the category of the attributes that you want to alert for.

Category	Description
General	Attributes for the key properties of a resource, such as status, removals, discoveries, and data collection status.
Capacity	Attributes for capacity statistics of a resource, such as available and used capacity, drive capacity, file systems, volumes, and pools, and reserved capacity.

- To enable the alert for an attribute, click the check mark for the attribute.
- Specify the conditions for generating an alert for an attribute.
Conditions can include operators such as *greater than or equal to*, *less than or equal to*. Conditions can also include storage values and time values.
For example, for a capacity attribute such as Available Capacity, you can specify that an alert is generated when the amount of available capacity on a resource's pools is less than or equal to 50 GiB.

Available Capacity

Operator	Value	Unit		
<input style="width: 25px; height: 25px; border: 1px solid #ccc;" type="button" value="<="/>	<input style="width: 25px; height: 25px; border: 1px solid #ccc;" type="button" value=">"/>	<input type="text" value="50"/> ^ v	<input type="text" value="GiB"/>	<input style="width: 25px; height: 25px; border: 1px solid #ccc;" type="button" value="<"/>

Tips:

- Not all attributes require criteria for generating alerts. The category and type of an attribute determines whether you can specify criteria and the options that you can select.
 - Some attributes can use the operators such as *is*, *is not*, and *contains*. For example, for the Firmware attribute on a DS8000® storage system, select the operator contains. Then, in the value field, type R5 to be notified if the firmware is at the R5 level rather than at a later version such as R6.3, R6.2, or R6.3.
- Assign a severity to an alert to help you more quickly identify and address the critical conditions that are detected on resources.

The severity that you assign depends on the guidelines and procedures within your organization. Default assignments are provided for each alert.

Option	Description
 Critical	Assign this severity to alerts that are critical and must be resolved. For example, assign a critical severity to alerts that notify you when the amount of available capacity on a file system falls below a specified threshold.
 Warning	Assign this severity to alerts that are not critical, but represent potential problems. For example, assign a warning severity to alerts that notify you when data collection failed.
 Informational	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes. For example, assign an informational severity to alerts that are generated when a new fileset is added to a storage system.

9. Optional: Click View History to view a chart of the capacity of the resource. Use the chart to evaluate the current and historical capacity trend of a resource to help determine the threshold value for an alert.

The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

To customize the chart, click Top 10 or Bottom 10 to show resources according to their capacity, click a time period, and change the start and end dates for the data that is displayed.

10. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

11. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

12. Optional: Click the icon  to duplicate an alert.

Use this action when you want to define another alert for the same attribute but with different criteria and settings.

Duplicating alerts can be helpful in the following situations:

- When you want to generate separate warning alerts and critical alerts for different conditions on the same attribute. For example, for a capacity attribute such as Available Capacity, you might want to define the following alerts:

- Define a warning alert  to be generated when the amount of available capacity on a resource's disks is less than or equal to 50 GiB.
- Duplicate the alert, but this time, specify a critical severity  when the amount of available capacity on a resource's disks is less than or equal to 10 GiB.
- When you want to send alert notifications to different people based on the severity of an alert.

In the previous example for the Available Capacity attribute, you can configure the notification settings so that warning alerts are sent to junior administrators, while critical alerts are sent to more senior administrators to resolve.

13. Click Save Changes.

Related reference

- [Alert notifications](#)

Defining general group alerts for performance metrics

You can define alerts that are triggered when the performance of the storage systems or switches that belong to a general group fall outside a specified threshold.

About this task

To define a general group alert for performance metrics, select the metric that you want to measure and specify a threshold value. When the performance of that resource falls outside the threshold, an alert is generated. For example, you can define an alert that notifies you when the back-end response times for managed disks on a SAN Volume Controller exceed 35 milliseconds per read operation. The Overall Back-end Response Time is a metric that measures the average number of milliseconds that it takes to service each read operation on a managed disk.

Procedure

To define a general group alert for performance metrics, complete these steps:

1. In the menu bar, select Groups > General Groups.
2. Right-click a general group in the list and click View Alert Definitions.
3. Click Edit Alert Definitions.
4. Click the type of resource that you want to alert on.
5. Click Performance and then click Add Metrics.
6. Select one or more metrics to alert on and click OK.
7. To enable the alert for a performance metric, click the check mark for the metric.
8. Specify the conditions for generating an alert.

Conditions include an operator and a threshold value.

- a. Select an operator.

An operator determines if an alert is triggered when the performance of a resource is *greater than or equal to* or *less than or equal to* the specified threshold value.

- b. Enter a threshold value.

For example, to trigger an alert if the Total I/O Rate for a storage system is greater than or equal to 500 ops/s, enter the value 500.

Tips for threshold values:

- IBM® Storage Insights Pro provides recommended values for threshold values that do not vary much between environments. For example, the default threshold values for Port Send Bandwidth Percentage are greater than or equal to 75% for warning alerts, and greater than or equal to 85% for critical alerts. However, for metrics that measure throughput and response times, thresholds can vary because of workload, model of hardware, amount of cache memory, and other factors. In these cases, there are no recommended values. To help determine threshold values for a resource, collect performance data over time to establish a baseline of the normal and expected performance behavior for that resource. After you determine a set of baseline values, define alerts to trigger if the measured performance behavior falls outside the normally expected range.
- For some metrics, lower values might indicate more stress and higher values might indicate idle behavior. For example, a lower threshold value for the Cache Holding Time Threshold metric might indicate a performance problem.

9. Optional: Click View History to view a chart of the performance of the resource. Use the chart to evaluate the current and historical performance of a resource to help determine the threshold value for an alert.

The chart displays a horizontal color line at the specified threshold value. The color of the line indicates the severity of the alert:

- Critical alert: red
- Warning alert: yellow
- Information alert: blue

For multi-conditional alerts, the chart displays a horizontal line for each condition that shows the threshold value and severity.

To customize the chart, click Top 10 or Bottom 10 to show resources according to their performance, click a time period, and change the start and end dates for the data that is displayed.

10. Assign a severity to an alert.

Assigning a severity can help you more quickly identify and address the critical performance conditions that are detected on resources. The severity that you assign depends on the guidelines and procedures within your organization. Default assignments are provided for each alert.

Option	Description
 Critical	Assign this severity to alerts that are critical and must be resolved. For example, assign a critical severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 85%.
 Warning	Assign this severity to alerts that are not critical, but represent potential problems. For example, assign a warning severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 75% but less than 85%.
 Informational	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes.

11. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

12. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

13. Optional: Click the icon  to duplicate an alert.

Use this action when you want to define another alert for the same metric but with different criteria and settings.

Duplicating alerts can be helpful in the following situations:

- When you want to generate separate warning alerts and critical alerts for different thresholds on the same metric. For example, for the CRC Error Rate metric for ports, you might want to define the following alerts:

- Define a warning alert  to be generated when the number of frames per second that are received with cyclic redundancy check (CRC) errors is greater than or equal to 0.01 counts per second.
 - Duplicate the alert, but this time, specify a critical severity  when the CRC error rate is greater than or equal to 0.03 counts per second.
 - When you want to send alert notifications to different people based on the severity of an alert.
- In the previous example for the CRC Error Rate metric, you can configure the notification settings so that warning alerts are sent to junior administrators, while critical alerts are sent to more senior administrators to resolve.

14. Click Save Changes.

Related reference

- [Alert notifications](#)
-

Defining custom alerts for general groups

Define a custom alert to combine multiple conditions from multiple resources for a general group in a single alert. By creating a custom alert, you can analyze multiple configuration, capacity, and performance conditions together to determine whether an urgent situation occurred on the resources in a group.

About this task

You can create a custom alert, for example, that notifies you when the response times for volumes and pools in a group exceed a certain threshold and data collection for storage systems is running without issues.

Tip: In a custom alert, the resource types that you specify conditions for must be associated with the same type of top-level resource. For example, if you include conditions for storage systems, you can also include additional conditions for pools and volumes, but you cannot include conditions for servers.

Procedure

1. In the menu bar, select Groups > General Groups.
2. Right-click a general group in the list and click View Alert Definitions.
3. Click Edit Alert Definitions.
4. Click Custom.
5. Click , then enter a name for the custom alert.
6. Assign a severity to the alert.

Assigning a severity can help you more quickly identify and address the critical conditions that are detected on resources. The severity that you assign depends on the guidelines and procedures within your organization.

Option	Description
	Assign this severity to alerts that are critical and need to be resolved. For example, assign a critical severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 85%. The default severity for custom alerts is critical.
	Assign this severity to alerts that are not critical, but represent potential problems. For example, assign a warning severity to alerts that notify you when the Port Send Bandwidth Percentage is greater than or equal to 75% but less than 85%.
	Assign this severity to alerts that might not require any action to resolve and are primarily for informational purposes.

7. Select a component, category, and group for the alert.
For example, select Volumes, Capacity, and Available Capacity.
8. Optional: Click View History to view a chart of the capacity of the resource. Use the chart to evaluate the current and historical capacity trend of a resource to help determine the threshold value for an alert.
The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:
 - Critical alert: red
 - Warning alert: orange
 - Information alert: blue
 To customize the chart, click Top 10 or Bottom 10 to show resources according to their capacity, click a time period, and change the start and end dates for the data that is displayed.
9. For general and capacity attributes, specify the criteria for generating an alert.
Use criteria such as greater than or equal to, less than or equal to, storage values, and time measurements to customize the conditions under which attributes generate alerts.

For example, for a capacity attribute such as Used Capacity, you can specify that an alert is generated when the amount of used capacity on a resource is more than or equal to 75%. The operator (less than or equal to) + a specified amount of space (75) + the unit of measurement (%) is the criteria that determines if an alert is generated.

Tips:

- Not all attributes require criteria for generating alerts. The category and type of an attribute determines whether you can specify criteria and the options that you can select.
- Some attributes can use the operators such as *is*, *is not*, and *changes*. For example, for the Firmware attribute on a DS8000® storage system, select the operator contains. Then, in the value field, type R5 to be notified if the firmware is at the R5 level rather than at a later version such as R6.3, R6.2, or R6.3. This alert definition might be useful if you want to be notified when the firmware for a storage system was reverted to a previous version for some reason.

10. For performance attributes, specify the criteria for generating an alert.

Criteria includes an operator and a threshold value.

a. Select an operator.

An operator determines if an alert is triggered when the performance of a resource is *greater than or equal to* or *less than or equal to* the specified threshold value.

b. Enter a threshold value.

For example, to trigger an alert if the Total I/O Rate for a volume is greater than or equal to 500 ops/s, enter the value 500.

Tips for threshold values:

- For metrics that measure throughput and response times, thresholds can vary because of workload, model of hardware, amount of cache memory, and other factors. In these cases, there are no recommended values. To help determine threshold values for a resource, monitor performance data to establish a baseline of the normal and expected performance behavior for that resource. After you determine a set of baseline values, define alerts to trigger if the measured performance behavior falls outside the normally expected range.
- For some metrics, lower values might indicate more stress and higher values might indicate idle behavior. For example, a lower threshold value for the Cache Holding Time Threshold metric might indicate a performance problem.

11. Optional: Click View History to view a chart of the performance of the resource. Use the chart to evaluate the current and historical performance of a resource to help determine the threshold value for an alert.

The chart uses colored lines to represent the different threshold values and severities that can be defined for an alert:

- Critical alert: red
- Warning alert: orange
- Information alert: blue

To customize the chart, click Top 10 or Bottom 10 to show resources according to their performance, click a time period, and change the start and end dates for the data that is displayed.

12. Optional: If you want to send email notifications of alert violations to contacts other than the policy contacts or global alert notification addresses, enter the email addresses in the Email Override field.

Tip: If you enter an email address in the Email Override field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

13. Add another condition to the custom alert and repeat steps 7 - 11.

If you do not want to add another condition, continue to the next step.

14. Optional: Click View Additional Options to specify how frequently you are notified of alerts.

Use these settings to avoid triggering too many alerts for some conditions.

15. Click Save Changes.

Related reference

- [Alert notifications](#)

Defining notification settings for alerts

You can define the alert notification settings to determine the actions that are taken when alert conditions are detected for a resource. The settings are applied to all of the alert definitions that are specified for the resource.

Procedure

1. To define notification settings for alerts, choose one of the following options:

Option	Steps
--------	-------

Option	Steps
Define notification settings for alerts in a policy	<ol style="list-style-type: none"> Go to Configuration > Alert Policies. Double-click the policy. Click Edit Policy Notifications.
Define notification settings for alerts for a resource that is not managed by a policy	<ol style="list-style-type: none"> Go to the resource list page for the resource. For example, to modify notification settings for alerts for a block storage system, go to Resources > Block Storage Systems. To modify notification settings for a switch, go to Network > Switches. Right-click the resource for which you want to define alerts, then click View Alert Definitions. Click Edit Notifications in the Resource Notifications area.

2. If you want to send email notifications of alert violations, enter the email addresses in the Email Addresses field.

Tip: If you enter an email address in the Email Addresses field, only that email address receives notifications for the alert. The following contacts do not receive notifications:

- Any email addresses that are specified as policy contacts, if the alert is in an alert policy.
- Any global email addresses that are specified for alert notifications. To view the global alert notification addresses, go to Configuration > Settings.

3. Click Save Changes.

- **[Alert notifications](#)**

You can specify that IBM® Storage Insights Pro sends emails to specific email addresses when alert conditions are detected on monitored resources. The setting is defined globally for all resources, and can be overridden for a specific alert definition, for all alert definitions that apply to a specific resource, or for an alert policy.

Alert notifications

You can specify that IBM® Storage Insights Pro sends emails to specific email addresses when alert conditions are detected on monitored resources. The setting is defined globally for all resources, and can be overridden for a specific alert definition, for all alert definitions that apply to a specific resource, or for an alert policy.

Learn more about override behavior, scenarios, and frequency and notification settings for alert notifications:

- [Notifications and override behavior](#)
- [Scenarios for the different levels of alert notification](#)
- [Specifying the frequency of alert notifications](#)
- [Specifying notification settings in the GUI](#)

Notifications and override behavior

You can specify notification settings at the following levels:

- Globally, for all alerts.
- In alert policies, for groups of resources of the same type.
- In individual alert definitions, which can be part of an alert policy, or can be specific to a resource.

Notification settings at the lower levels override the settings at the higher levels. For example,

1. If you want all email notifications to go to a specific set of email addresses, specify email addresses for global alert notifications.
2. If you're using alert policies, you can also specify a list of email addresses to notify that are applicable to that policy. These addresses override the global setting.
3. For an alert definition, you can specify a set of email addresses to notify. This email addresses override the alert policy and global settings.

Scenarios for the different levels of alert notification

A small organization might specify only global email addresses if they want to send all alert notifications to one team.

A larger organization can have multiple storage environments that are managed by different teams. They can create alert policies for each environment and specify different email addresses for each alert policy. For example, they might create alert policies for their mainframe, VMware, and AIX® environments, and specify different email addresses for each of those policies. These email addresses override any global email addresses.

If you want to notify a specific person when a specific condition occurs, you set an email address in an individual alert definition. This email address overrides any alert policy or global email addresses. For example, an operations team might review all of the alerts, but want to

notify their storage architect if capacity in a pool exceeds 80%.

Specifying the frequency of alert notifications

You can use the Notification Frequency settings to avoid triggering too many alerts for some conditions. You can select one of the following options:

Option	Description
Send every time condition is violated	Receive alert notifications whenever an alert condition is violated.
Send once until problem clears	Receive one notification for a violation, even if the condition is violated multiple times.
Send every <i>time_period</i>	Receive one notification when an alert condition is initially violated. The alert is suppressed and no notifications are sent until both the specified time passes and the alert is triggered again.

You can also select to send notifications only if the violation is not cleared for longer than a time period that you specify. Select Only send notifications after condition is violated for *time_period*, then specify the time period. If multiple alerts are triggered by the same violations on the same device at the same time, the alerts are consolidated into one alert with that indicates the number of violations that occurred that time.

For example, you might want to be notified about an alert only after the condition has been violated for 20 minutes. You might also want to be notified about the alert only once until the problem clears. In this case, you can set up an alert with the following notification frequency settings:

Notification Frequency

<input checked="" type="radio" value="Send once until problem clears"/> Send once until problem clears	▼
<input checked="" type="checkbox"/> Only send notifications after condition is violated for	
20	minute(s)
▲ ▼	

Restrictions:

- For some attributes, not all the notification frequency options are available. Specifically, you cannot change the notification frequency for the following attributes: New *resource*, Removed or Deleted *resource*, Last Successful Probe, and Last Successful Monitor.
- For attributes that use the changes operator (for example, the Firmware attribute), only the Send every time condition is violated and Send every *time_period* notification frequency options are available.

Specifying notification settings in the GUI

Table 1. Locations where you can specify alert notification settings

Task	Location in GUI
Specify the global notification settings for all alert definitions.	Global Alert Notifications To specify the global notification settings, go to Configuration > Settings, and specify the email addresses that you want to notify when alerts are generated. The email addresses that you specify are applied globally to all alert definitions, unless overridden.
Specify the notification settings for an alert policy.	Alert policies page To specify the notification settings for an alert policy, go to Configuration > Alert Policies. Double-click the policy whose notification settings you want to specify. Click Edit Policy Notifications. Specify the email addresses that you want to notify when alerts are generated. The email addresses are applied to all of the alert definitions for all resources in the policy, unless overridden.
Specify the notification settings for all the alert definitions that apply to a resource that is not managed by an alert policy.	Resource details page For example, to specify the notification settings for a block storage system, go to Resources > Block Storage Systems. Right-click the storage system, click View Alert Definitions, then click Edit Notifications. The email addresses that you specify are applied to all the alert definitions that are specified for the selected storage system.

Task	Location in GUI
Specify notification settings for a specific alert definition in an alert policy.	<p>Alert definitions page Go to Configuration > Alert Policies. Double-click the policy whose notification settings you want to specify. For example, to change the notification settings for specific alerts in a custom alert policy, double-click the policy and click Edit Alert Definitions. Edit the Email Override field or click View Additional Options for an alert definition to specify notification settings.</p> <p>The email addresses that you specify for the alert definition override any global notification settings, any policy settings, and any settings for the resource.</p> <p>Attention: Default alert policy cannot be edited. To create the editable alert policy, right-click the default alert policy and select Copy Policy. The copied policy can be edited as needed. Or select Create Policy to create a new policy.</p>
Specify notification settings for a specific alert definition for a resource that is not managed by an alert policy.	<p>Resource details page For example, go to Resources > Switches. Right-click a resource that is not managed by an alert policy and select View Alert Definitions, and then select Edit Alert Definitions. Edit the Email Override field or click View Additional Options for an alert definition to specify notification settings.</p> <p>The email addresses that you specify for the alert definition override any global notification settings, any policy settings, and any settings for the resource.</p>

Related reference

- [Settings for global alert notifications, outage notifications, and log permissions](#)

Triggering conditions for alerts

Define alerts so that IBM® Storage Insights Pro notifies you when changes to the configuration, status, capacity, and performance of a resource or group are detected. Such changes are the *triggering conditions* for the alert. The specific conditions that can trigger alerts depend on the type of resources that you are monitoring.

Tip: IBM Storage Insights Pro triggers alerts when it detects changes in your storage environment. For example, you might define an alert for when volumes change status to Error. An alert is triggered if IBM Storage Insights Pro detects that the status of a volume changes to Error. An alert is not triggered for volumes that already have Error status when the alert is defined.

- **[Triggering conditions for storage system alerts](#)**
You can set up IBM Storage Insights Pro so that it examines the attributes, capacity, and performance of a storage system and notifies you when changes or violations are detected.
- **[Triggering conditions for server alerts](#)**
You can view alerts for the server on which IBM Storage Insights Pro is installed.
- **[Triggering conditions for fabric alerts](#)**
You can set up IBM Storage Insights Pro so that it examines the attributes of a fabric and notifies you when changes are detected.
- **[Triggering conditions for switch alerts](#)**
You can set up IBM Storage Insights Pro so that it examines the attributes and performance of a switch and notifies you when changes or violations are detected.
- **[Triggering conditions for chassis alerts](#)**
You can set up IBM Storage Insights Pro so that it examines the attributes and performance of a chassis and notifies you when changes or violations are detected.

Triggering conditions for storage system alerts

You can set up IBM® Storage Insights Pro so that it examines the attributes, capacity, and performance of a storage system and notifies you when changes or violations are detected.

Alerts can notify you of general changes and performance issues on the following resources:

- [Storage Systems \(performance\)](#)

- [Storage Systems \(general changes\)](#)
- [Triggering conditions for storage system internal resource alerts](#)

Important: Not all the attributes upon which you can alert are listed here. To view a complete list of attributes upon which you can alert, go to Configuration > Alert Policies. Double-click a default policy for a storage system. Click Edit Alert Definitions on the Alert Definitions tab. View the attributes that are available in the general, capacity, and performance categories. Note that the attributes that are automatically configured for alerts in the default alert policies, or default alerts, have a status of Active.

In the tables, default alerts are marked with an asterisk (*).

Tips:

- The type of storage system determines which attributes and performance conditions are available for alerts. For example, triggering conditions for shares are available only for storage systems that are configured for file storage, such as Storwize® V7000 Unified.
- For capacity attributes, you can generate alerts when the amount of storage is greater than, less than, or equal to a specified value. You can also determine the unit of measurement for the attribute, such as KiB, MiB, GiB, or TiB.
- If you are doing tasks where many volumes are being deleted, you might want to temporarily disable alerts that use the Deleted Volume attribute. For example, you might want to disable Deleted Volume alerts temporarily if you are doing maintenance tasks or decommissioning storage.

Storage Systems (performance)

Define alerts that notify you when the performance of a storage system falls outside a specified threshold. In alerts, you can specify conditions based on metrics that measure the performance of volumes, disks, ports, and nodes. By creating alerts with performance conditions, you can be informed about potential bottlenecks in your storage infrastructure.

Examples:

- You can define an alert to be notified when the average number of I/O operations per second for read and write operations on a storage system's volumes is greater than or equal to a specified threshold. Use this alert to be notified when the workload of a volume is high and you might need to balance that load across other volumes to improve overall performance.
- You can define an alert to be notified when the percentage of the average response time that can be attributed to delays from host systems is greater than or equal to a specified threshold. Use this alert to be notified of slow hosts that might not be working efficiently.
- You can also define an alert that notifies you when a metric is less than a specified threshold, such as if you want to identify volumes that might be under used.

Tips:

- The type of storage system determines the metrics that can be alerted upon. For a list of the metrics that are available for each type of storage system, see [Performance metrics](#).
- Data must be collected before IBM Storage Insights Pro can determine whether a threshold is violated and an alert is generated for a performance condition.

Best practice: When you set thresholds for performance conditions, try to determine the best value so you can derive the maximum benefit without generating too many false alerts. Because suitable thresholds are highly dependent on the type of workload that is being run, hardware configuration, the number of physical disks, exact model numbers, and other factors, there are no easy or standard default rules. A recommended approach is to monitor the performance of resources and, by using historical data, determine reasonable threshold values for each performance condition. You can then fine-tune the condition settings to minimize the number of false alerts.

Storage Systems (general changes)

By default, asset, capacity, and configuration metadata is aggregated and collected daily.

Table 1. Triggering attributes and conditions for general changes on storage systems

General Attributes	Triggering Conditions for Attributes
Firmware	<p>The firmware version of the microcode on a storage system. For the DS-series of storage systems, this value represents the Code Bundle version and the SEA or LMC Version of the firmware.</p> <p>To view information about the code bundles for the firmware versions of the DS-series, go to the IBM support site at http://www.ibm.com/support/entry/portal/Overview and search for code bundle information. An internet connection is required to access the support site.</p>

General Attributes	Triggering Conditions for Attributes
Status	<p>One of the following statuses is detected for a storage system:</p> <p>Not Normal An error or warning status was detected for a storage system.</p> <p>Warning A warning status was detected for a storage system. This status might occur if a storage system comes online or if its version changes.</p> <p>Error An error status was detected for a storage system. This status might occur if the cooling fans in a storage system are stopped and the internal temperature is too high or if a storage system goes offline.</p>

Table 2. Triggering attributes and conditions for capacity changes on storage systems

Capacity Attributes	Triggering Conditions for Attributes
Adjusted Used Capacity	<p>The amount of capacity that can be used without exceeding the capacity limit. For example, you set a capacity limit of 80% for your storage systems. You want to get an informational alert when the adjusted used capacity exceeds 60% and a critical alert when the adjusted used capacity exceeds 80%. So, you define an informational alert with these parameters:</p> <p>Adjusted Used Capacity \geq 60%</p> <p>And, you define a critical alert with these parameters:</p> <p>Adjusted Used Capacity \geq 80%</p>
Available Capacity (Previously known as Available Pool Space)	<p>The total amount of the space in the pools that is not allocated to the volumes in the pools. To calculate available capacity, the following formula is used:</p> <p>(pool capacity - used capacity)</p> <p>For XIV® systems, pool capacity is the physical capacity of the pools and does not include the provisioned capacity of the pools.</p>
Capacity (Previously known as Pool Capacity)	The amount of space in the pools on the storage system that is available for creating volumes.
Capacity-to-Limit	<p>The amount of capacity that is available for storing data before the capacity limit is reached. For example, if you set a capacity limit, you can define a warning alert when the available capacity relative to the capacity limit, falls below the value that you specify, such as:</p> <p>Capacity-to-Limit \leq 500 GiB</p>
Compression Savings	The estimated percentage of capacity that is saved by using data compression, across all pools on the storage system. The percentage is calculated across all compressed volumes in the pools and does not include the capacity of non-compressed volumes. Inline compression is a software feature that is supported by FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.
Deduplication Savings	The estimated percentage of capacity that is saved by using data deduplication, across all data reduction pools on the storage system. The percentage is calculated across all deduplicated volumes in the pools and does not include the capacity of volumes that are not deduplicated. Available for FlashSystem A9000, FlashSystem A9000R, and resources that run IBM Spectrum Virtualize version 8.1.3 or later.
File System Capacity (Previously known as Total File System Capacity)	The total capacity on all of the file systems on the storage system or filer.
Mapped Capacity	The total volume space in the storage system that is mapped or assigned to host systems, including child pool capacity.
Overprovisioned Capacity (Previously known as Unallocatable Volume Space)	<p>The capacity that cannot be allocated to volumes because the physical capacity of the pools cannot meet the demands for provisioned capacity.</p> <p>IBM Storage Insights Pro uses the following formula to determine this value: Provisioned Capacity - Capacity</p> <p>Available only for thin-provisioned volumes.</p>
Raw Capacity	The total unformatted disk capacity of a storage system. When this value is calculated, IBM Storage Insights Pro does not include the capacity of storage system disks that become missing after data collection.

Capacity Attributes	Triggering Conditions for Attributes
Reserved Capacity (Previously known as Reserved Pool Space)	<p>The amount of unused capacity in the pool that is reserved for provisioning and optimization tasks.</p> <p>Pool capacity is reserved when a provisioning or optimization task is created, and used when the task is run.</p>
Safeguarded Capacity	The total amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000®.
Shortfall	<p>The difference between the amount of provisioned capacity that is committed to the volumes in the pools and the actual physical capacity that is available in the pools. As the provisioned capacity is allocated to the thin-provisioned and compressed volumes, the shortfall increases and becomes more critical.</p> <p>This value is determined by the formula, $\text{Overprovisioned Capacity} \div \text{Committed but Unused Capacity}$</p> <p>For example, the physical capacity of the pools is 70 GiB, but 150 GiB of provisioned capacity was committed to the thin-provisioned volumes. If the volumes are using 50 GiB, then there is still 100 GiB committed to those volumes (150 GiB – 50 GiB) with only 20 GiB of available pool capacity (70 GiB – 50 GiB). Because only 20 GiB of the pool capacity is available, 80 GiB of the committed space cannot be allocated (100 GiB - 20 GiB).</p>
Snapshot Space	The amount of space that is used by all of the snapshots of the file systems that are associated with the IBM Spectrum® Scale cluster.
Total Capacity Savings (Previously known as Total Data Reduction Savings)	<p>The estimated percentage of capacity that is saved by using data deduplication, data compression, and thin provisioning.</p> <p>Available for FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.</p>
Unmapped Capacity (Previously known as Unassigned Volume Space)	The total volume space in the storage system that is not mapped or assigned to host systems.
Unused Volume Capacity (Previously known as Effective Unallocated Volume Space)	The amount of the provisioned capacity in the storage pool that is not used.
Used Capacity (Previously known as Physical Allocation)	The percentage of physical space in pools that is allocated to volumes, including child pools. The value is always less than or equal to 100% because you cannot allocate more physical space to the volumes than is available in the pools. This value is determined by the formula, $\text{Used Capacity} \div \text{Capacity} \times 100$. For example, if the capacity that is reserved for volumes is 50 GiB for a volume size of 200 GiB, used capacity is 25%.
Used Capacity (Previously known as Used Pool Space)	The capacity in the pool that is allocated to and used by volumes.
Provisioned Capacity (Previously known as Total Volume Capacity)	The total storage capacity on all the volumes in pools. For thin-provisioned and compressed volumes, this value includes provisioned capacity. For volumes with parent pools, this value includes child pool capacity.
Unreserved Capacity (Previously known as Unreserved Pool Space)	The amount of space in storage system pools that is not allocated for volumes, and is not reserved by pending or scheduled provisioning tasks.

- [Triggering conditions for storage system internal resource alerts](#)

You can set up IBM Storage Insights Pro so that it examines the attributes, capacity, and performance of the internal resources of storage systems and notifies you when changes or violations are detected.

Triggering conditions for storage system internal resource alerts

You can set up IBM® Storage Insights Pro so that it examines the attributes, capacity, and performance of the internal resources of storage systems and notifies you when changes or violations are detected.

Alerts can notify you of general changes and performance issues on the following internal resources of storage systems:

- [Internal resources \(common conditions\)](#)
- [Clusters](#)
- [Disks](#)
- [Disk Groups](#)
- [FC Ports](#)
- [Filesets](#)
- [File Systems](#)
- [File System Pools](#)
- [Host Connections](#)
- [I/O Groups](#)
- [IP Ports](#)
- [Managed Disks](#)
- [Modules](#)
- [Network Shared Disks](#)
- [Nodes](#)
- [Pools](#)
- [Quotas](#)
- [RAID Arrays](#)
- [»Device Adapters«](#)
- [»Host Adapters«](#)
- [Shares](#)
- [Volumes](#)

Important: Not all the attributes upon which you can alert are listed here. To view a complete list of attributes upon which you can alert, go to Configuration > Alert Policies. Double-click a default policy for a storage system. Click Edit Alert Definitions on the Alert Definitions tab. View the attributes that are available in the general, capacity, and performance categories. Note that the attributes that are automatically configured for alerts in the default alert policies, or default alerts, have a status of Active.

In the tables, default alerts are marked with an asterisk (*).

Tips:

- The type of storage system determines which attributes and performance conditions are available for alerts. For example, triggering conditions for shares are available only for storage systems that are configured for file storage, such as Storwize® V7000 Unified.
- For capacity attributes, you can generate alerts when the amount of storage is greater than, less than, or equal to a specified value. You can also determine the unit of measurement for the attribute, such as KiB, MiB, GiB, or TiB.

Internal resources (common conditions)

There are a number of alert conditions that are common to many of the internal resources in a storage system. These common conditions represent key changes in your storage infrastructure. For example, you can specify conditions that generate alerts when specific internal resources are added to or deleted from a storage system, or when current data isn't being collected about resources.

By default, asset, capacity, and configuration metadata for storage systems is aggregated and collected daily. Define alerts to track daily changes to the attributes and conditions of the internal resources in your storage systems.

Table 1. Triggering attributes and conditions that are common to internal resources

General Attributes	Triggering Conditions for Attributes
New resource	A resource is detected for the first time. Use this alert to be notified when new physical and logical resources are added to a storage system.
Removed physical resource	A previously monitored resource can no longer be found. Historical data about the resource is retained, but no current data is being collected. Use these alerts to be notified if a physical or logical resource is removed, deleted, or becomes unavailable.
Deleted logical resource	Physical resources include disks, RAID arrays, I/O groups, ports, nodes, host connections, clusters, and file systems. Logical resources include volumes, pools, filesets, and shares.

Clusters

Table 2. Triggering attributes and conditions for general changes on clusters

General Attributes	Triggering Conditions for Attributes
New Cluster	A cluster is detected for the first time.
Removed NAS Cluster	A previously monitored NAS cluster can no longer be found. Historical data about the cluster is retained, but no current data is being collected. Use this alert to be notified if a cluster is removed or becomes unavailable.

Disk

Table 3. Triggering attributes and conditions for general changes on storage system disks

General Attributes	Triggering Conditions for Attributes
New Disk	A disk is detected for the first time.
Removed Disk	A previously monitored disk can no longer be found. Historical data about the disk is retained, but no current data is being collected. Use this alert to be notified if a disk is removed or becomes unavailable.

Table 4. Triggering attributes and conditions for capacity changes on disks

Capacity Attributes	Triggering Conditions for Attributes
Available Drive Capacity (Previously known as Available Disk Space)	The capacity that is available (not allocated) on the disk.
Capacity (Previously known as Disk Capacity)	The total amount of storage capacity that is on the disk.

Disk Groups

Table 5. Triggering attributes and conditions for general changes on storage system disk groups

General Attributes	Triggering Conditions for Attributes
New Disk Group	A disk group is detected for the first time.
Removed Disk Group	A previously monitored disk group can no longer be found. Historical data about the disk group is retained, but no current data is being collected. Use this alert to be notified if a disk group is removed or becomes unavailable.
Status	<p>One of the following statuses is detected for a disk group:</p> <ul style="list-style-type: none"> Not Normal An error or warning condition is detected on a disk group. Warning A warning condition is detected on a disk group. This condition might occur if any of the disks in the disk group goes offline. Error An error condition is detected on a disk group. This condition might occur under the following conditions: <ul style="list-style-type: none"> • The percentage of remaining, unused volume capacity in a disk group that is not available to be used is too high. • The available capacity in a disk group that is not reserved for volumes is too low. • The disk group provisioned capacity exceeds the warning or critical threshold boundary value.

FC Ports

Table 6. Triggering attributes and conditions for general changes on Fibre Channel ports

General Attributes	Triggering Conditions for Attributes
New FC Port	A new FC port was detected for the first time.
Removed FC Port	A previously monitored FC port can no longer be found. Historical data about the port is retained, but no current data is being collected. Use this alert to be notified if a port is deleted or becomes unavailable.
Status	<p>One of the following statuses is detected for an FC port:</p> <ul style="list-style-type: none"> Not Normal An error or warning condition is detected on a port. Warning A warning condition is detected on a port. Error An error condition is detected on a port.

Filesets

Table 7. Triggering attributes and conditions for general changes on filesets

General Attributes	Triggering Conditions for Attributes
Deleted NAS Fileset	A previously monitored NAS fileset can no longer be found. Historical data about the fileset is retained, but no current data is being collected. Use this alert to be notified if a fileset is deleted or becomes unavailable.
New Fileset	A fileset is detected for the first time.
State	A fileset is linked to a file system, unlinked from a file system, or deleting.

File Systems

Table 8. Triggering attributes and conditions for general changes on file systems

General Attributes	Triggering Conditions for Attributes
New File System	A file system is detected for the first time.
Removed NAS File System	A previously monitored NAS file system can no longer be found. Historical data about the file system is retained, but no current data is being collected. Use this alert to be notified if a file system is deleted or becomes unavailable.

File System Pools

Table 9. Triggering attributes and conditions for general changes on file system pools

General Attributes	Triggering Conditions for Attributes
Deleted Pool	A previously monitored NAS pool can no longer be found. Historical data about the pool is retained, but no current data is being collected. Use this alert to be notified if a pool is deleted or becomes unavailable.
New Pool	A NAS pool is detected for the first time.

Host Connections

Table 10. Triggering attributes and conditions for general changes on host connections

General Attributes	Triggering Conditions for Attributes
New Host Connection	A host connection is detected for the first time.
Removed Host Connection	A previously monitored host connection can no longer be found. Historical data about the host connection is retained, but no current data is being collected. Use this alert to be notified if a host connection is removed or becomes unavailable.

Table 11. Triggering attributes and conditions for changes to performance metrics for unmap operations on host connections

Performance Attribute	Triggering Conditions for Attributes
Data Rate (Unmap)	Define an alert to monitor the average number of MiBs per second that were unmapped. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Overall I/O Rate (Unmap)	Define an alert to monitor the average number of unmap operations per second. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Peak Response Time (Unmap)	Define an alert to monitor the worst response time measured for an unmap operation in the sample interval. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Response Time (Unmap)	Define an alert to monitor the average number of milliseconds required to complete an unmap operation. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Unaligned Unmap I/O Rate	Define an alert to monitor the average number of volumes unmap operations per second that are not aligned on an 8K boundary. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.

I/O Groups

Table 12. Triggering attributes and conditions for general changes on I/O groups

General Attributes	Triggering Conditions for Attributes
New I/O Group	A new I/O group was detected for the first time.
Removed I/O Group	A previously monitored I/O group can no longer be found. Historical data about the I/O group is retained, but no current data is being collected. Use this alert to be notified if an I/O group is removed or becomes unavailable.

IP Ports

Triggering attributes and conditions are available for Internet Protocol ports on the nodes on block storage systems that run IBM Spectrum Virtualize, such as SAN Volume Controller, the IBM Storwize family, and some models of the IBM FlashSystem® family.

Table 13. Triggering attributes and conditions for general changes on IP ports

General Attributes	Triggering Conditions for Attributes
Status	One of the following statuses was detected for an IP port: <ul style="list-style-type: none"> • Configured • Unconfigured
Removed Port	A previously monitored IP port can no longer be found. Historical data about the port is retained, but no current data is being collected. Use this alert to be notified if a port is deleted or becomes unavailable.
New Port	A new IP port was detected for the first time.
Host Attach	An IP port was attached to, or detached from, a host.
Storage Attach	An IP port was attached to, or detached from, a storage system.
Management	One of the following management statuses was detected for an IP port: <ul style="list-style-type: none"> • Configured • Unconfigured
Remote Copy Relationship	The remote copy relationship changed, or one of the following remote copy statuses was detected for an IP port: <ul style="list-style-type: none"> • Active • Unconfigured • Standby

Managed Disks

Table 14. Triggering attributes and conditions for general changes on managed disks

General Attributes	Triggering Conditions for Attributes
Managed Disk Status	One of the following statuses is detected for a managed disk: <ul style="list-style-type: none"> Not Normal <ul style="list-style-type: none"> An error or warning status was detected on a managed disk. Warning <ul style="list-style-type: none"> A warning status was detected on a managed disk. Error <ul style="list-style-type: none"> An error status was detected on a managed disk.
New Managed Disk	A new managed disk was detected for the first time.
Removed Managed Disk	A previously monitored managed disk can no longer be found. Historical data about the managed disk is retained, but no current data is being collected. Use this alert to be notified if a managed disk is removed or becomes unavailable.

Table 15. Triggering attributes and conditions for capacity changes on managed disks

Capacity Attributes	Triggering Conditions for Attributes
Available Capacity	The unused storage capacity on the managed disk.
Capacity (Previously known as Total Space)	The total capacity on the managed disk on the storage system. This attribute is only available for Storwize V7000 storage systems that are configured as back-end storage.

Modules

Table 16. Triggering attributes and conditions for general changes on modules

General Attributes	Triggering Conditions for Attributes
Deleted Module	A previously monitored module can no longer be found. Use this alert to be notified if a module is removed or becomes unavailable.

Network Shared Disks

Table 17. Triggering attributes and conditions for general changes on NSDs

General Attributes	Triggering Conditions for Attributes
New NSD	A new NSD was detected for the first time.
Removed NSD	A previously monitored NSD can no longer be found. Historical data about the NSD is retained, but no current data is being collected. Use this alert to be notified if an NSD is removed or becomes unavailable.
Status	<p>One of the following statuses is detected for an NSD:</p> <ul style="list-style-type: none"> Not Normal An error or warning status was detected on an NSD. Warning A warning status was detected on an NSD. This status might occur if a storage system comes online or if its version changes. Error An error status was detected on an NSD.

Nodes

Table 18. Triggering attributes and conditions for general changes on nodes

General Attributes	Triggering Conditions for Attributes
New Node	A new node was detected for the first time.
Removed Node (Block storage)	A previously monitored node can no longer be found. Historical data about the node is retained, but no current data is being collected. Use this alert to be notified if a node is removed or becomes unavailable.
Removed NAS Node (File storage)	A previously monitored NAS node can no longer be found. Historical data about the node is retained, but no current data is being collected. Use this alert to be notified if a node is removed or becomes unavailable.
Cloud Gateway Status (File storage)	<p>One of the following statuses is detected for a node. This attribute is available only for IBM Spectrum Scale.</p> <ul style="list-style-type: none"> Not Running The gateway service is not running because, for example, the service is stopped, no cloud account is configured, or the connection to the cloud provider failed. Not Installed The node is not a cloud gateway. No File System The node is a cloud gateway and the gateway service is running, but the node is not yet assigned to a file system. Stopped The node is a cloud gateway for a file system, but the gateway service is stopped. No Cloud Account The node is a cloud gateway for a file system and the gateway service is running, but no cloud account is configured. Disconnected The node is a cloud gateway, the gateway service is running, and a cloud account is configured, but the connection to the cloud provider failed.

Table 19. Triggering attributes and conditions for changes to performance metrics for cache fullness on nodes

Performance Attributes	Triggering Conditions for Attributes

Performance Attributes	Triggering Conditions for Attributes
Max Read Cache Fullness	<p>Define an alert to monitor the maximum amount of the lower cache which the cache partitions of the pools that are managed by the node use for read operations. If the maximum value for the cache reaches 100%, the read cache partition for one or more of the pools is full. The read operations that pass through the node to the affected pools will be queued and the I/O response times will increase for the volumes in the affected pools.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later.</p>
Max Write Cache Fullness	<p>Define an alert to monitor the maximum amount of the lower cache which the cache partitions of the pools that are managed by the node use for write operations. If the maximum value for the cache reaches 100%, the write cache partition for one or more of the pools is full. The write operations that pass through the node to the affected pools will be queued and the I/O response times will increase for the volumes in the affected pools.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later.</p>
Read Cache Fullness	<p>Define an alert to monitor the average amount of the lower cache which the cache partitions of the pools that are managed by the node use for read operations. Use this alert to monitor the average cache fullness for read operations to identify the nodes that experience heavy cache usage.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later.</p>
Write Cache Fullness	<p>Define an alert to monitor the average amount of the lower cache which the cache partitions of the pools that are managed by the node are using for write operations. Use this alert to monitor the average cache fullness for write operations to identify the nodes that experience heavy cache usage.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later.</p>

Table 20. Triggering attributes and conditions for changes to performance metrics for recovering data in data reduction pools on nodes

Performance Attributes	Triggering Conditions for Attributes
Data Rewrite Rate	<p>Define an alert to monitor the rate at which data is rewritten when a host overwrites data in data reduction pools on the node.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V8.1.2 or later.</p>
Extent Collection Rate	<p>Define an alert to monitor the number of volume extents that were processed for garbage collection. The reclaimable capacity in the volume extents is collected so that it can be reused in the data reduction pools on the node.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V8.1.2 or later.</p>
Data Movement Rate	<p>Define an alert to monitor the rate at which valid data in a reclaimed volume extent is moved to a new extent in the data reduction pool on the node.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V8.1.2 or later.</p>
New Address Write Rate	<p>Define an alert to monitor the rate at which capacity is used to write the host's data to unallocated addresses in the data reduction pool on the node. Use this alert to determine which hosts are increasing the amount of capacity that is being written to data reduction pools on a node.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V8.1.2 or later.</p>
Reclaimable Capacity	<p>Define an alert to monitor the amount of capacity that can be reclaimed in the data reduction pools on the node.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V8.1.2 or later.</p>
Recovered Capacity Rate	<p>Define an alert to monitor the rate at which capacity is recovered by garbage collection for reuse in the data reduction pools on the node.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V8.1.2 or later.</p>

Pools

Table 21. Triggering attributes and conditions for general changes on pools

General Attributes	Triggering Conditions for Attributes
Deleted Pool	A previously monitored pool can no longer be found. Historical data about the pool is retained, but no current data is being collected. Use this alert to be notified if a pool is deleted or becomes unavailable.
New Storage Pool	A new pool was detected for the first time.

General Attributes	Triggering Conditions for Attributes
Status	<p>One of the following statuses is detected for a pool:</p> <p>Not Normal An error or warning condition is detected on a pool.</p> <p>Warning A warning condition is detected on a pool. This condition might occur if a pool goes offline.</p> <p>Error An error condition is detected on a pool. This condition might occur under the following conditions:</p> <ul style="list-style-type: none"> • The percentage of remaining, unused volume capacity in a pool that is not available to be used is too high. • The available capacity in a pool that is not reserved for volumes is too low. • The pool provisioned capacity exceeds the warning or critical threshold boundary value.

Table 22. Triggering attributes and conditions for capacity changes on pools

Capacity Attributes	Triggering Conditions for Attributes
Adjusted Used Capacity	<p>The amount of capacity that can be used without exceeding the capacity limit. For example, you set a capacity limit of 80% for your pools. You want to get an informational alert when the adjusted used capacity exceeds 60% and a critical alert when the adjusted used capacity exceeds 80%. So, you define an informational alert with these parameters:</p> <p>Adjusted Used Capacity \geq 60%</p> <p>And, you define a critical alert with these parameters:</p> <p>Adjusted Used Capacity \geq 80%</p>
Available Repository Capacity	<p>The amount of available, unallocated storage space on all extents in the repository of a pool for Track Space-Efficient (TSE) thin-provisioning. This attribute applies only to the DS8000® storage systems.</p> <p>You can use this alert to be notified about space-efficient volumes.</p>
Available Virtual Capacity	The amount of provisioned capacity in a thin-provisioned pool that is not used by volumes.
Available Written Capacity (Previously known as Effective Available Capacity)	The total amount of the provisioned capacity in the pools that is not allocated to the volumes in the pools.
Capacity-to-Limit	<p>The amount of capacity that is available for storing data before the capacity limit is reached. For example, if you set a capacity limit, you can define a warning alert when the available capacity relative to the capacity limit, falls below the value that you specify, such as:</p> <p>Capacity-to-Limit \leq 500 GiB</p>
Compression Savings	The estimated percentage of capacity that is saved by using data compression. The percentage is calculated across all compressed volumes in the pool and does not include the capacity of non-compressed volumes. Inline compression is a software feature that is supported by FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV® storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.
Deduplication Savings	The estimated percentage of capacity that is saved by using data deduplication. The percentage is calculated across all deduplicated volumes in the pool and does not include the capacity of volumes that are not deduplicated. Available for resources that run IBM Spectrum Virtualize version 8.1.3 or later.
Mapped Capacity (Previously known as Assigned Volume Space)	<p>The amount of space on all the volumes in a pool that are mapped or assigned to host systems.</p> <p>For a thin-provisioning pool, this value includes the provisioned capacity of thin-provisioned volumes, which might exceed the total capacity in the pool. For Hitachi VSP non-thin provisioning pool capacity, this value is the sum of assigned regular host-accessible volumes. Volumes that are used for thin-provisioning (pool volumes) are not included.</p>
Enterprise HDD Capacity	The total capacity on Enterprise hard disk drives in the pool. Easy Tier® can use the capacity on these drives to retier the volume extents in the pool.
Enterprise HDD Available Capacity	The available capacity on Enterprise hard disk drives in the pool. Easy Tier can use the available capacity to retier the volume extents in the pool.
Enterprise HDD Available Capacity (%)	The percentage of capacity on Enterprise hard disk drives in the pool that is available. Easy Tier can use the available capacity to retier the volume extents in the pool.

Capacity Attributes	Triggering Conditions for Attributes
Nearline HDD Capacity	The total capacity on Nearline hard disk drives in the pool. Easy Tier can use the capacity on these drives to retier the volume extents in the pool.
Nearline HDD Available Capacity	The available capacity on Nearline hard disk drives in the pool. Easy Tier can use the available capacity to retier the volume extents in the pool.
Nearline HDD Available Capacity (%)	The percentage of capacity on Nearline hard disk drives in the pool that is available. Easy Tier can use the available capacity to retier the volume extents in the pool.
Provisioned Capacity (Previously known as Virtual Allocation)	The percentage of physical space in a pool that is committed to the provisioned capacity of the volumes in the pool. You can use this alert to be notified about space-efficient volumes.
Repository Space	The amount of space on all extents in the repository of a pool. This attribute applies only to the DS8000 storage systems.
Reserved Capacity (Previously known as Reserved Pool Space)	The amount of unused capacity in a pool that is reserved for provisioning and optimization tasks. Pool capacity is reserved when a provisioning or optimization task is created, and used when the task is run.
Reserved Volume Capacity (Previously known as Unused Space)	The amount of pool capacity that is reserved but has not been used yet to store data on the thin-provisioned volume.
Safeguarded Capacity	The total amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000.
Shortfall	The difference between the amount of provisioned capacity that is committed to the volumes in the pools and the actual physical capacity that is available in the pools. As the provisioned capacity is allocated to the thin-provisioned and compressed volumes, the shortfall increases and becomes more critical. This value is determined by the formula, <i>Overprovisioned Capacity ÷ Committed but Unused Capacity</i> For example, the physical capacity of the pools is 70 GiB, but 150 GiB of provisioned capacity was committed to the thin-provisioned volumes. If the volumes are using 50 GiB, then there is still 100 GiB committed to those volumes (150 GiB – 50 GiB) with only 20 GiB of available pool capacity (70 GiB – 50 GiB). Because only 20 GiB of the pool capacity is available, 80 GiB of the committed capacity cannot be allocated (100 GiB - 20 GiB).
SCM Capacity	The total capacity on Storage Class Memory (SCM) drives in the pool. Easy Tier can use the capacity on SCM drives to retier the volume extents in the pool. Available for IBM Spectrum Virtualize systems, such as IBM FlashSystem 9100, IBM FlashSystem 7200, and the IBM Storwize family.
SCM Available Capacity	The available capacity on Storage Class Memory (SCM) drives in the pool. Easy Tier can use the available capacity to retier the volume extents in the pool. Available for IBM Spectrum Virtualize systems, such as IBM FlashSystem 9100, IBM FlashSystem 7200, and the IBM Storwize family.
SCM Available Capacity (%)	The percentage of capacity on Storage Class Memory (SCM) drives in the pool that is available. Easy Tier can use the available capacity to retier the volume extents in the pool. Available for IBM Spectrum Virtualize systems, such as IBM FlashSystem 9100, IBM FlashSystem 7200, and the IBM Storwize family.
Tier 0 Flash Capacity	The total capacity on Tier 0 flash solid-state drives in the pool. Easy Tier can use the capacity on these drives to retier the volume extents in the pool.
Tier 0 Flash Available Capacity	The available capacity on Tier 0 flash solid-state drives in the pool. Easy Tier can use the available capacity to retier the volume extents in the pool.
Tier 0 Flash Available Capacity (%)	The percentage of capacity on Tier 0 flash solid-state drives in the pool that is available. Easy Tier can use the available capacity to retier the volume extents in the pool.
Tier 1 Flash Capacity	The total capacity on Tier 1 flash solid-state drives in the pool. Easy Tier can use the capacity on these drives to retier the volume extents in the pool.
Tier 1 Flash Available Capacity	The available capacity on Tier 1 flash solid-state drives in the pool. Easy Tier can use the available capacity to retier the volume extents in the pool.
Tier 1 Flash Available Capacity (%)	The percentage of capacity on Tier 1 flash solid-state drives in the pool that is available. Easy Tier can use the available capacity to retier the volume extents in the pool.

Capacity Attributes	Triggering Conditions for Attributes
Tier 2 Flash Capacity	The total capacity on Tier 2 flash, high-capacity drives in the pool. Easy Tier can use the capacity on these drives to retier the volume extents in the pool. Available for DS8000 storage systems.
Tier 2 Flash Available Capacity	The available capacity on Tier 2 flash, high-capacity drives in the pool. Easy Tier can use the available capacity to retier the volume extents in the pool. Available for DS8000 storage systems.
Tier 2 Flash Available Capacity (%)	The percentage of capacity on Tier 2 flash, high-capacity drives in the pool that is available. Easy Tier can use the available capacity to retier the volume extents in the pool. Available for DS8000 storage systems.
Total Capacity Savings (Previously known as Total Data Reduction Savings)	The estimated percentage of capacity that is saved by using data deduplication, data compression, and thin provisioning. Available for FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.
Total Reserved Capacity	The total amount of space on the pool that is reserved for provisioning and optimization tasks. Pool space is reserved when a provisioning or optimization task is created, and allocated when the task is run.
Used Capacity (Previously known as Allocated Space)	The amount of space that is reserved for all the volumes in a pool.
Used Capacity (%) (Previously known as Physical Allocation)	The percentage of physical capacity in the pool that is used by the standard-provisioned volumes, the thin-provisioned volumes, and the volumes in child pools. This value is always less than or equal to 100% because you cannot allocate more physical space than is available in a pool. This value is determined by the formula, $\text{Used Capacity} \div \text{Capacity} \times 100$. For example, if the space that is reserved for volumes is 50 GiB for a volume size of 200 GiB, used capacity is 25%.
Used Repository Space	The amount of used capacity on all extents in the repository of a pool. This attribute applies only to the DS8000 storage systems. You can use this alert to be notified about space-efficient volumes.
Used Volume Space	The amount of space on the storage system that is used by volumes.
Used Written Capacity (%) (Previously known as Effective Used Capacity)	The percentage of capacity that is provisioned to the standard-provisioned volumes and the thin-provisioned volumes, given the drive compression savings.
Used Written Capacity (Previously known as Effective Used Capacity)	The total amount of provisioned capacity that is used by all the volumes given the drive compression savings.
User Reserved Capacity	The amount of space in the pools on the storage system that is reserved for user-defined purposes.
Virtual Capacity Limit	The maximum amount of virtual storage space available to allocate to volumes in the storage pools that are associated with the storage system. You can use this alert to be notified about space-efficient volumes.
Virtual Volume Space	The total amount of physical space in a pool that is committed to the total virtual capacity of the volumes in the pool. You can use this alert to be notified about space-efficient volumes.
Written Capacity Limit (Previously known as Effective Capacity)	The amount of provisioned capacity that can be created, given the drive compression savings.

Table 23. Triggering attributes and conditions for changes to performance metrics for cache fullness on pools

Performance Attributes	Triggering Conditions for Attributes
-------------------------------	---

Performance Attributes	Triggering Conditions for Attributes
Read and Write Cache Fullness	<p>Define an alert to monitor the average amount of the lower cache which the pools' cache partitions on the nodes use for read and write operations. Use this alert to monitor the average cache fullness for read and write operations to identify the pools that experience heavy cache usage.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later.</p>
Max Read and Write Cache Fullness	<p>Define an alert to monitor the maximum amount of the lower cache, which the cache partitions on the nodes that manage the pool use for read and write operations. If the maximum value for the cache reaches 100%, one or more cache partitions on one or more pools is full. The operations that pass through the pools with full cache partitions will be queued and I/O response times will increase for the volumes in the affected pools.</p> <p>This metric applies to systems that are running IBM Spectrum Virtualize V7.3 or later.</p>

Quotas

Table 24. Triggering attributes and conditions for general changes on quotas

General Attributes	Triggering Conditions for Attributes
Deleted Quota	A previously monitored quota can no longer be found. Historical data about the quota is retained, but no current data is being collected. Use this alert to be notified if a quota is deleted or becomes unavailable.
New Quota	A new quota was detected for the first time.

RAID Arrays

Table 25. Triggering attributes and conditions for general changes on RAID arrays

General Attributes	Triggering Conditions for Attributes
New RAID Array	A new RAID array was detected for the first time.
Removed RAID Array	A previously monitored RAID array can no longer be found. Historical data about the RAID array is retained, but no current data is being collected. Use this alert to be notified if a RAID array is removed or becomes unavailable.
Status	<p>One of the following statuses is detected for a RAID array:</p> <ul style="list-style-type: none"> Not Normal An error or warning condition is detected on a RAID array. Warning A warning condition is detected on a RAID array. Error An error condition is detected on a RAID array.

Table 26. Triggering attributes and conditions for capacity changes on RAID arrays

Capacity Attributes	Triggering Conditions for Attributes
Available Physical Capacity, Available Physical Capacity (%)	<p>The amount and percentage of storage space that is unused on all the disk drive modules (DDMs) in the RAID array.</p> <p>Available for RAID arrays with disk drive modules that use inline data compression, such as RAID arrays on FlashSystem 9100 and FlashSystem 900.</p>
Compression Savings, Compression Savings (%)	For compressed RAID arrays, the amount and percentage of capacity that is saved by using drive compression.
Capacity (Previously known as Total Space)	<p>For uncompressed RAID arrays, the total capacity is the same as the physical capacity and represents the total storage capacity of all the DDMs in the array.</p> <p>For compressed RAID arrays, the total capacity is the estimated amount of data that can be written to the array. This value is larger than the physical capacity as the drive compression is used to reduce the size of the data.</p>

Table 27. Triggering attributes and conditions for changes to performance metrics for RAID arrays

Performance Attribute	Triggering Conditions for Attributes
Data Rate	The average rate at which data is transferred in MiB per second.
I/O Rate	The average number of operations per second.
Response Time	The average number of milliseconds required to complete an operation.
Transfer size	The average number of KiB that are transferred per I/O operation.
Disk Utilization Percentage	The average percentage of time the disks that are associated with an array are busy.

Performance Attribute	Triggering Conditions for Attributes
Sequential I/O Percentage	The percentage of operations among all I/O operations that were sequential I/O operations.

Device Adapters

Table 28. Triggering attributes and conditions for general changes on device adapters

General Attributes	Triggering Conditions for Attributes
New Device Adapter	A new Device Adapter was detected for the first time.
Removed Device Adapter	A previously monitored Device Adapter can no longer be found. Historical data about the Device Adapter is retained, but no current data is being collected. Use this alert to be notified if a Device Adapter is removed or becomes unavailable.
Status	<p>One of the following statuses is detected for a Device Adapter:</p> <ul style="list-style-type: none"> Not Normal An error or warning condition is detected on a Device Adapter. Warning A warning condition is detected on a Device Adapter. Error An error condition is detected on a Device Adapter.

Table 29. Triggering attributes and conditions for changes to performance metrics for device adapters

Performance Attribute	Triggering Conditions for Attributes
Data Rate	The average rate at which data is transferred in MiB per second.
I/O Rate	The average number of operations per second.
Response Time	The average number of milliseconds required to complete an operation.
Transfer size	The average number of KiB that are transferred per I/O operation.

»

Host Adapters

Table 30. Triggering attributes and conditions for general changes on host adapters

General Attributes	Triggering Conditions for Attributes
New Host Adapter	A new Host Adapter was detected for the first time.
Removed Host Adapter	A previously monitored Host Adapter can no longer be found. Historical data about the Host Adapter is retained, but no current data is being collected. Use this alert to be notified if a Host Adapter is removed or becomes unavailable.
Status	<p>One of the following statuses is detected for a Host Adapter:</p> <ul style="list-style-type: none"> Not Normal An error or warning condition is detected on a Host Adapter. Warning A warning condition is detected on a Host Adapter. Error An error condition is detected on a Host Adapter.

«

Shares

Table 31. Triggering attributes and conditions for general changes on shares

General Attributes	Triggering Conditions for Attributes
New Share	A new share was detected for the first time.
Deleted Share	A previously monitored share can no longer be found. Historical data about the share is retained, but no current data is being collected. Use this alert to be notified if a share is deleted or becomes unavailable.

Volumes

Table 32. Triggering attributes and conditions for general changes on volumes

General Attributes	Triggering Conditions for Attributes
Deleted Volume	<p>A previously monitored volume can no longer be found. Historical data about the volume is retained, but no current data is being collected. Use this alert to be notified if a volume is deleted or becomes unavailable.</p> <p>If you are doing tasks where many volumes are being deleted, you might want to temporarily disable alerts that use the Deleted Volume attribute. For example, you might want to disable Deleted Volume alerts temporarily if you are doing maintenance tasks or decommissioning storage.</p>
New Volume	A new volume was detected for the first time.
Status	<p>One of the following statuses is detected for a volume:</p> <ul style="list-style-type: none"> Not Normal An error or warning condition is detected on a RAID array. Warning A warning condition is detected on a RAID array. Error An error condition is detected on a RAID array.

Table 33. Triggering attributes and conditions for capacity changes on volumes

Capacity Attributes	Triggering Conditions for Attributes
Compression Savings	The estimated percentage of capacity that is saved by using data compression. Inline compression is a software feature that is supported by FlashSystem A9000 and FlashSystem A9000R, IBM Spectrum Accelerate, XIV storage systems with firmware version 11.6 or later, and resources that run IBM Spectrum Virtualize.
Provisioned Capacity (Previously known as Unallocatable Space)	The amount of space by which the capacity of a volume exceeds the physical capacity of the associated pool. In thin-provisioned environments, it is possible to over commit (over provision) storage in a pool by creating volumes with more virtual capacity than can be physically allocated in the pool. This value represents the amount of volume space that cannot be allocated based on the current capacity of the pool.
Real Capacity	The total amount of storage space that is physically allocated to a volume. For thin-provisioned volumes, this value is less than the provisioned capacity of the volume. In an XIV and IBM Spectrum Accelerate, this value represents the physical ("hard") capacity of the volume, not the provisioned ("soft") capacity.
Remaining Managed Space	The amount of storage space that is available on a managed disk. This value is only available for Storwize V7000 storage systems that are configured as back-end storage.
Reserved Volume Capacity (Previously known as Unused Space)	<p>The amount of pool capacity that is reserved but has not been used yet to store data on the thin-provisioned volume.</p> <p>The value for Reserved Volume Capacity is available only for SAN Volume Controller and Storwize family storage systems that are configured with block storage.</p>
Safeguarded Capacity	The amount of capacity that is used to store volume backups that are created by the Safeguarded Copy feature in DS8000.
Space	The amount of space in a pool that is allocated to a volume.
Unused Capacity (Previously known as Unallocated Space)	<p>The capacity in a pool that is not reserved for a volume. This value is determined by the formula: <i>Capacity – Used Capacity</i></p> <p>The value for Unused Capacity is available only for thin provisioned volumes.</p>
Uncompressed Used Capacity	The amount of storage space that is used if the compressed volume space is uncompressed. For example, if 100 GiB of uncompressed data is compressed, and the size of the compressed data is 20 GiB, the value is 100.
Used Capacity (Previously known as Allocated Space)	The capacity on a pool that is physically allocated to a volume.
Written Capacity (Previously known as Written Space)	The amount of data that is written from the assigned hosts to the volume before compression or data deduplication are used to reduce the size of the data.

Table 34. Triggering attributes and conditions for changes to performance metrics for unmap operations on volumes

Performance Attribute	Triggering Conditions for Attributes
Data Rate (Unmap)	Define an alert to monitor the average number of MiBs per second that were unmapped. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Overall I/O Rate (Unmap)	Define an alert to monitor the average number of unmap operations per second. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Peak Response Time (Unmap)	Define an alert to monitor the worst response time measured for an unmap operation in the sample interval. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Response Time (Unmap)	Define an alert to monitor the average number of milliseconds required to complete an unmap operation. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.
Unaligned Unmap I/O Rate	Define an alert to monitor the average number of volumes unmap operations per second that are not aligned on an 8K boundary. This metric applies to systems that are running IBM Spectrum Virtualize V8.1.1 or later.

Triggering conditions for server alerts

You can view alerts for the server on which IBM® Storage Insights Pro is installed.

Triggering conditions for the IBM Storage Insights Pro server

The server on which IBM Storage Insights Pro is installed is automatically monitored for conditions that might cause an interruption in product functions. When these conditions are detected, alerts are triggered and shown on the Dashboards > Alerts page. You do not need to manually define alerts for these product-related conditions; they are automatically enabled.

Table 1. Triggering conditions for the IBM Storage Insights Pro server

Triggering Condition	Explanation	Related Error Message
Database unavailable	The product database is not available. This database is the repository for information that is collected about the monitored resources in your environment.	ALR4112E, ALR4113E
High memory usage*	A high amount of memory is being used by a server process and might cause stability problems.	ALR4103W
Database alarm*	The system database or the database manager that hosts the product's database repository is reporting an alarm.	ALR4104W
High workload	The workload queue for the Device server is high and might cause performance issues.	ALR4105W
High number of external events	The server is receiving a high number of external events, such as CIM indications or SNMP traps. The high number of events might cause performance issues.	ALR4106W

Triggering conditions for fabric alerts

You can set up IBM® Storage Insights Pro so that it examines the attributes of a fabric and notifies you when changes are detected.

Alerts can notify you of general changes on fabric resources.

Important: Fabrics do not have a default alert policy assigned. If you wish to define alerts for a fabric you can either edit the alert definitions for a single fabric, or create an alert policy and assign it to one or more fabrics. To define alerts for a fabric, go to Resources > Fabrics, right-click a fabric, and select View Alert Definitions. Then, click Edit Alert Definitions to start defining alerts. To create an alert policy that can be applied to multiple fabrics, go to Configuration > Alert Policies > and click Create Policy. Then, name the policy, click Policy Type, select Fabrics, and select the fabrics that you want to include.
In the table, default alerts are marked with an asterisk (*).

Fabrics

Table 1. Alerts for fabrics

Fabric Attributes	Defining Conditions for Attributes

Fabric Attributes	Defining Conditions for Attributes
Status	<p>One of the following statuses is detected on a fabric:</p> <ul style="list-style-type: none"> Not Normal An error or warning status was detected on the fabric or its internal resources. Warning A warning status was detected on the fabric or its internal resources. Error (default) An error status was detected on the fabric or its internal resources. Unreachable One or more of the monitored resources for a fabric are not responding.
Custom alerts	You may choose from a small number of custom alerts to add to a fabric or policy. Conditions include number of Switches, number of Ports, etc.

Triggering conditions for switch alerts

You can set up IBM® Storage Insights Pro so that it examines the attributes and performance of a switch and notifies you when changes or violations are detected.

Alerts can notify you of general changes and performance issues on the following resources:

- [Switches \(performance\)](#)
- [Switches \(general changes\)](#)
- [Ports \(general changes\)](#)
- [Ports \(performance\)](#)
- [Trunks \(performance\)](#)

Important: Not all the attributes upon which you can alert are listed here. To view a complete list of attributes upon which you can alert, you can either edit alert definitions for a switch with no alert policy assigned, or you can create a new custom alert policy and define new alerts in the policy. To create a custom alert policy go to Configuration > Alert Policies and click Create Policy.

In the tables, default alerts are marked with an asterisk (*).

Switches (general changes)

Table 1. Pre-defined alerts for Switches

General Attributes	Defining Conditions for Attributes
Last Successful Probe	A specified amount of time has passed since a probe or performance monitor was able to collect data about a switch. You can use this alert to be notified when up-to-date configuration, status, or performance data is not being collected about a switch and its existing data might be stale. This situation might occur if the resource, network, or server is unavailable.
Probe Status*	<p>Generate an alert when one of the following statuses is detected for a probe:</p> <ul style="list-style-type: none"> Not Successful An error or warning occurred during data collection. This status indicates that a probe did not collect any data, or only collected a partial set of data about a resource. Warning A probe completed, but might not have collected a complete set of data. This status might occur if data cannot be collected about one or more of the internal resources of a resource. Error A probe did not complete when it attempted to collect asset data about the resource. This status might occur if the resource cannot be reached during data collection.

General Attributes	Defining Conditions for Attributes
Performance Monitor Status*	<p>One of the following statuses is detected for a performance monitor:</p> <p>Not Successful An error or warning occurred during data collection. This status indicates that a performance monitor did not collect any data, or only collected a partial set of data about a resource.</p> <p>Warning A performance monitor completed, but did not collect a complete set of performance data. This status might occur if the resource was rebooted during data collection, no valid performance data was provided by the resource, or a communication error occurred with the resource or its associated agent.</p> <p>Error A performance did not complete when it attempted to collect performance data about the resource. This status might occur if the resource cannot be reached during data collection, or if no configuration data is available for the resource.</p>
Status*	<p>One of the following conditions is detected on a switch:</p> <p>Not Normal An error or warning status was detected on the switch or its internal resources.</p> <p>Warning A warning status was detected on the switch or its internal resources.</p> <p>Error (default) An error status was detected on the switch or its internal resources. For example, an error status might occur when a switch goes offline.</p> <p>Unreachable One or more of the monitored resources for a switch are not responding. This status might be caused by a problem in the network.</p>

Switches (performance)

Define alerts that notify you when the performance of a switch falls outside a specified threshold. In alerts, you can specify conditions based on metrics that measure the performance of switch ports, including I/O, data, and error rates, and frame transfer sizes. By creating alerts with performance conditions, you can be informed about potential bottlenecks in your network infrastructure.

For example, you can define an alert to be notified when the port congestion index for a port is greater than or equal to a specified threshold. Port congestion represents the estimated degree to which frame transmission was delayed due to a lack of buffer credits. Use this alert to help identify port conditions that might slow the performance of the resources to which those ports are connected.

You can also be notified when a metric is less than a specified threshold, such as when you want to identify ports that might be under used.

For a complete list of switch metrics that can be alerted upon, see [Performance metrics for switches](#).

Tips for performance conditions:

- Data Collection must run against a resource for a period of time before IBM Storage Insights Pro can determine whether a threshold is violated and an alert is generated for a performance condition.
- When you define alerts for Trunks, the performance for all the Inter-Switch Links (ISLs) in the trunk are aggregated and compared to the threshold value. To determine if a single ISL is exceeding a threshold, define an alert for port performance.

Best practice: When you set thresholds for performance conditions, try to determine the best value so you can derive the maximum benefit without generating too many false alerts. Because suitable thresholds are highly dependent on the type of workload that is being run, hardware configuration, the number of physical disks, exact model numbers, and other factors, there are no easy or standard default rules. A recommended approach is to monitor the performance of resources for a number of weeks and by using this historical data, determine reasonable threshold values for each performance condition. After that is done, you can fine-tune the condition settings to minimize the number of false alerts.

Click Edit alert Definitions, and for each performance alert definition click View History to see the history of switch, port or trunk performance and set the threshold you want relative to that data.

Trunks (performance)

Define alerts that notify you when the performance of a trunk falls outside a specified threshold. In alerts, you can specify conditions based on metrics that measure the performance of the trunk, including I/O, data, and error rates, and frame transfer sizes. By creating alerts with performance conditions, you can be informed about potential bottlenecks in your network infrastructure.

For example, you can define an alert to be notified when the aggregate port congestion index of the ports in the trunk is greater than or equal to a specified threshold. Port congestion represents the estimated degree to which frame transmission was delayed due to a lack of buffer credits. Use this alert to help identify port conditions that might slow the performance of the resources to which those ports are connected.

You can also be notified when a metric is less than a specified threshold, such as when you want to identify trunks that might be under used.

For a complete list of trunk metrics that can be alerted upon, see [Performance metrics for switches](#)

Ports (general changes)

Table 2. Pre-defined alerts for ports

General Attributes	Defining Conditions for Attributes
Removed Port	A previously monitored port can no longer be found. Historical data about the port is retained, but no current data is being collected. Use this alert to be notified if a port is removed or becomes unavailable.
State	A port is online, enabled but offline, or disabled.
Status*	<p>One of the following statuses is detected for a port:</p> <ul style="list-style-type: none"> Not Normal An error or warning status is detected on a port. Warning A warning status is detected on a port. This status might occur if the switch is stopped, starting, or in service (being maintained, cleaned, or administered). Error An error status is detected on a port.

Ports (performance)

Define alerts that notify you when the performance of a port falls outside a specified threshold. In alerts, you can specify conditions based on metrics that measure the performance of switch ports, including I/O, data, and error rates, and frame transfer sizes. By creating alerts with performance conditions, you can be informed about potential bottlenecks in your network infrastructure.

For example, you can define an alert to be notified when the port congestion index for a port is greater than or equal to a specified threshold. Port congestion represents the estimated degree to which frame transmission was delayed due to a lack of buffer credits. Use this alert to help identify port conditions that might slow the performance of the resources to which those ports are connected.

You can also be notified when a metric is less than a specified threshold, such as when you want to identify ports that might be under used.

For a complete list of port metrics that can be alerted upon, see [Performance metrics for switches](#)

Triggering conditions for chassis alerts

You can set up IBM® Storage Insights Pro so that it examines the attributes and performance of a chassis and notifies you when changes or violations are detected.

Alerts can notify you of general changes on the following resources:

- [Chassis](#)
- [Blades](#)

Important: Not all the attributes upon which you can alert are listed here. A number of other alert types can be defined in custom alert policies or by editing the alert definitions for a chassis with no alert policy assigned.

In the tables, default alerts are marked with an asterisk (*).

Chassis

Table 1. Predefined alerts for chassis

General Attributes	Defining Conditions for Attributes
--------------------	------------------------------------

General Attributes	Defining Conditions for Attributes
Last Successful Probe Last Successful Monitor	A specified amount of time has passed since a probe or performance monitor was able to collect data about a chassis. You can use this alert to be notified when up-to-date configuration, status, or performance data is not being collected about a chassis and its existing data might be stale. This situation might occur if the resource, network, or server is unavailable.
Probe Status*	<p>One of the following statuses is detected for a probe:</p> <p>Not Successful An error or warning occurred during data collection. This status indicates that a probe did not collect any data, or only collected a partial set of data about a resource.</p> <p>Warning A probe completed, but might not have collected a complete set of data. This status might occur if data cannot be collected about one or more of the internal resources of a resource.</p> <p>Error (default) A probe did not complete when it attempted to collect asset data about the resource. This status might occur if the resource cannot be reached during data collection.</p>
Performance Monitor Status*	<p>One of the following statuses is detected for a performance monitor:</p> <p>Not Successful An error or warning occurred during data collection. This status indicates that a performance monitor did not collect any data, or only collected a partial set of data about a resource.</p> <p>Warning A performance monitor completed, but did not collect a complete set of performance data. This status might occur if the resource was rebooted during data collection, no valid performance data was provided by the resource, or a communication error occurred with the resource or its associated agent.</p> <p>Error A performance did not complete when it attempted to collect performance data about the resource. This status might occur if the resource cannot be reached during data collection, or if no configuration data is available for the resource.</p>
Status*	<p>One of the following conditions is detected on a chassis:</p> <p>Not Normal An error or warning status was detected on the chassis or its internal resources.</p> <p>Warning A warning status was detected on the chassis or its internal resources.</p> <p>Error (default) An error status was detected on the chassis or its internal resources. For example, an error status might occur when a chassis goes offline.</p> <p>Unreachable One or more of the monitored resources for a chassis are not responding. This status might be caused by a problem in the network.</p>

Blades

Table 2. Predefined alerts for blades

General Attributes	Defining Conditions for Attributes
Removed Blade	A previously monitored blade can no longer be found. Historical data about the blade is retained, but no current data is being collected. Use this alert to be notified if a blade is removed or becomes unavailable.
Status	<p>One of the following statuses is detected for a blade:</p> <p>Not Normal An error or warning status is detected on a blade.</p> <p>Warning A warning status is detected on a blade. This status might occur if the switch is stopped, starting, or in service (being maintained, cleaned, or administered).</p> <p>Error An error status is detected on a blade.</p>

Reporting

Keep your colleagues and management up-to-date by sending inventory, capacity, performance, and storage consumption reports by email or by exporting information about your storage environment.

Reports overview

Share the information that is collected about your storage environment by sending reports by email or by exporting the information to create your own reports.

User roles: You must have an Administrator role to create, edit, or delete custom, predefined capacity and inventory reports, and chargeback and storage consumption reports. Users with a Monitor role can run and view the reports that are shown on the Reports page, but they can't edit or delete reports.

In IBM® Storage Insights Pro, you can create all of the reports and share the reports with your colleagues and management:

- [By creating predefined capacity and inventory reports that you can schedule and send by email](#)
- [By creating custom reports, such as inventory, capacity, and performance reports, that you can customize, schedule, and send by email](#)
- [By creating storage consumption reports for your applications, departments, and physical servers, that you can customize, schedule, and send by email](#)
- [By exporting information to a file](#)

Create reports in the free version of IBM Storage Insights: In the free version of IBM Storage Insights, you can create these predefined reports and share the reports with your colleagues and management:

-  Capacity reports for block storage systems and pools
-  Inventory reports for block storage systems

Try it out! From the menu, click Reports, and then click Create Report.

You can use the export feature as follows:

- To export capacity and performance information about your storage resources from IBM Storage Insights Pro into the spreadsheets and the reports that you create for your organization
- To share information with your colleagues about the storage resources in your environment
- To make your colleagues aware of issues and to help them investigate and resolve capacity and performance issues

Predefined, custom, and storage consumption reports



Predefined inventory and capacity reports

Leverage and share the insights that IBM Storage Insights Pro gains from the metadata that it collects and analyzes to generate information about your storage assets and to monitor capacity usage and plan capacity purchases.

- ⇒ Create predefined capacity reports
- ⇒ Create predefined inventory reports

Custom reports

From any table view for a resource, leverage and share the insights that IBM Storage Insights Pro gains into the capacity, configuration, performance, and health status of the storage resources that you monitor.

- ⇒ Create custom reports

Chargeback and consumer reports

Create, schedule, and send chargeback and consumer reports by email to make your organization aware of the cost and the amount of capacity that is used by storage consumers such as applications.

- ⇒ More information about chargeback and consumer reports
- ⇒ Create chargeback reports
- ⇒ Create consumer reports

In the IBM Storage Insights Pro GUI, you can create the following types of reports, which you can configure, schedule, and send by email:

Predefined reports

You can use predefined reports:

- To notify colleagues about the capacity issues that affect them, and to monitor the capacity usage of resources, such as storage systems, pools, and servers, to ensure that you have sufficient capacity to meet current usage and to help plan capacity purchases
- To generate inventory reports about your storage assets, such as storage systems, servers, and IBM Spectrum Virtualize nodes, and IBM Spectrum Scale nodes

Custom reports

You use custom reports to create a variety of reports such as reports that provide information about your storage assets, and capacity and performance reports that provide information about the storage usage and performance of your resources.

Tip: You can open the table view for any resource, such as storage systems, volumes, pools, general groups, applications, and departments and click Create Report to create a custom report that you can send in a few simple steps. To create performance reports, open the Performance page for the resource and click Create Report.

Storage consumption reports

Chargeback reports make the owners of resources, such as applications, departments, or physical servers, aware of the amount and cost of the block and file storage that is consumed.

Consumer reports make the owner of a specific resource, such as an application, department, or physical server, aware of the amount and cost of the block storage that is consumed.

How to create reports

Watch a short video about how to create and customize a capacity report, attach a file to the report, and schedule when to run it in IBM Storage Insights Pro.



- [**Creating predefined capacity reports**](#)

To share information about capacity availability, usage, and growth, create capacity reports. You can configure and refine the information that is included in the report so that your colleagues get the information that they need to monitor the resources that they manage and make capacity planning decisions.

- [**Creating predefined inventory reports**](#)

To share information with your colleagues about the configuration and properties of your storage assets, create inventory reports.

- [**Creating custom reports**](#)

Create, configure, schedule, and send custom reports by email that include asset, capacity, configuration, or health status or performance information about your storage resources.

- [**Creating chargeback and consumer reports**](#)

To help plan capacity purchases and make your organization aware of the cost and the amount of the storage that is used by storage consumers, create chargeback and consumer reports.

- [**Running reports**](#)

You can run reports that you created without defining a schedule or changing the schedule that was created for the report.

- [**Editing reports**](#)

Change the configuration and scheduling for reports.

- [**Deleting reports**](#)

Remove the reports that you don't need.

- [**Types of predefined capacity and inventory reports**](#)

The predefined capacity and inventory reports that you can create for your storage resources are listed.

- [**Reports FAQ**](#)

Find answers to questions about the reports that you can create in IBM Storage Insights Pro.

Creating predefined capacity reports

To share information about capacity availability, usage, and growth, create capacity reports. You can configure and refine the information that is included in the report so that your colleagues get the information that they need to monitor the resources that they manage and make capacity planning decisions.

Step 1: Pick your predefined report

Click Reports, and then click Create Report and pick the capacity report that you want to create.

Step 2: Name the report

Provide a unique name for your report. You can use alphabetical and numerical characters, hyphens, dashes, and blank spaces.

Step 3: Specify the scope of the report

Choose one of these options:

- Option 1: Generate capacity information about all of the resources of a specific type.
- Option 2: Generate capacity information about a selection of resources of a specific type.
- Option 3: Generate capacity information about the resources of a specific type in a group.

Free version of IBM Storage Insights: Users can generate capacity reports for:

- All block storage systems or a selection of block storage systems
- All pools, or a selection of pools, or pools by storage systems

all storage systems or a selection of storage systems, and for all pools, a selection of pools, or pools by storage systems.

Option 1: All	Option 2: Selection	Option 3: In a Group
 <p>Include information in the report about all of the storage systems.</p>	 <p>Include information in the report about a selection of the storage systems.</p>	 <p>Include information in the report about the storage systems that are assigned to a general group, such as the production platform.</p>

Option 1: All of the resources

Choose this option to generate a report about all of the resources, such as all storage systems, pools, volumes, managed disks, or NAS file systems.

Option 2: One or more of the resources

Choose this option to generate capacity information about a selection of resources such as a selection of storage systems, pools, volumes, managed disks, or NAS file systems.

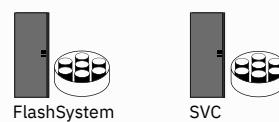
When you create capacity reports about managed disks, pools, servers, or volumes, you can group the types of resources, such as managed disks by storage systems, pools by storage systems, servers by applications, and volumes by servers.

Try it out: Click Reports, click Create Report, and choose the Pools capacity report. Choose capacity information for one or more resources, and select pools by storage systems or pools by tiers. To refine the list of the resources that are shown, you can enter a matching pattern for the names of the storage systems, or you can select the storage systems that contain the pools that you want to include in the report.

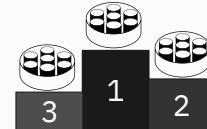
Predefined Capacity Reports: Selecting the resources that you're interested in

Pools capacity reports

Pools by storage systems



Pools by tiers



Volumes capacity reports

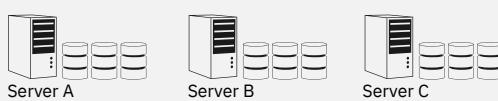
Volumes by storage systems



Volumes by pools



Volumes by servers

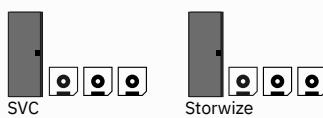


Volumes by applications



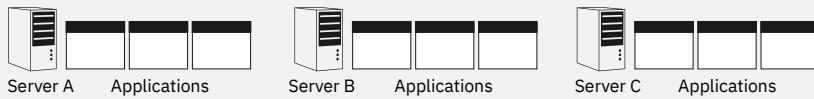
Managed disks capacity reports

Managed disks by storage systems



Servers capacity reports

Servers by applications



Option 3: Resources assigned to groups

You can also generate capacity information about the storage systems that belong to a group that you created, such as a general group that consists of the storage systems that are assigned to your production platform, or the storage resources that are assigned to an application or department.

Tip: The report you pick, determines the level of information that is shown about applications in reports. For example, if you want to see the capacity information about the set of volumes that you added to an application, create a Volumes capacity report and select the application. Or, if you want to see the capacity information about the filesets that you added to an application, create a Filesets capacity report and select the application.

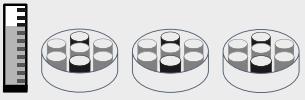
Step 4: Select columns

To ensure that the report's recipients get the information that they need, you can add more information, such as the location of the resources or custom tags. You can also remove the information that your colleagues don't need.

Step 5: Add filters

To refine the information in the report, you can add up to four filters.

Sample filters for block storage systems capacity reports

<p>Sample 1: Filter by storage system name</p>  <p>Column Storage System</p> <p>Comparison Contains</p> <p>Value storwize</p> <p>Only include capacity information about IBM Storwize family storage systems.</p>	<p>Sample 2: Filter by Used Capacity %</p>  <p>Column Used Capacity %</p> <p>Comparison \geq</p> <p>Value 80</p> <p>Only include capacity information for IBM Storwize family storage systems with used capacity values of 80% or higher.</p>
---	---

For example, if you want to notify resource administrators or owners about capacity shortfalls, you can set threshold values for capacity information. Or if you want to exclude information that is not of interest to the report's recipients, you can add a filter.

Don't forget to check the table when you apply filters to make sure that the recipients of the report will get the information that they need.

Step 6: Schedule and deliver the report

To notify your colleagues of capacity or configuration anomalies, create one-off capacity and inventory reports or create a schedule to provide regular updates about the capacity or state of your storage assets.

Tip: If you want to modify the report in a spreadsheet, you can also attach the report as a CSV, PDF, or HTML file.

Review, edit, and delete reports

To review the report that you created, click Reports, expand the relevant section, such as Capacity Report for predefined capacity reports and Inventory Report for predefined inventory reports, and then select the report.

You can edit the report, such as change the name and scope of the report or schedule of the report. To delete the report, click Actions  Delete Report.

Tip: You want to send a scheduled report now, but you don't want to change the original schedule? Click Reports. Select the report, and click Actions  Run Now. The report is sent without changing the schedule that you saved.

- [**Tutorial: Creating a predefined capacity report about storage systems**](#)

Create, schedule, and send predefined capacity reports about your storage systems by email, to keep your colleagues informed about capacity usage and to help them plan capacity and prevent capacity shortages.

- [**Tutorial: Creating a predefined capacity report about pools**](#)

Create, schedule, and send predefined capacity reports about your pools by email, to keep your colleagues informed about capacity usage and to help them plan capacity purchases and prevent capacity shortages.

- [**Tutorial: Creating a predefined capacity report about tiered pools**](#)

Create a pools by tier report to share information about the capacity of the pools that are assigned to your production platform.

- [**Tutorial: Creating a predefined capacity report about the volumes assigned to servers**](#)

Create, schedule, and send predefined reports about the capacity of the volumes that are assigned to servers.

- [**Tutorial: Creating a predefined capacity report about managed disks by storage systems**](#)

Share information with your colleagues about the capacity of your managed disks grouped by the storage systems that they belong to.

- [**Adding resources to applications to generate large reports**](#)

To generate capacity reports about a large number of resources, add the resources to an application and then generate the report.

Tutorial: Creating a predefined capacity report about storage systems

Create, schedule, and send predefined capacity reports about your storage systems by email, to keep your colleagues informed about capacity usage and to help them plan capacity and prevent capacity shortages.

About this task

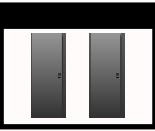
You can create a predefined report about the capacity usage of all of the storage systems in your storage environment, a selection of storage systems in your storage environment, or the storage systems that are assigned to a group such as a general group.

Procedure

1. Click Reports, and then click Create Report.
2. In the Capacity Reports section, click Block Storage Systems.

3. Enter the unique name of the report.

4. To specify the range of the report, choose one of the following options:

Option 1: All	Option 2: Selection	Option 3: In a Group
 Include information in the report about all of the storage systems.	 Include information in the report about a selection of the storage systems.	 Include information in the report about the storage systems that are assigned to a general group, such as the production platform.

Option	Description
Capacity information about all of the storage systems	Generate capacity information about all of the block, file, and object storage systems in your storage environment.
Capacity information about one or more storage systems	Generate information about a set of storage systems.
Capacity information about the storage systems that are assigned to a group	Generate information about the storage systems that were assigned to a group such as the production, preproduction, or test platforms general group.

5. Add and remove columns to choose the capacity and any other information that you want to include in the report.

6. Add up to four filters to deliver the capacity information that the report's recipients need.

Sample 1: Filter by storage system name	Sample 2: Filter by Used Capacity %
 Column Storage System Comparison Contains Value storwize Only include capacity information about IBM Storwize family storage systems.	 Column Used Capacity % Comparison >= Value 80 Only include capacity information for IBM Storwize family storage systems with used capacity values of 80% or higher.

Tip: To make sure that the report's recipients get the information that you want them to get, use the report preview feature. Each time you apply a filter, or make a configuration change to the report, such as add or remove a column or filter, the table view of the report is refreshed.

7. Send the report now or schedule the report to be sent regularly, such as every week, or month.

Instead of including the report in the email, you can attach the report to the email as a CSV, PDF, or HTML file.

Results

The Reports page opens where you can preview and edit the report that you created.

Tutorial: Creating a predefined capacity report about pools

Create, schedule, and send predefined capacity reports about your pools by email, to keep your colleagues informed about capacity usage and to help them plan capacity purchases and prevent capacity shortages.

About this task

You want to send a regular report to the owners of block storage resources so that they'll know:

- Which pools are depleted
- When the pools will run out of capacity

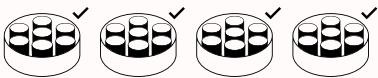
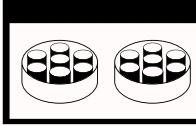
To do this, you include the Zero Capacity column and create a filter.

What's zero capacity: The capacity information that is collected over 180 days is analyzed to determine, based on historical storage consumption, when the pools will run out of capacity. The pools that have already run out of capacity are marked as depleted. For the other pools, a date is provided so that you know when the pools are projected to run out of capacity. If sufficient information isn't collected to analyze the storage usage of the pool, None is shown as the value for zero capacity. If a capacity limit is set for the pool, the date shown in the Zero Capacity column is the date when the available capacity based on the capacity limit will be depleted. For example, if the capacity

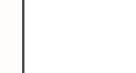
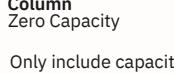
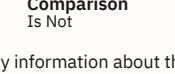
limit for a 100 GiB pool is 80%, it is the date when the available capacity of the pool is less than 20 GiB. Depleted is shown in the column when the capacity limit is reached.

Procedure

1. Click Reports, and then click Create Report.
2. In the Capacity Reports section, click Pools.
3. Enter the unique name of the report.
4. To specify the range of the report, choose one of the following options:

Option 1: All	Option 2: Selection	Option 3: In a Group
		
Option	Description	
Capacity information about all of the pools	Generate capacity information about all of the pools in your storage environment.	
Capacity information about one or more pools	Generate information about a set of pools. You can select the pools by the storage systems that they belong to or by the tiers that the pools are assigned to.	
Capacity information about the pools that are assigned to a group	Generate information about the pools that were assigned to a general group such as an application.	

5. Add and remove columns to choose the capacity and any other information that you want to include in the report.
6. Add up to four filters to deliver the capacity information that the report's recipients need.

Sample: Filter by Zero Capacity									
Column	Zero Capacity	Comparison	Is Not	Value	none	Column	Zero Capacity	Comparison	Is Not
									
Only include capacity information about the pools that are depleted or that could be analyzed to determine when the pools are projected to run out of capacity.									

Tip: To make sure that the report's recipients get the information that you want them to get, use the report preview feature. Each time you apply a filter, or make a configuration change to the report, such as add or remove a column or filter, the table view of the report is refreshed.

7. Send the report now or schedule the report to be sent regularly, such as every week, or month.
You can send the report by email, and attach the report as a CSV file, PDF file, or HTML file.

Results

The Reports page opens where you can preview and edit the report that you created.

Tutorial: Creating a predefined capacity report about tiered pools

Create a pools by tier report to share information about the capacity of the pools that are assigned to your production platform.

Before you begin

The pools that are used on your production platform are assigned to one or more tiers.

Assign pools to tiers: Click Resources > Pools. To add the Tier column to the table, right-click any column heading, and select Tier. Select and then right-click the pools on your production platform, and click Set Tier. If you can use a naming pattern for the pools or storage systems that are assigned to your production platform, you can filter the pools by pool or storage system name. Just click . Then click Name or Storage System and enter the pattern that matches the names of the pools or storage systems in the filter.

About this task

You want to create a scheduled report that shows the key capacity values of the pools on your production platform.

Procedure

1. Click Reports, and then click Create Report.
 2. Pick the Pools capacity report.
 3. Enter the name of the report, and click Capacity information about one or more pools.
 4. Select Tiers from the Pools drop-down list.
A list of the tiers that were created is shown.
 5. Select the tiers that you created for your production platform.
When you click Next, capacity information about the pools assigned to the tiers that you selected is shown.
 6. Select the capacity information that you want to include in the report.
Tip: Include the name of the tier in the report. In the General section, click Tier. Drag the Tier column and drop it before the Name column. To sort the pools by the tiers they are assigned to, click the Tier column.
 7. To refine the information that you want to include in the report, add filters.
 8. Schedule the delivery of the report.
- [Creating tiers and defining tier thresholds](#)

Tutorial: Creating a predefined capacity report about the volumes assigned to servers

Create, schedule, and send predefined reports about the capacity of the volumes that are assigned to servers.

About this task

When you create reports about the capacity of volumes, you can select volumes:

- By the storage systems that they belong to.
- By the pools that they belong to.
- By the servers that they are assigned to.
- By the applications that they are assigned to.

In this tutorial, you create a capacity report about the volumes that are assigned to the servers in your storage environment.

Procedure

1. Click Reports, and then click Create Report.
2. Click the Volumes capacity report.
3. Enter the name of the report.
4. Select Capacity information about one or more volumes.
5. On the Select Volumes page, select Servers from the Volumes list.
6. On the Select Volumes by Servers page, you can:
 - a. Choose all of the servers.
 - b. Choose one or more of the servers.
 - c. Select Name from the Filter  list. Then, enter a pattern that matches the names of the servers that you want to select.
7. Choose the columns that you want to include in the report.
You can rearrange the columns by dropping the columns where you want them to appear in the report.
8. Add a filter and then click Apply Filter.
For example, you can create a weekly report that lists the volumes with a used capacity greater than 80%.
9. Schedule the report.

Tutorial: Creating a predefined capacity report about managed disks by storage systems

Share information with your colleagues about the capacity of your managed disks grouped by the storage systems that they belong to.

Procedure

1. Click Reports, and then click Create Report.
2. Pick the Managed Disks capacity report.
3. Enter the name of the report and choose Capacity information about one or more managed disks.
4. On the Select Managed Disks page, change the selection from Managed Disks to Block Storage Systems.
5. On the Select Managed Disks by Block Storage Systems page, you can:
 - a. Choose all of the storage systems that have managed disks.
 - b. Choose one or more of the storage systems that have managed disks.
 - c. Select Name from the  column filter. Then, enter a pattern that matches the names of the storage systems that you want to select.
6. Choose the columns that you want to include in the report.
You can rearrange the order of the columns by dropping the columns where you want them to appear in the report.
7. Add and apply filters.
8. Schedule the report.

Adding resources to applications to generate large reports

To generate capacity reports about a large number of resources, add the resources to an application and then generate the report.

About this task

For example, you want to generate a capacity report about all of the file sets, servers, or volumes in your production environment. To do this, you can add the resources to an application and then generate a report about the application.

You can also add resources to general groups to generate large reports. However, when you add or remove resources, you'll have to add or remove the resources from the general group that you created. Whereas, when you use naming patterns to match the resources that you associate with applications, the applications are automatically updated when resources are added or removed.

Procedure

1. To add file sets or volumes to an application, complete these steps:

Option	Description
File sets and volumes	<ol style="list-style-type: none">a. Click Groups > Applications.b. Click Create Application, enter the name of the application, and then click Create.c. Click Assign Storage Resources to the Application.d. Choose a selection of volumes or file sets that match a pattern.e. To add all the file sets or volumes to the filter, type an asterisk (*).f. Save the filter.
Servers	<ol style="list-style-type: none">a. Click Groups > Applications.b. Click Create Application, enter the name of the application, and then click Create.c. Click Assign Storage Resources to the Application.d. Choose all storage that belongs to set of servers.e. To add all the servers to the filter, type an asterisk (*).f. Save the filter.

2. Click Reports, and then click Create Report.
3. Pick the capacity report that you want to create.
4. Enter the name of the report, choose the option for groups and select the group that you created.
5. Complete the steps for creating the report.
 - [Creating applications](#)
 - [Creating general groups](#)
 - [Filters for associating storage resources with applications and subcomponents](#)

Creating predefined inventory reports

To share information with your colleagues about the configuration and properties of your storage assets, create inventory reports.

Step 1: Pick your predefined report

Click Reports, and then click Create Report and pick the inventory report that you want to create.

Step 2: Name the report

Provide a unique name for your report. You can use alphabetical and numerical characters, hyphens, dashes, and blank spaces.

Step 3: Specify the scope of the report

Generate information about all of the resources of a specific type, such as an inventory report for block storage systems, or IBM Spectrum Virtualize nodes, or IBM Spectrum Scale nodes.

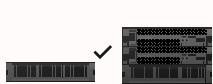
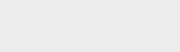
Step 4: Select columns

To ensure that the report's recipients get the information that they need, you can add more information, such as the location of the resources or custom tags. You can also remove the information that your colleagues don't need.

Step 5: Add filters

To refine the information in the report, you can add up to four filters.

Sample filters for block storage systems inventory reports

Sample 1: Filter by type of storage system			Sample 2: Filter by Firmware version		
					
Column Type	Comparison Contains	Value storwize	Column Firmware	Comparison Not Contains	Value 7.8.1.5

Only include inventory information for IBM Storwize family storage systems.

Only include information for IBM Storwize family storage systems with firmware versions that don't match the value that you enter.

For example, if you want to check whether your IBM® Storwize® family block storage systems have the correct firmware version, you can add filters to list the storage systems with firmware versions that don't match the value that you enter.

Don't forget to check the table when you apply filters to make sure that the recipients of the report will get the information that they need.

Step 6: Schedule and deliver the report

To notify your colleagues of inventory issues, create one-off inventory reports or create a schedule to provide regular updates about the state of your storage environment.

Tip: If you want to modify the report in a spreadsheet, you can also attach the report as a CSV, PDF, or HTML file.

Review, edit, and delete reports

To review the report that you created, click Reports, expand the relevant section, such as Inventory Report, and then select the report.

You can edit the report, such as change the name and scope of the report or schedule of the report. To delete the report, click Actions > Delete Report.

Tip: You want to send a scheduled report now, but you don't want to change the original schedule? Click Reports. Select the report, and click Actions > Run Now. The report is sent without changing the schedule that you saved.

- [Tutorial: Creating an inventory report about block storage systems](#)

Create a predefined report that includes information such as the name, type, model, vendor, and location of your block storage systems.

Tutorial: Creating an inventory report about block storage systems

Create a predefined report that includes information such as the name, type, model, vendor, and location of your block storage systems.

Procedure

1. Click Reports, and then click Create Report.
2. In the Inventory Reports pane, choose Block Storage Systems.
3. Enter the unique name of the report.
4. Choose the inventory information that you want to include in the report.
5. Add up to four filters.
Tip: Don't forget to click Apply Filter when you add each filter, and check the report preview to ensure that the report's recipients will get the information that they need.
6. Send the report now or schedule the report to be sent regularly, such as every week, or month.
You can send the report by email, and attach the report as a CSV, PDF, or HTML file.

Results

The Reports page opens where you can preview and edit the report that you created.

Creating custom reports

Create, configure, schedule, and send custom reports by email that include asset, capacity, configuration, or health status or performance information about your storage resources.

About this task

Use custom reports to quickly create reports to alert members of your organization about performance anomalies, health issues, capacity shortfalls, or capacity depletion. You can also schedule custom reports to keep a close watch on critical resources such as applications, or the storage resources that you use in your production environment.

From any table view that shows information about your storage systems or their related resources, you can create, configure, schedule, and send reports by email.

For example, you can create custom reports that include asset, capacity, and configuration information or performance information for top-level storage resources such as:

- Storage systems
- Servers
- Back-end storage systems

You can create custom reports for internal resources such as:

- Disks
- Pools
- Volumes
- Filesets
- File systems
- Network Shared Disks

And, if you added groups, you can create custom reports for general groups, applications, and departments.

Try it out: Open any page that shows information about your storage resources, such as the Block Storage Systems page, click Create Report, and create a custom report. Or, go to the Performance page and click Create Report, to create a performance report.

Procedure

1. Open any page that shows capacity or performance information about your storage systems, and then click Create Report.
2. Provide a unique name for your report. You can use alphabetical and numerical characters, hyphens, dashes, and blank spaces.
Remember: When you create your report, you can also use the table view features to customize your report, such as:
 - Drag the column headings to reorder the information that you want to show in the report.
 - Click the column heading in the table view to sort the values in the column.
3. To ensure that the report's recipients get the information that they need, you can add other information, such as the location of the resources or custom tags and remove the information they don't need.
4. To refine the capacity or asset information that you want to share, you can add up to four filters.

Sample 1: Filter by storage system name




Value storwize

Only include capacity information about IBM Storwize family storage systems.

Sample 2: Filter by Used Capacity %




Value 80

Only include capacity information for IBM Storwize family storage systems with used capacity values of 80% or higher.

For example, if you want to notify resource administrators or owners about capacity shortfalls, you can set threshold values for capacity information. Or if you want to exclude information that is not of interest to the report's recipients, you can add a filter. Check the report preview when you apply filters to make sure that the recipients of the report will get the information that they need.

Tip: You can add advanced filters to refine information about capacity and information about the assets in your storage environment. If advanced filters aren't available for a resource, you can use the filter feature that is available in the table. For example, in reports about volumes, you can filter by volume, pool, or storage system name, or by Easy Tier® attributes.

5. Send the report now or schedule the report to be sent regularly, such as every week, or month.

You can send the report by email, and attach the report as a CSV, PDF, or HTML file.

Results

To review the report that you created, click Reports > Reports, expand Customs Report, and then select the report.

You can edit the report, such as change the name and the schedule for the report. To delete the report, click Actions > Delete Report.

Tip: You want to send a scheduled report now, but you don't want to change the original schedule? Click Reports > Reports. Select the report, and click Actions > Run Now. The report is sent without changing the original schedule.

- **[Tutorials: Creating custom capacity and performance reports for applications](#)**

In these tutorials, you create an application so that you can create, schedule, and send reports by email about the storage resources that the application consumes.

- **[Custom capacity and performance view reports](#)**

When you create custom capacity or performance view reports, you can specify a relative time range for the information that is shown about the resources in the reports.

Related tasks

- [Editing reports](#)
- [Deleting reports](#)

Related reference

- [Capacity and space metrics](#)

Tutorials: Creating custom capacity and performance reports for applications

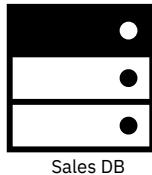
In these tutorials, you create an application so that you can create, schedule, and send reports by email about the storage resources that the application consumes.

About this task

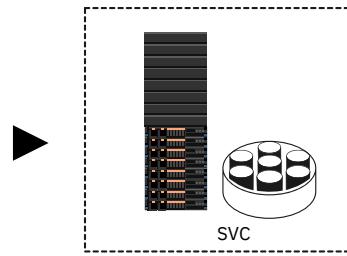
Create custom reports for an application

Step 1

Map the storage resources that your application uses, such as your sales database, with the application that you create in IBM Storage Insights Pro.



Sales DB



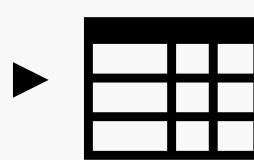
Sales DB Application
in IBM Storage Insights Pro

Step 2

Create a custom report that shows the key capacity values for the application.



Open the Sales DB
application in
IBM Storage Insights Pro



Open the capacity
table view of the
application's pools



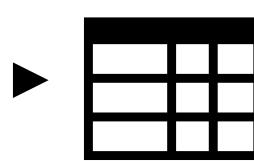
Create, configure, and
schedule the custom report

Step 3

Create a custom report that shows the key performance values for the application.



Open the Sales DB
application in
IBM Storage Insights Pro



Open the performance
table view of the
application's volumes



Create, configure, and
schedule the custom report

You create the application IBM® Storage Insights Pro, and then create custom capacity and performance reports.

1. [Creating the application for the capacity report](#)

In this scenario, you create the application that you want to use to generate the custom report.

2. [Creating the capacity report for the application](#)

In this scenario, you create a scheduled report about the capacity and storage usage of an application's pools.

3. [Creating the performance report for the application](#)

In this scenario, you create a performance report about the volumes that are assigned to the application.

Creating the application for the capacity report

In this scenario, you create the application that you want to use to generate the custom report.

About this task

Add the storage resources that your application consumes to the application that you create in IBM® Storage Insights Pro.

Procedure

- From the Groups menu, click Applications.

2. Click Create Application.
3. Complete these actions:
 - Enter the name.
 - Add a description.
 - Enter the type. For example, to distinguish this application from the other types of application that you create, enter DB or the type of DB, such as db2.
 - Enter the subtype. For example, you can enter preproduction, test, or, production to categorize applications by environment.
4. Click Assign storage resources to the application, and then click A selection of volumes that match a pattern.
5. In this scenario, you enter an asterisk * as the name pattern for the volumes, then you click Belonging to, and add a name pattern that matches the names of the pools that contain the volumes.
Assigning resources: Enter name patterns instead of adding comma-separated lists of the resources that an application uses. When you add more storage resources that match the name pattern, they are dynamically added to the application.
6. Click Preview to check that you added the storage resources that the application consumes, and then click Save.

Next topic: [Creating the capacity report for the application](#)

Creating the capacity report for the application

In this scenario, you create a scheduled report about the capacity and storage usage of an application's pools.

About this task

You want to create and schedule a report about the capacity of the pools that are assigned to an application.

Procedure

1. From the Groups menu, click Applications.
2. In the Related Resources section, double-click the application, and then click Pools.
3. Click Create Report, enter the unique name of the report, and then click Next.
4. Select the capacity values that you want to include in the report.

In this scenario, the following actions are completed to configure the report output:

- a. In the General section, exclude all of the columns except for the Name and Tier columns.
- b. In the Storage section , add capacity values, and select Zero Capacity from the Other section.

What's zero capacity: The capacity information that is collected over 180 days is analyzed to determine, based on historical storage consumption, when the pools will run out of capacity. The pools that have already run out of capacity are marked as depleted. For the other pools, a date is provided so that you know when the pools are projected to run out of capacity. If sufficient information isn't collected to analyze the storage usage of the pool, None is shown as the value for zero capacity. If a capacity limit is set for the pool, the date shown in the Zero Capacity column is the date when the available capacity based on the capacity limit will be depleted. For example, if the capacity limit for a 100 GiB pool is 80%, it is the date when the available capacity of the pool is less than 20 GiB. Depleted is shown in the column when the capacity limit is reached.

- c. To reorder the report output, drag the column headings.

5. Add up to four filters.

Sample: Filter by Zero Capacity

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Column	Comparison	Value							
Zero Capacity	Is Not	none							

Only include capacity information about the pools that are depleted or that could be analyzed to determine when the pools are projected to run out of capacity.

Tip: Don't forget to click Apply Filter when you add each filter, and check the report preview to ensure that the report's recipients will get the information that they need.

6. Send the report now or schedule the report to be sent regularly, such as every week, or month.

You can send the report by email, and attach the report as a CSV, PDF, or HTML file.

7. Click Save and Schedule.

Results

Depending on the scheduling option that you chose, the report is sent or will be sent at the interval that you specified. To preview or edit the report, click Reports > Reports, expand the Custom Report section, and select the report.

[Previous topic: Creating the application for the capacity report](#)

[Next topic: Creating the performance report for the application](#)

Creating the performance report for the application

In this scenario, you create a performance report about the volumes that are assigned to the application.

Procedure

1. Click Groups > Applications.
2. Double-click the application, and then click Volumes in the navigation pane.
3. Select the volumes and click View Performance.
Tip: Before you create the performance report, you can add more or other performance metrics to the table. The average, minimum, and maximum values of the performance metrics that are added to the table are calculated and shown in the report. Click Edit Table Metrics and select the additional metrics that you want in the report.
4. Click Create Report.
5. Enter the name of the report and click Next.
6. Select the metrics that you want to include in the report and click Next.
7. Add a filter and then click Apply Filter.
8. Send the report now or schedule the report to be sent regularly, such as every week, or month.
You can send the report by email, and attach the report as a CSV, PDF, or HTML file.

Results

The report is created. To edit the report, click Reports > Reports, expand the Custom Report section, and click the report.

[Previous topic: Creating the capacity report for the application](#)

Custom capacity and performance view reports

When you create custom capacity or performance view reports, you can specify a relative time range for the information that is shown about the resources in the reports.

To generate custom reports with relative time ranges, you must select one or more resources and click View Capacity, or View Performance. Alternatively, you can open the page for the resource and click the Capacity or Performance tab.

Remember: If you decide to specify your own start date, or end date, or both, you'll get the same information in the report each time it is generated. For example, you change the time range to 2 days, January 1 to January 2, and then generate a weekly report. Each time the report is generated, the information that was collected from January 1 to January 2 is used to generate the report.

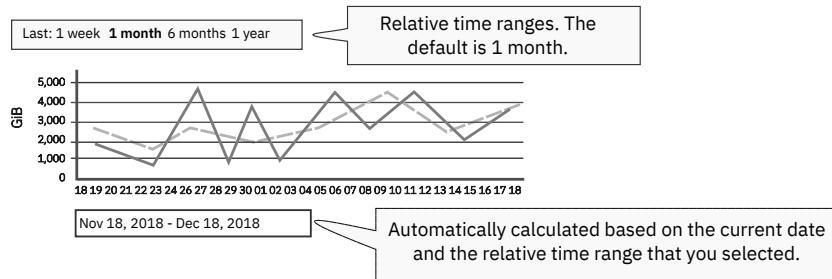
Relative time ranges for custom capacity reports

When you create custom capacity reports on Capacity View pages, the default time range for the capacity information that is shown in the report comprises an aggregate of the capacity information that was collected over the previous month.

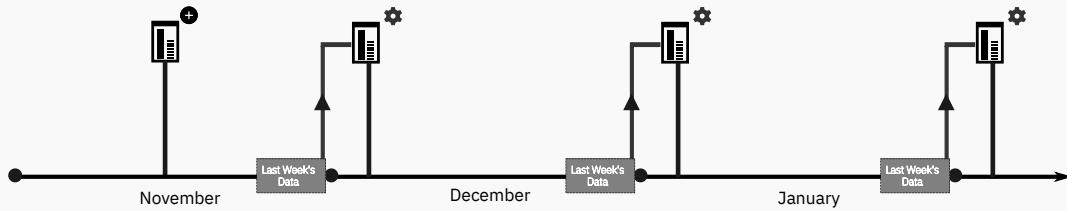
Choosing relative time ranges in custom capacity reports

Overview

When you create custom reports on the Capacity tab, you choose a relative time range. The time range determines how many daily collections of capacity information are analyzed when the report is generated.



Scenario



On November 18, you select the last week as the relative time range. You create the report and schedule the report to run on the fifth day of each month.

When the report is run on 5 December, the aggregate of the daily capacity information that was collected in the last week of November is shown in the report.

If you navigate to the capacity view for a storage resource, you can specify a relative time range for the capacity information in the report, such as last week, month, 6 months, or year. Depending on the time range that you specify, the aggregated values for the capacity information are shown in the report.

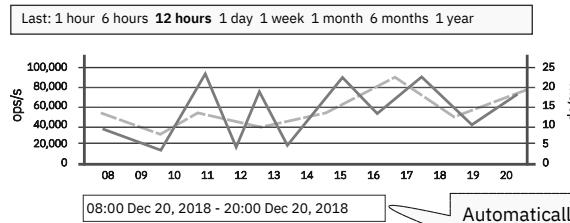
Relative time ranges for custom performance reports

When you create custom performance reports on Performance View pages, the default time range for the performance information that is shown in the report comprises an aggregate of the performance information that was collected over the last 12 hours.

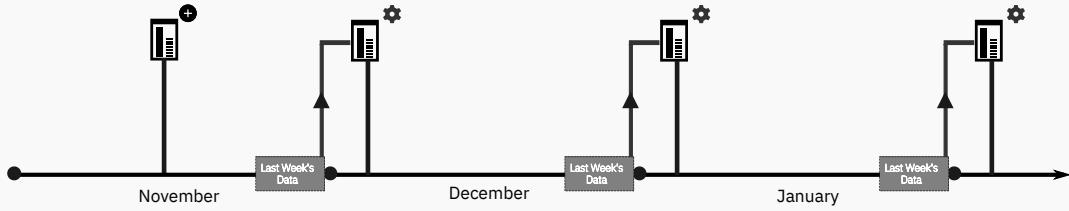
Choosing relative time ranges in custom performance reports

Overview

When you create custom reports on the Performance tab, you choose a relative time range. The time range determines how many hourly or daily collections of performance information are analyzed when the report is generated.



Scenario



On November 18, you select the last week as the relative time range. You create the report and schedule the report to run on the fifth day of each month.

When the report is run on 5 December, the aggregate of the daily performance information that was collected in the last week of November is shown in the report.

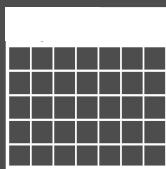
If you navigate to the performance view for a storage resource, you can specify a relative time range for the capacity information in the report, such as the last hour, 6 hours, 12 hours, day, week, month, 6 months, or year. Depending on the time range that you specify, the aggregated values for the performance information are shown in the report.

Creating chargeback and consumer reports

To help plan capacity purchases and make your organization aware of the cost and the amount of the storage that is used by storage consumers, create chargeback and consumer reports.

Chargeback and storage consumer reports

Create and send chargeback and consumer reports by email

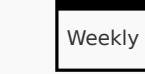


Schedule the Reports

Add the email addresses of the recipients of the report and choose how often you want to send the report.



Add Report Recipients



Specify Frequency



Specify Time



Choose the Storage Resources



Applications



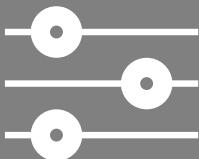
Departments



Servers

For chargeback reports choose the type of resource such as applications, departments, physical servers, or hypervisors. For consumer reports, choose the resource, such as a specific application.

[Creating applications and departments](#)



Configure the Report

Complete the configuration of the report. You can:

- Calculate capacity by used or mapped capacity
- Charge for primary data or copy data, or both
- Use default or custom costs
- Include or exclude costs
- Choose the unit of capacity measurement such as TiB or TB

In chargeback reports, you create reports that show the capacity and the cost of the block and file storage that is used by the types of storage consumers in your storage environment such as:

- Applications
- Departments
- Physical servers

In storage consumer reports, you create reports that show the capacity and cost of the block storage that is used by a single storage consumer, such as the capacity and the cost of the storage that is used by a single application.

To make the owners of the storage consumers aware of the capacity and cost of the storage they use, you schedule and send chargeback and storage consumer reports by email.

To view the capacity and charge for the storage that is used by applications and departments, you must create models of the applications and departments in your business organization and map the storage resources to the applications and map the applications that the departments use to the departments. If you organize an application or department in hierarchies, the chargeback and consumer reports show the capacity and cost of the storage resources that the application and its child applications use and the capacity and cost of the storage resources that the department and its child departments use.

Storage costs

The cost of the storage that is used by storage consumers is included in all reports even if the storage costs are set to zero. If you want to send reports that show the capacity of the storage, but not the cost of the storage that is used, you can exclude the storage costs from the report.

Before you decide how you want to set the costs for the block storage that is used by the storage consumers, you must choose whether you want to charge for the storage that is allocated to the storage consumer or the storage that is assigned to the storage consumer.

By default, block storage is calculated by the amount of storage that is allocated to the volumes that are being used for storage by the consumer. Whether you choose to calculate by allocated or assigned capacity, it doesn't affect the calculation of capacity for standard-provisioned volumes because standard-provisioned volumes are fully allocated when they are created. However, the calculation of the capacity of thin provisioned and compressed volumes is affected depending on whether you choose to calculate capacity by allocated or assigned capacity.

For example, an application has three volumes, two fully allocated volumes with 1 TiB each and one thin-provisioned volume with an assigned capacity of 3 TiB. The thin-provisioned volume is allocated capacity in increments of 1 TiB. If you generate a report that calculates capacity by allocated capacity, and the thin-provisioned volume is currently allocated 1 TiB, the total amount of capacity for the application is $1 \text{ TiB} + 1 \text{ TiB} + 1 \text{ TiB} = 3 \text{ TiB}$. However, if you choose to calculate by assigned space, the total capacity for the application is $1 \text{ TiB} + 1 \text{ TiB} + 3 \text{ TiB} = 5 \text{ TiB}$. The cost is also affected because the cost is the total capacity of the block storage, which is multiplied by the unit cost or the unit cost per tier.

Restriction: If you choose to calculate block storage by used capacity, the block storage for FlashSystem A9000 and FlashSystem A9000R storage systems is calculated based on the provisioned capacity percentage of the volumes. This restriction occurs because used capacity information for volumes is not available from FlashSystem A9000 and FlashSystem A9000R.

Default or custom storage costs

When you create or update a report, you can choose one of the following options:

Use default cost

Set or use default costs per unit and type of storage.

If you choose to use the default costs option, the changes that you make apply to all of the reports that use the default option to calculate the cost of storage. When you exclude costs from reports that use default costs, you exclude costs from all reports that use default costs to calculate the cost of storage.

Set custom cost

Use custom costs per unit and type of storage.

If you choose to use the custom costs option, the costs that you set are used to calculate the cost of storage only for that report.

Tip: If you want to change the configuration of a report, such as how storage costs are calculated, click Reports > Email Reports, select the report, and then click Edit.

Deleted and unavailable reports

If you delete a storage consumer, such as an application, the entry for that storage consumer is removed from all chargeback reports for applications. If you created a consumer report for a storage consumer that was deleted, the report is automatically deleted.

If you organize your applications or departments in hierarchies, the chargeback and consumer reports show the total capacity and costs for the parent application or department and its child applications and departments. However, if you create a consumer report for a specific application or department and then designate the application or department as a child application of another application, the consumer report is deleted.

For example, you create a consumer report for an application called German Online Sales. You then reorganize your sales applications in a hierarchy and the application for German Online Sales becomes a child application of European Sales. To include the capacity and cost of the storage that is used for German Online sales, you must create a consumer report for the application for European Sales.

- [**Creating chargeback reports**](#)

Create chargeback reports that show how much capacity is used and the cost of the capacity that is used by applications, departments, and physical servers.

- [**Creating consumer reports**](#)

Create consumer reports that show how much block capacity is used and the cost of the block capacity that is used by an application, department, or physical server.

- [**Creating summary reports of the storage capacity**](#)

Configure reports that make managers aware of the capacity of the storage that is used by their applications, departments, or physical servers. The cost of the storage is not shown in the reports.

- [**Capacity metrics for chargeback and consumer reports**](#)

Learn more about how the capacity and costs for block and file storage is calculated in chargeback and consumer reports.

Creating chargeback reports

Create chargeback reports that show how much capacity is used and the cost of the capacity that is used by applications, departments, and physical servers.

About this task

Chargeback reports help managers to realize the cost of the storage that they use, plan storage usage more efficiently, and reduce storage costs. For example, a manager gets a chargeback report that shows that the bulk of the storage that is used by a non-critical application is on tier-1. To reduce storage costs and use storage more efficiently, the manager can request the storage administrator to use tier-2 or lower tiers of storage for the application's data.

Procedure

1. Click Reports, and then click Create Report.
2. In the Summary Reports pane, click Chargeback.
3. Type the unique name of the report, and enter the delivery and the scheduling details.
4. Choose the type of storage consumer from the list.
If you choose Physical Server, the capacity and cost of the physical servers that belong to clusters are listed under the name of the cluster.
5. Choose how you want to calculate the capacity and cost of thin-provisioned storage.
6. Choose the unit of capacity measurement that you want to use in the report.
Tip: To make sure that the recipients of the report get the report that they want, check the report preview.
7. Choose whether you want to use default or customized costs for block and file storage.
To change the default costs for block and file storage, click the lock () icon.
8. Choose the types of storage that you want to include in the report.
9. Set the unit costs for the storage that is used.
To get a complete picture of the capacity and cost of the block storage, include the cost of the data that is copied.
10. Click Save.
If you set the frequency of the report to Now, you click Save and Send.

Results

The report is saved and, depending on the scheduling option, the report is sent to the recipients or scheduled to be sent later. If you want to change the configuration of the report, click Reports, select the report, and then click Edit.

Tip: You want to send a scheduled report now, but you don't want to change the original schedule? Click Reports > Reports. Select the report, and click Actions > Run Now. The report is sent without changing the original schedule.

- [Chargeback reports](#)
-

Chargeback reports

You configure, schedule, and send chargeback reports so that the owners and managers of storage resources:

- Know the cost of maintaining the block data and file data that they use
- Know the cost of maintaining block data on each tier of storage
- Know the cost of maintaining block copy data

Include total block and file capacity in the report

In the Configure Report section, you choose the types of storage that you want to show in the report. For example, if you click the File Storage check box, the names of the resources and the total file capacity that the resources use are shown in the report.

For block storage, you can show the total storage capacity and, if your storage is tiered, the total capacity by tier. You can also break down the total block capacity into total primary capacity and total copy capacity.

Tip: The recipient of the report, such as the application owner, sees that the capacity for copy data is high for tier-1 storage. To reduce costs and use the block storage more efficiently, the application owner can ask the storage administrator to place the volumes that are used for copy data on lower and less expensive storage tiers.

Include block and file costs in the report

In the Set Storage Cost section, you set the cost per TiB of storage that the resources use. The total cost of the storage that is used is shown in the Cost column in the report.

For block storage, you set the costs as follows:

- If your storage environment is tiered, you set the price per TiB for each tier of storage
- If your storage environment is not tiered, you set the price per TiB for all of your block storage
- If your storage environment contains tiered and non-tiered storage, you can set the price per TiB for the tiered storage, but you can't set a price for the non-tiered storage. Although you can't set the cost for the non-tiered storage, the capacity of the non-tiered storage that is used is calculated.

If you assign your block storage pools to tiers, you can differentiate between the cost of expensive tier-1 storage and the cost of the less expensive storage that is used on the lower tiers of storage.

For file storage, you set a price for all of the file storage that is used by your resources.

When you configure chargeback reports, you can send the report immediately or schedule the report to be sent every day, every week, or every month.

Tip: If your storage environment changes, you should check whether you need to update your scheduled reports. For example, if you add a storage tier, you can edit the report and set the price for the new tier.

Creating consumer reports

Create consumer reports that show how much block capacity is used and the cost of the block capacity that is used by an application, department, or physical server.

About this task

Storage consumer reports help the managers and owners of applications, departments, and physical servers realize the cost of the block storage that they use, plan block storage usage more efficiently, and reduce block storage costs.

Procedure

1. Click Reports, and then click Create Report.
2. In the Summary Reports pane, click Storage Consumer.
3. Type the unique name of the report, and enter the delivery and the scheduling details.
4. From the list, click the type of storage consumer and type or click the name of the storage consumer.
To generate a report about the physical servers that belong to a cluster, you choose Physical Server, and then choose or type the name of the cluster.
5. Choose whether you want to calculate block capacity by allocated or assigned space.
6. Choose the unit of capacity measurement that you want to use in the report.
Tip: To make sure that the recipients of the report get the report that they want, check the report preview.
7. Choose whether you want to use default or customized costs for block storage.
8. Choose the types of storage that you want to include in the report.
To change the default costs for block storage, click the lock (icon).
9. Set the unit costs for the block storage that is used.
To get a complete picture of the capacity and cost of the block storage, include the cost of the data that is copied.
10. Click Save.
If you set the frequency of the report to Now, you click Save and Send.

Results

The report is saved and, depending on the scheduling option, the report is sent to the recipients or scheduled to be sent later. If you want to change the configuration of the report, click Reports, select the report, and then click Edit.

Tip: You want to send a scheduled report now, but you don't want to change the original schedule? Click Reports Reports. Select the report, and click Actions Run Now. The report is sent without changing the original schedule.

- **[Consumer reports](#)**

Configure consumer reports to calculate the cost and capacity of the block storage that is used by a storage consumer such as an application, a department, or a physical server.

Consumer reports

Configure consumer reports to calculate the cost and capacity of the block storage that is used by a storage consumer such as an application, a department, or a physical server.

You configure, schedule, and send consumer reports so that the owner or manager of the storage consumer knows the cost of maintaining the block storage that the storage consumer uses.

In the Configure Report section, you include the total block storage capacity and, if your storage is tiered, the total capacity by tier in your report. You can also include the total primary capacity and the total copy capacity of the storage that is used, and you can include the total capacity:

- For VDisk mirrors
- For FlashCopy® and Safeguarded Copy volumes
- For remote mirrors such as Global Mirror, Global Copy, and Metro Mirror

In the Set Storage Cost section, you set the cost per TiB of the block storage that the storage consumer uses.

You set the costs as follows:

- If your storage environment is tiered, you set the price per TiB for each tier of storage
- If your storage environment is not tiered, you set the price per TiB for all of your block storage
- If your storage environment contains tiered and non-tiered storage, you can set the price per TiB for the tiered storage, but you can't set a price for the non-tiered storage. Although you can't set the cost for the non-tiered storage, the capacity of the non-tiered storage that is used is calculated.

Creating summary reports of the storage capacity

Configure reports that make managers aware of the capacity of the storage that is used by their applications, departments, or physical servers. The cost of the storage is not shown in the reports.

About this task

You can create reports that show the total capacity of the storage that is used by storage consumers and exclude the storage costs from the reports.

Procedure

1. Click Reports > Reports, and then click Create Report.

2. Choose one of the following options:

Option	Steps
Create chargeback reports	In the Summary Reports pane, click Chargeback.
Create consumer reports	In the Summary Reports pane, click Storage Consumer.

3. Enter the report details and schedule the report.

4. Choose one of the following options:

Option	Steps
Chargeback reports	Choose the type of storage consumer.
Consumer reports	Choose the type of storage consumer and the storage consumer.

5. To calculate the capacity that is assigned to the thin-provisioned volumes, click Assigned space.

By default, the amount of space that is allocated to the thin-provisioned volumes is used to calculate the cost.

6. Choose the unit of capacity measurement that you want to use in the report.

Tip: To make sure that the recipients of the report get the report that they want, check the report preview.

7. In the Configure Report section, choose the capacity values that you want to include in the report.

8. By default, the storage costs are shown in the report. To exclude storage costs from the report, choose one of the following options.

If you exclude costs from a report that uses default costs, the costs are excluded from all of the chargeback and consumer reports that use default costs.

Storage cost option	Steps
Use Default Cost	a. Click the lock (🔒) icon. b. In the Include Storage Cost in Report section, click No.
Use Custom Cost	In the Include Storage Cost in Report section, click No.

9. Click Save.

If you set the frequency of the report to Now, you click Save and Send.

Results

The reports include the capacity values and exclude the costs of the capacity that is used.

Capacity metrics for chargeback and consumer reports

Learn more about how the capacity and costs for block and file storage is calculated in chargeback and consumer reports.

Chargeback and storage consumer reports

The same block capacity metrics are shown in chargeback and consumer reports. In chargeback reports, the block capacity and costs are shown for all applications, departments, and physical servers. In consumer reports, the block capacity and costs are shown for a specific application, department, or physical server. The capacity and cost of file storage is not included in consumer reports.

If you create reports about physical servers, servers that are virtual machines are excluded from the report.

Tip: To find out which servers are virtual machines, click `Servers > Servers`, right-click any column heading and click `Virtual Machine`.

Virtual machine capacity

If you assign the storage resources on a virtual machine to an application or department, the capacity of those storage resources is included in the calculation of capacity and cost for the application or department.

For example, three virtual machines are allocated capacity from a data store, which has a total capacity of 3 TiB. The capacity for the data store comprises:

- One volume on tier 1 with a capacity of 2 TiB
- One volume on tier 2 with a capacity of 1 TiB

The ratio of tier-1 storage to tier-2 storage is 2:1 or 66.66% to 33.33%.

The total capacity of the data store is split across 3 by 1,024 GiB disks and one of the disks is allocated to `Virtual_Machine_1`. The used capacity on `Virtual_Machine_1` is allocated to a database application. So, the total amount of capacity that is allocated to the database application is 1,024 GiB, which comprises 66.66% of tier-1 storage and 33.33% of tier-2 storage. When the report is generated for the database application, the block capacity for tier-1 storage is **1024 GiB*66.66%**, which is 682.67 GiB or 0.67 TiB. The block capacity for the tier-2 storage is **1024 GiB*33.33%**, which is 341.33 GiB or 0.33 TiB.

If you calculate the capacity and cost of storage by used capacity, the capacity and cost of the storage that is used by the application or department is shown in the chargeback and consumer reports.

Restriction: You might get unexpected results in chargeback and consumer reports if the volumes that are used to provide the capacity on the disks for the virtual machine are thin-provisioned and shared by two or more applications.

Physical server clusters

In chargeback and storage consumer reports, the capacity and cost of storage for physical servers that are members of clusters are included in the capacity and cost of the cluster that they belong to. For example, `physical_server_1` and `physical_server_2` belong to `cluster_1`. To create the chargeback report about the physical servers' cluster, you choose Physical Servers as the consumer, and the capacity and the cost of the two physical servers are included in the report entry for `cluster_1`. To create a report for `cluster_1` in a storage consumer report, you choose Physical Server as the type of consumer, and `cluster_1` as the name of the consumer.

Block storage

The following information is provided about how block capacity is calculated:

Block or Used Capacity

In chargeback reports, the total block capacity for all of the storage resources is called `Block capacity`, whereas in consumer reports the total block capacity that the storage consumer uses is called `Used Capacity`.

The total capacity of these volumes is included in the calculation of block capacity:

- The provisioned capacity of the volumes without copies that are allocated to the consumer
- The provisioned capacity of the volumes with copies that are allocated to the consumer such as:
 - The total capacity of VDisk mirror volumes and their copies
 - The total capacity of FlashCopy® volumes and their target volumes
 - The total capacity of Safeguarded Copy source volumes and their volume backups
 - The total capacity of Global Mirror, Global Copy, and Metro Mirror volumes and their target volumes

For example, an application is assigned all of the block storage volumes on a physical server. In this scenario, the block capacity value includes the capacity of all of the block volumes that are assigned to the physical server. If the assigned volume on the

physical server has a VDisk mirror copy or the volume is a FlashCopy source volume, the capacity of the VDisk mirror copy or the capacity of the FlashCopy target volume is also included in the calculation.

Primary capacity

The total capacity of the following types of volumes is included in the calculation of primary capacity:

- The provisioned capacity of the volumes without copies that are allocated to the consumer
- The provisioned capacity of primary VDisk mirror copies that are allocated to the consumer
- The provisioned capacity of the source volumes in FlashCopy relationships that are allocated to the consumer
- The provisioned capacity of the Safeguarded Copy source volumes that are allocated to the consumer
- The provisioned capacity of the Global Mirror, Global Copy, and Metro Mirror source volumes that are allocated to the consumer

VDisk Mirrors

The total capacity of the VDisk mirror copies for the volumes that are allocated to the consumer.

FlashCopy

The total capacity of the following types of volumes is included in the calculation of FlashCopy:

- The capacity of the FlashCopy target volumes for the source volumes that are allocated to the consumer
- The capacity of the volume backups for the Safeguarded Copy source volumes that are allocated to the consumer

Remote Mirrors

The total capacity of the Global Mirror, Global Copy, and Metro Mirror target volumes for the source volumes that are allocated to the consumer.

Primary capacity by tier

The primary capacity that is allocated to the consumer for the specified tier.

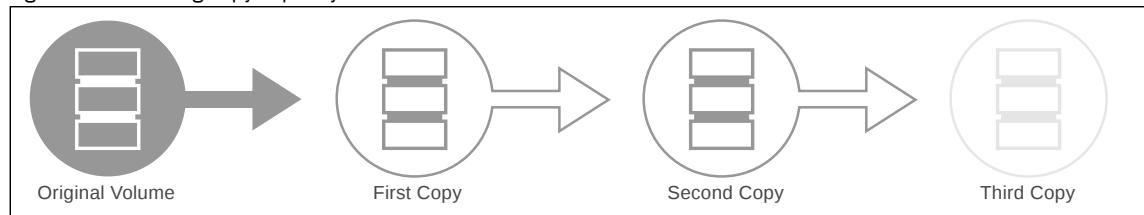
Copy capacity by tier

The copy capacity that is allocated to the consumer for the specified tier, which is calculated as follows:

- The total capacity of the non-primary VDisk mirror copies
- The total capacity of the target volumes for volumes in FlashCopy relationships
- The total capacity of target volumes for Global Mirror, Global Copy, and Metro Mirror

In tiered environments, the source volume might be on tier 1 and the target volume on tier 3. In this case, the capacity of the source volume is included in the calculation for the total primary capacity for Tier 1 and the capacity of the target volume is included in the calculation for the total copy capacity for tier 3.

Figure 1. Calculating copy capacity



Restriction: For volumes that have multiple volume copies, only the capacity of the first copy and the capacity of the second copy of the volume are included in the calculation of copy capacity.

File storage

File capacity is the total amount of file storage space that is allocated to the consumer.

For example, if a server mounts a fileset export from a file storage system and a quota is defined for the fileset, the file capacity is the hard limit capacity that is defined for the quota.

If a quota is not defined for the fileset, the file capacity is the capacity of the file system that contains the fileset. If multiple fileset exports from the same file system are mounted and the hard limits that are defined for the quota exceed the total file system capacity, then the file capacity is the total capacity of the file system.

Running reports

You can run reports that you created without defining a schedule or changing the schedule that was created for the report.

About this task

If you created a report, but didn't schedule it, you can run the report again. You can also run reports that you scheduled without changing the schedule for the report.

Procedure

1. Click Reports.
2. Click the report.
To run two or more reports, press Ctrl or press Shift and click the reports.
3. Click Actions > Run Now.

Results

The reports are generated and sent to the reports' recipients.

Editing reports

Change the configuration and scheduling for reports.

About this task

You can edit and reschedule custom, predefined capacity and inventory, and consumer and chargeback reports.

Procedure

1. From the Reports menu, click Reports.
2. Expand the section that contains the report.
3. Click the report, and then click Edit.
Tip: For custom and predefined capacity and inventory reports, click one of the links in the task pane. By default, the first page that is shown is the Schedule Delivery page. For example, to add, change, or remove filters, click Edit Filter.
4. Make your changes.

Results

If you schedule the report, the changes are saved and included in the next scheduled report. If you chose send now when you scheduled the report, the changes are saved and the report is sent to the recipients.

What to do next

Don't forget when you send the report that you will need to reconfigure the schedule if you want to send the report at regular intervals.

Deleting reports

Remove the reports that you don't need.

Procedure

1. Click Reports.
2. Click the report.
To select two or more reports, press Ctrl or press Shift and click the reports.
3. Click Actions > Delete Report.

Types of predefined capacity and inventory reports

The predefined capacity and inventory reports that you can create for your storage resources are listed.

Check the table to see the predefined reports that you can create for the storage resources in your environment.

IBM® Storage Insights Pro users can create all of the reports that are listed. IBM Storage Insights users can create the following reports:

- Capacity reports for block storage systems
- Capacity reports for pools
- Inventory reports for block storage systems

Table 1. Predefined capacity and inventory reports

Resource	Capacity	Inventory
Block Storage Systems	Yes	Yes
File Storage Systems	Yes	Yes
Object Storage Systems	Yes	Yes
Chassis	No	Yes
Servers	Yes	Yes
Applications	Yes	No
Departments	Yes	No
Managed Disks	Yes	Yes
Controllers	No	Yes
Enclosures	No	Yes
Filesets	Yes	No
NAS File Systems	Yes	No
Modules	No	Yes
Network Shared Disks	Yes	No
Pools	Yes	No
Spectrum Scale Nodes	No	Yes
Spectrum Virtualize Nodes	No	Yes
Storage System FC Ports	No	Yes
Storage System IP Ports	No	Yes
Volumes	Yes	No

Reports FAQ

Find answers to questions about the reports that you can create in IBM® Storage Insights Pro.

Troubleshooting reports

Why can't I send the report as an attachment?

You're notified that a report can't be sent by email because the report's attachments exceed the maximum size limit. The maximum size limit for attachments is set on your email server.

You can reduce the scope of the report to create smaller and more focused reports. For example, when you create reports about volumes, you can select volumes by the storage systems, pools, or applications that they belong to, or the servers that they are assigned to. You can also refine the report by removing columns and adding filters. And, to reduce the size of attachments, choose CSV as the file type.

[Learn more](#)

Why can't I see all of the rows in the report in my email?

If the report is very large, the report's recipients might not see all of the rows in the report in the email.

Click Reports. Select the report and click Edit. On the Schedule Delivery page, add the report as a CSV or HTML attachment. To see all of the rows in the report, the reports' recipients can open the attachment.

Creating and sending

Why can't I create a new custom report on the Reports page?

Unlike chargeback, consumer, and predefined reports, you can't create new custom reports on the Reports page. To create new custom reports, open any page that shows asset, capacity, configuration, or performance information, such as the Block Storage Systems page, and click Create Report. On the Reports page, you can edit or delete the custom reports that you created.

[Learn more](#)

How do I create a custom report about performance?

Go to a page that shows information about block storage resources. Select one or more of the resources, click View Performance, and then click Create Report.

[Learn more](#)

What types of reports can I create?

IBM Storage Insights Pro users can create chargeback, consumer, predefined capacity, predefined inventory, and custom reports.

IBM Storage Insights users can create predefined capacity reports for storage systems and pools and predefined inventory reports for storage systems. To create new predefined reports, click Reports, and then click Create Report.

[Learn more](#)

How can I send the reports that I created now?

You want to send a report now although the report, for example, is scheduled to run next week. Or, you created a report that you didn't schedule and want to send again.

Click Reports. To select the reports, press Ctrl or press Ctrl + Shift and click the reports. From the Actions menu, click Run Now. The report is generated without changing the schedule that you created for the report.

Security

Understanding the security and data collection features of IBM® Storage Insights Pro and IBM Storage Insights can help address the concerns of administrators and IT professionals who deploy the products in their environments.

Viewing a PDF version of security information: The security information for IBM Storage Insights Pro and IBM Storage Insights is also available in PDF format:

- For a quick, 1-page security overview, see the [IBM Storage Insights Security Sheet](#).
- For the full security guide, see the [IBM Storage Insights Security Guide](#).
- **[Summary](#)**
The concerns that customers might have about deploying a data collector on-premises and processing and storing metadata off-premises are discussed.
- **[What is the data collector](#)**
The data collector is the application that collects and delivers the metadata that is analyzed and presented in the GUI.
- **[How is the metadata protected](#)**
End-to end protection is provided for the metadata that is collected, delivered, and stored for your instance of IBM Storage Insights Pro or IBM Storage Insights in the IBM Cloud data center. This protection includes meeting the requirements of the General Data Protection Regulation (GDPR).
- **[What types of metadata are collected](#)**
Asset, capacity, configuration, and performance metadata are collected and stored for the storage systems that are monitored. Diagnostic data is also collected into log packages and added to support tickets.
- **[How long is the metadata kept](#)**
Information is provided about the retention periods for the metadata that is collected to provide storage services and to improve storage services.
- **[Who can access the metadata](#)**
Information is provided about access to the metadata that is collected and stored.
- **[Asset, capacity, and configuration metadata](#)**
The data collector collects and stores asset, capacity, and configuration metadata for block, file, and object storage systems and their resources. A list of the supported storage systems is provided.
- **[Performance metadata](#)**
The data collector collects and stores performance metadata for IBM block storage systems and non-IBM block storage systems and it collects and stores file system and node performance metadata for IBM Spectrum Scale storage systems.

Summary

The concerns that customers might have about deploying a data collector on-premises and processing and storing metadata off-premises are discussed.

IBM® Storage Insights Pro and IBM Storage Insights are cloud service offerings that use a light-weight application that is called the data collector to collect and send asset, configuration, capacity, and performance metadata for analysis to an IBM Cloud data center and for

presentation in the GUI.

Important: The security policies for collecting, sending, accessing, protecting, and storing metadata for IBM Storage Insights Pro and IBM Storage Insights are identical.

The key differences between both cloud service offerings lie in the exclusive features that IBM Storage Insights Pro provides to its subscribers, such as capacity planning analysis, reclamation analysis, and tiering analysis, and in the access to the metadata that is presented in the GUI for the cloud service offerings. In IBM Storage Insights Pro, subscribers have access to all of the metadata in the GUI, whereas in IBM Storage Insights, users have access to key capacity and performance metadata in the GUI, and IBM Support has read-only access to the set of metadata that they need to troubleshoot and close support tickets.

To discuss the security concerns that customers might have, the following questions are answered:

- What is the data collector?
- How is the metadata protected?
- What types of metadata are collected?
- How long is the metadata kept?
- Who can access the metadata that is collected?

Lists of the asset, capacity, and configuration metadata and the performance metadata that is collected and stored about your storage systems are also provided.

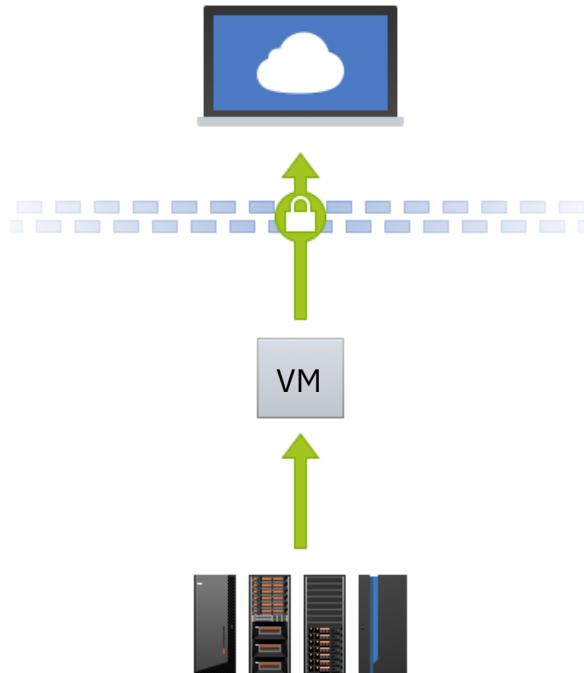
Additional legal and security information: For an additional summary of security and legal information, see the official [compatibility report for IBM Storage Insights](#).

Related reference

- [Asset, capacity, and configuration metadata](#)
 - [Performance metadata](#)
-

What is the data collector

The data collector is the application that collects and delivers the metadata that is analyzed and presented in the GUI.



The data collector is a light-weight application that is installed on a server in your data center. It sends the metadata that is collected about your storage systems, such as asset, configuration, capacity, and performance metadata, from your data center to your instance of IBM® Storage Insights Pro or IBM Storage Insights, which is in an IBM Cloud data center.

Important: Outbound metadata is sent by the data collector to a single, unique address, which is the IBM host name and port of your instance. This means that when you configure your firewall to send the metadata, you open a single path to a well-defined and secure

endpoint.

In a matter of minutes, you can install the data collector and when you add the storage systems that you want to monitor, you get the capacity and performance insights that you need to monitor your data center. Because the metadata that IBM Support needs to investigate and close tickets is also collected, you can also upload logs automatically when you create or update tickets and IBM Support can access and investigate the metadata to resolve any issues that you might have.

Credentials for connecting to storage systems: To add and collect metadata from the storage systems that you want to monitor, you must provide the storage system's credentials. Depending on the type of storage system that you add for monitoring, you can provide the name and password of a user with privileges to collect the metadata, or an SSH user and SSH key. The credentials that are provided are encrypted before they are stored in the database for the instance, and the database is also encrypted. In addition, most storage systems support the creation of users with read-only roles, who can't make any changes to the configuration of the storage system.

Supported operating systems: Data collectors can be installed on servers or virtual machine that run AIX®, Linux®, or Windows (64-bit systems only). On the server or virtual machine, you must provide at least 1 GB of RAM and 3 GB of disk space.

Security certification: IBM Storage Insights, based on regular audits, has [ISO/IEC 27001 Information Security Management certification](#). Annually, the following audits are conducted: two KPI audits, one external Veritas ISO27001, 27017, and 27018 audit, and one IBM internal audit for each ISO2700x.

Key security characteristics

To ensure that metadata is collected securely, the data collector has the following characteristics:

In-built security

Communication with other entities, such as storage systems in the local data center and the IBM Storage Insights service in the IBM Cloud data center are initiated solely by the data collector. The data collector does not provide any remote APIs that might be used to interact with the data collector.

One-way communication

The data collector sends metadata out of your network to your instance of IBM Storage Insights Pro or IBM Storage Insights.

Communication is outbound only; the data collector can't receive data from the internet or any other entity in your network. Here's how the one-way communication works:

1. The data collector sends out a request for work.
2. IBM Storage Insights responds with a data collection request.
3. The data collector communicates with the storage resource or starts a log collection.

Secure transmission

All communication between the data collector and IBM Storage Insights Pro or IBM Storage Insights in the IBM Cloud data center uses encryption based on HTTPS.

The communication that the data collector initiates with the server where it is installed, and the communication between the server and IBM Storage Insights Pro GUI or IBM Storage Insights GUI uses HTTPS connections. HTTPS connections are signed by DigiCert Inc., which uses TLS 1.2 with 128-bit keys.

Tip: Because HTTPS connections are used, the data collector can run on any computer that can access the internet over an outbound TCP connection to port 443. Port 443 is the standard port for HTTPS connections.

Related tasks

- [Downloading and installing data collectors](#)

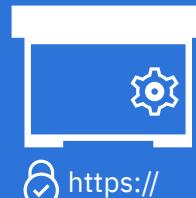
How is the metadata protected

End-to end protection is provided for the metadata that is collected, delivered, and stored for your instance of IBM® Storage Insights Pro or IBM Storage Insights in the IBM Cloud data center. This protection includes meeting the requirements of the General Data Protection Regulation (GDPR).

Metadata collection, delivery, and storage in the cloud

To transform the metadata into insights and present them in IBM Storage Insights Pro or IBM Storage Insights, the data collector forwards metadata packages for analysis and storage to the IBM Cloud data center (located in Washington, D.C.).

1010



https://

To keep the metadata package safe on its journey to the cloud, the data collector uses Hypertext Transfer Protocol Secure (HTTPS), which encrypts the metadata and sends the metadata package through a secure channel to the IBM Cloud data center.

Firewall

Internet

Gateway

IBM Cloud Data Center



At the gateway, or reverse proxy gateway, the metadata package gets instructions to deliver the package to your instance of IBM Storage Insights Pro or IBM Storage Insights.

When the metadata package is delivered, the metadata is decrypted, analyzed, and stored.

From your data center to the internet

HTTPS connections are used to compress and encrypt the metadata that is collected about your storage systems and sent to the IBM Cloud data center.

As part of the onboarding process, you're provided with a host name and port number for your instance of IBM Storage Insights Pro or IBM Storage Insights. To secure the outbound communication between the data collector and IBM Storage Insights Pro or IBM Storage Insights, a Secure Sockets Layer (SSL) certificate is used. The certificate and HTTPS connections are signed by DigiCert, which uses TLS 1.2 with 128-bit keys.

To send the metadata, your firewall must be configured to allow outbound communication on HTTPS port 443 using TCP to the address of your instance.

At the IBM Cloud data center

IBM Storage Insights Pro and IBM Storage Insights are hosted in IBM Cloud data centers, which comply with high physical, technical, and organizational security standards.

Key security

Each instance of IBM Storage Insights uses a local keystore that is dedicated to that instance and is password protected. The password for the keystore is generated randomly when the instance is created. The certificate in the keystore is unique to each instance and the keystore password is encrypted. (The encryption doesn't include hardware encryption.) The master password is kept encrypted in the service payload configuration in a secure location in IBM Cloud®.

There is only one external customer key, which is the public key that is certified by DigiCert. As part of the TLS Handshake and certificate exchange, the client (Web Browser) uses the signed certificate to verify that it is communicating with the IBM Storage Insights Pro or IBM Storage Insights gateway in IBM Cloud and that communications are not tampered with. For internal traffic, each customer's instance of IBM Storage Insights Pro or IBM Storage Insights has a unique key, which is protected with a unique, encrypted password, and which is self-signed by IBM to validate that the communication is between the customer and the customer's instance.

Key rotation: A new master key is created and added to the keystore when the instance is created and when the instance is upgraded. Instances are upgraded at least once every three months, which results in an implicit key rotation of not less than 90 days. The public key that is certified by DigiCert is updated every 2 years.

This results in end-to-end privacy and encryption for each instance of IBM Storage Insights Pro and IBM Storage Insights.

Physical protection

The data centers are rigorously controlled and onsite security is provided round the clock. Access to server-rooms is limited to certified employees and security controls are vetted by third-party auditors.

See <https://www.ibm.com/cloud-computing/bluemix/data-centers> and <https://www.ibm.com/cloud/security>.

Technical security

Each instance of IBM Storage Insights Pro or IBM Storage Insights is isolated from other instances of IBM Storage Insights Pro or IBM Storage Insights at the compute and at the storage layer.

Note: Dedicated SAN disks are used for each instance.

Each instance also uses its own database, which stores only data for that instance. The database is encrypted separately using native IBM DB2® encryption with a strong cryptographic algorithm, AES 256-bit encryption. An SSL certificate is used. For the encrypted DB2 database and its encrypted backups that are stored in IBM Cloud, the certificate is self-signed by IBM.

See https://www.ibm.com/support/knowledgecenter/SSEPGG_10.5.0/com.ibm.db2.luw.admin.sec.doc/doc/c0061758.html.

On a day-to-day basis, the following security software and services are used:

- Mantes Endpoint Protection to protect against malware
- IBM Bigfix® to comply with security and regulatory requirements
- IBM Security QRadar® SIEM to store and monitor system and application logs

Organizational security

Access to the infrastructure and instances for IBM Storage Insights Pro and IBM Storage Insights, is controlled:

- By restricting access to the members of the DevOps team and cloud service infrastructure teams who qualify as privileged users.
- By conducting regular system health and vulnerability scans at the source code level and on the running instances.
- By conducting regular penetration tests. External companies conduct the penetration tests.

GDPR: IBM Storage Insights meets the requirements of the EU General Data Protection Regulation (GDPR). Additional information related to IBM's privacy policy can be found at <https://www.ibm.com/privacy/us/en/>.

What types of metadata are collected

Asset, capacity, configuration, and performance metadata are collected and stored for the storage systems that are monitored. Diagnostic data is also collected into log packages and added to support tickets.

Metadata about the configuration and operations of storage resources is collected, and not the actual data that is stored on the storage systems or their resources.

The metadata that is collected is used:

- To provide and improve services
- To analyze and get insights into storage usage and performance
- To generate charts and present data in the GUI
- To upload logs automatically when support tickets are created or updated
- To enable IBM® Support to investigate and close the issues that you might encounter

The types of the metadata that are collected and stored are as follows:

Asset metadata

Name, model, firmware, and type of storage system.

Configuration metadata

Name and number of the resources that are associated with the storage system such as the number of disks, pools, and volumes.

Capacity metadata

Storage usage values such as provisioned capacity, unmapped capacity, pool capacity, used capacity, and raw capacity.

Performance metadata

Performance metrics, such as read and write data rates, I/O rates, and response times.

Relationships metadata

In IBM Storage Insights Pro, metadata is collected to represent general groups, applications, and departments that are created to show storage usage and performance metadata.

Server metadata

In IBM Storage Insights Pro, asset and capacity metadata is collected about the servers that are added for monitoring.

Data collector metadata

To monitor the performance of the data collector and resolve data collection issues, the name of the server that hosts the data collector, the status of the data collector, and when the data collector was last run is collected.

To get the metadata, the information that is used to connect to the storage systems that are monitored is also collected and stored. The information is stored in the database that was created for your instance of IBM Storage Insights and passwords are encrypted before they are stored in the database.

IBM Support ticket and diagnostic log packages

When the IBM Storage Insights data collector collects a diagnostic log package from your storage system, it transfers the package to IBM Support by using HTTPS.

When users create tickets in IBM Storage Insights, they provide a name, an email address, and a phone number so that IBM Support can contact them. IBM Storage Insights collects and uploads the diagnostic data for IBM block storage systems to IBM Enhanced Customer Data Repository (ECuRep).

What is ECuRep: ECuRep is an IBM strategic worldwide Post Sales Technical Support solution for client diagnostic data transmission, storing, and analysis.

If an IBM block storage system is configured to use Blue Diamond Enhanced Secure Support, IBM Storage Insights collects and uploads the diagnostic data that is collected for the storage system to the Blue Diamond environment.

What is Blue Diamond: Blue Diamond Enhanced Secure Support is an enhancement to standard IBM remote software and hardware support. It adds extra layers of security and allows you to use a secure, dedicated portal to upload diagnostic data to IBM® Support.

How long is the metadata kept

Information is provided about the retention periods for the metadata that is collected to provide storage services and to improve storage services.

When you add storage systems, asset, configuration, capacity, and performance metadata is collected about the storage systems. The metadata is collected and retained to provide and improve the analytical and monitoring services that IBM® Storage Insights offers. For example, the metadata is analyzed to present key capacity and performance metrics and for detecting and investigating capacity and performance trends. The metadata is also used to show capacity savings, predict capacity shortfalls, and to provide reclamation and tiering recommendations.

As the metadata is collected, the aggregation level of the metadata changes. For asset, configuration, and capacity metadata, over a 24-month period, the aggregation levels of the metadata change from daily, to weekly, to monthly based on the age of the metadata. For performance metadata, over a 52-week period, the aggregation levels change from sample, to hourly, to daily based on the age of the performance metadata. In effect, a more granular view of new metadata is provided and a less granular view of aged metadata is provided.

The following table lists the aggregation levels for asset, configuration, and capacity metadata based on the age of the data that is collected:

Table 1. Asset, configuration, and capacity metadata

Aggregation level	Metadata age
Daily	12 weeks
Weekly	24 weeks
Monthly	24 months

The following table lists the aggregation levels for performance metadata based on the age of the data that is collected:

Table 2. Performance metadata

Aggregation level	Metadata age
Sample	2 weeks
Hourly	4 weeks
Daily	52 weeks

Based on the collection date, metadata is retained for up to two years.

Note: If you subscribe to IBM Storage Insights Pro and cancel your subscription, you'll still be able to use IBM Storage Insights. The metadata from IBM Storage Insights Pro is retained.

How long are diagnostic data packages kept

Typically, diagnostic data is automatically deleted from IBM Enhanced Customer Data Repository (ECuRep) 30 days after the ticket is closed. For information about the retention of data in ECuRep, see the [IBM terms of use for Exchanging diagnostic data with IBM](#).

Blue Diamond Enhanced Secure Support uses a secure, dedicated portal for diagnostic data packages. For more information about diagnostic data and Blue Diamond, contact the Blue Diamond team at the [Blue Diamond registration page](#).

Related tasks

- [Requesting the deletion of personal information](#)
-

Who can access the metadata

Information is provided about access to the metadata that is collected and stored.

Access to the metadata that is collected and stored for your instance of IBM® Storage Insights Pro or IBM Storage Insights is restricted:

- To the DevOps and cloud service infrastructure teams who are responsible for the maintenance and day-to-day operation of your instance
- To IBM Support for investigating and closing support tickets and for downloading support logs to investigate issues
Note: IBM Support has read-only access to the metadata that is collected about all your monitored block storage systems and their internal resources.

To access the metadata in the IBM Cloud® network and ensure that the connection is secure, DevOps and cloud service infrastructure teams use a secure virtual private network (VPN) connection. Access to instances is only permitted from privileged user workstations, which must meet the strict security controls of IBM Security policies for production servers.

The access to metadata for DevOps and cloud service infrastructure teams is restricted:

- To the infrastructure for the cloud service
 - To the operating system
 - To add-on services such as agents
 - To middleware components
-
- **[Metadata access controls and authorization](#)**
Access controls and authorization checks are enforced for SaaS infrastructure components and services.
 - **[Metadata access for resolving issues](#)**
To investigate and resolve issues, access is required to metadata and instances of IBM Storage Insights Pro or IBM Storage Insights.
 - **[IBM Support access for troubleshooting your tickets](#)**
To investigate hardware and software tickets, IBM Support has read-only access to the asset, configuration, capacity, and performance metadata that is collected for IBM storage systems and their internal storage resources.
 - **[Metadata access for quality improvements](#)**
Anonymized metadata is used to improve the quality of service and to enhance the product offering.
 - **[Data backup and restore](#)**
To restore instances, regular backups of the data are made automatically.
 - **[Requesting the deletion of personal information](#)**
To delete the minimal personal information that was stored to provide you with monitoring and support services for your storage systems, you can submit a request to IBM Support.

Metadata access controls and authorization

Access controls and authorization checks are enforced for SaaS infrastructure components and services.

An approval process is used to authorize access to the following infrastructural elements and services:

- The network
- The operating system
- The middleware components
- The application
- Administrative services

When managing the changes to a production environment, the following change management processes are adhered to:

- Changes to the production environment must be recorded and must be approved by the change advisory board
- All support activities must be tracked in the IBM® Support Portal for cloud services
- All operational and maintenance activities must be tracked by the internal ticketing system

Metadata access for resolving issues

To investigate and resolve issues, access is required to metadata and instances of IBM® Storage Insights Pro or IBM Storage Insights.

To find the causes of issues, investigations are undertaken that might require access to the metadata that is collected and stored, or access to infrastructural elements, or both. For example, the DevOps team or IBM Support, might need to monitor instances of the application to determine the cause of interruptions in service, or to investigate interruptions in the collection of metadata. To resolve such issues, it might be necessary:

- To analyze the configuration of the instance
- To analyze log files
- To analyze the metadata that was collected

To thoroughly investigate some issues, it might also be necessary to package the metadata and transfer it to a secure IBM system so that the development team can complete the investigation.

IBM Support access for troubleshooting your tickets

To investigate hardware and software tickets, IBM® Support has read-only access to the asset, configuration, capacity, and performance metadata that is collected for IBM storage systems and their internal storage resources.

The metadata might not provide enough information to close the ticket, so IBM Support might need to collect a log package from your storage systems. In this case, IBM Support can attach the log package to an open ticket and submit the log package to IBM Enhanced Customer Data Repository (ECuRep). Depending on the data governance requirements of a client, the diagnostic data package might be uploaded to the Blue Diamond Enhanced Secure Support environment instead of ECuRep.

Permit IBM Support to collect log packages: To save time when IBM® Support troubleshoots your ticket, you can permit IBM® Support to collect and upload log packages remotely without contacting you. To set this permission, click Configuration > Settings, and then click Edit in the IBM Support Log Permissions section. You can set this permission for each storage system.

This is the procedure for uploading the log packages to tickets:

1. The data collector submits a request to the storage system to create a log package.
2. The data collector uses Hypertext Transfer Protocol Secure (HTTPS), which encrypts the metadata, and sends the log package through a secure channel to IBM Storage Insights.
3. IBM Storage Insights sends the log package to ECuREP or to Blue Diamond Enhanced Secure Support environment.

Metadata access for quality improvements

Anonymized metadata is used to improve the quality of service and to enhance the product offering.

A subset of the metadata from all of the instances is aggregated and condensed for further analysis. The data that is used is anonymized:

- It does not include instance-specific metadata
- It does not include customer-specific metadata such as IP addresses

For example, the aggregated metadata contains such information as the number of different types of storage systems or the number of different firmware levels for the storage systems that are monitored. The aggregated metadata might contain GUI and usage metrics, but it doesn't contain the names, the serial numbers, or the IP addresses of the storage systems.

Data backup and restore

To restore instances, regular backups of the data are made automatically.

Backups are made daily, which means that recovery point objective (RPO) is one day, and the recovery time objective (RTO) is between 1.5 and 2 days.

Backups are stored both locally, in the same data center, and remotely. The latest backup of the instance is stored in a remote data center, whereas the five previous backups are stored in the local data center.

Requesting the deletion of personal information

To delete the minimal personal information that was stored to provide you with monitoring and support services for your storage systems, you can submit a request to IBM® Support.

About this task

If you cancel your subscription for IBM Storage Insights Pro or decide that you no longer want to monitor your storage environment with IBM Storage Insights, you can request that the minimal personal information is deleted.

Procedure

1. Go to [IBM Support](#).
2. Sign in.
3. Click Go to my cases.
4. Create a new case and request the deletion of your personal information.

Asset, capacity, and configuration metadata

The data collector collects and stores asset, capacity, and configuration metadata for block, file, and object storage systems and their resources. A list of the supported storage systems is provided.

Asset, capacity, and configuration, metadata is collected and stored for the following IBM® block storage systems and non-IBM block storage systems when they are added for monitoring.

Table 1. Asset, capacity, and configuration metadata by storage system

Storage System	IBM Storage Insights Pro	IBM Storage Insights
DS8000®	Yes	Yes
Dell EMC Unity	Yes	No
Dell EMC VMAX	Yes	No
Dell EMC VNX, VNXe	Yes	No
FlashSystem 5000	Yes	Yes
FlashSystem 5100	Yes	Yes
FlashSystem 7200	Yes	Yes
FlashSystem 9100	Yes	Yes
FlashSystem 9200	Yes	Yes
FlashSystem 900	Yes	Yes
FlashSystem A9000	Yes	Yes
FlashSystem A9000R	Yes	Yes
FlashSystem V9000	Yes	Yes
Hitachi VSP	Yes	No
IBM Spectrum Accelerate	Yes	Yes
NetApp ONTAP 9	Yes	No
Pure FlashArray//M and FlashArray//X	Yes	No
SAN Volume Controller	Yes	Yes
Storwize® V3500	Yes	Yes
Storwize V3700	Yes	Yes
Storwize V5000	Yes	Yes
Storwize V7000	Yes	Yes
Storwize V7000 Unified	Yes	Yes
XIV®	Yes	Yes

In IBM Storage Insights Pro, asset, capacity, and configuration metadata is collected for the following file, object, and software-defined storage systems when they are added for monitoring:

- Dell EMC Unity
- Dell EMC VNX

- Dell EMC VNXe
- IBM Cloud Object Storage
- IBM Spectrum Scale
- NetApp ONTAP 9
- Storwize V7000 Unified
- [**Block storage system metadata**](#)
View the list of the asset, configuration, and capacity metadata for block storage systems.
- [**Block volumes metadata**](#)
View the list of the asset, capacity, and configuration metadata for volumes.
- [**Block pools metadata**](#)
View the list of the asset, capacity, and configuration metadata for block storage pools.
- [**I/O groups, nodes, and ports metadata**](#)
View the lists of the asset, capacity, and configuration metadata for I/O groups, nodes, Fibre Channel (FC) ports, and IP ports.
- [**Disks and managed disks metadata**](#)
View the lists of the asset, capacity, and configuration metadata for disks and managed disks.
- [**»Block device adapters metadata«**](#)
View the list of the asset, configuration, and capacity metadata for device adapters.
- [**»Block host adapters metadata«**](#)
View the list of the asset, configuration, and capacity metadata for host adapters.
- [**Enclosures metadata**](#)
View the list of the configuration metadata for block storage system enclosures.
- [**File storage system metadata**](#)
View the list of the asset, configuration, and capacity metadata for file storage systems.
- [**File system metadata**](#)
View the list of the asset, configuration, and capacity metadata for file systems.
- [**Fileset metadata**](#)
View the list of the asset, configuration, and capacity metadata for filesets.
- [**File shares metadata**](#)
View the list of the asset, configuration, and capacity metadata for file shares.
- [**File system pools metadata**](#)
View the list of the asset, configuration, and capacity metadata for file system pools.
- [**Network shared disks metadata**](#)
View the list of the asset, configuration, and capacity metadata for network shared disks.
- [**File nodes metadata**](#)
View the list of the asset, configuration, and capacity metadata for file nodes.
- [**Object storage systems metadata**](#)
View the lists of the asset, configuration, and capacity metadata for object storage systems and their internal resources.
- [**Switches metadata**](#)
View the list of the asset, configuration, and status metadata for switches.
- [**Fabrics metadata**](#)
View the list of the asset, configuration, and status metadata for fabrics.
- [**Groups metadata**](#)
View the lists of the asset, configuration, and capacity metadata for general groups, applications, and departments.
- [**Servers metadata**](#)
View the list of the asset, capacity, and configuration metadata for servers.

Block storage system metadata

View the list of the asset, configuration, and capacity metadata for block storage systems.

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored:

- Available Capacity (GiB) (Previously known as Available Pool Space)
- Available Written Capacity (GiB) (Previously known as Effective Available Capacity)
- Capacity (GiB) (Previously known as Pool Capacity)
- Compressed
- Compression Savings (%)
- Custom Tag 1, 2, 3
- Deduplication Savings (%)
- Data Collection
- Disks
- FC Ports

- Firmware
- FlashCopy®
- IP Address
- IP Ports
- Location
- Managed Disks
- Mapped Capacity (GiB) (Previously known as Assigned Volume Space)
- Model
- Name
- Overhead Capacity (GiB)
- Pools
- Ports
- Provisioned Capacity (%) (Previously known as Virtual Allocation)
- Provisioned Capacity (GiB) (Previously known as Total Volume Capacity)
- Raw Capacity (GB)
- Read Cache (GiB)
- Remote Relationships
- Reserved Volume Capacity (GiB) (Previously known as Unused Space)
- Safeguarded Capacity (GiB)
- Serial Number
- Shortfall (%)
- Time Zone
- Total Capacity Savings (%) (Previously known as Total Data Reduction Savings)
- Turbo Performance
- Type
- Unmapped Capacity (GiB) (Previously known as Unassigned Volume Space)
- Used Capacity (%) (Previously known as Physical Allocation)
- Used Capacity (GiB) (Previously known as Used Pool Space (GiB))
- Used Written Capacity (%) (Previously known as Effective Used Capacity)
- Used Written Capacity (GiB) (Previously known as Effective Used Capacity)
- VDisk Mirrors
- Vendor
- Volumes
- Write Cache (GiB)
- Written Capacity Limit (GiB) (Previously known as Effective Capacity)

Block volumes metadata

View the list of the asset, capacity, and configuration metadata for volumes.

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for block storage volumes.

- Auto Expand
- Available Capacity (%) (Previously known as Unallocated Space)
- Capacity (GiB)
- Compression Savings (%)
- Copies
- Copy ID
- Copy Relationship
- Easy Tier®
- Enterprise HDD Capacity (GiB)
- Enterprise HDD Capacity (%)
- Fast Write State
- Formatted
- Grain Size (KiB)
- Hosts
- I/O Group
- ID
- Last Data Collection
- Mirror Role
- Name
- Nearline HDD Capacity (GiB)
- Nearline HDD Capacity (%)

- Node
- Pool
- Provisioned Capacity (%) (Previously known as Virtual Allocation)
- RAID Level
- Reserved Volume Capacity (GiB)
- Safeguarded
- Safeguarded Capacity (GiB)
- Safeguarded Location
- SCM Capacity (GiB)
- SCM Capacity (%)
- Shortfall (%)
- SSD Capacity (GiB)
- Storage System
- Storage Virtualizer
- Tier 0 Flash Capacity (GiB)
- Tier 0 Flash Capacity (%)
- Tier 1 Flash Capacity (GiB)
- Tier 1 Flash Capacity (%)
- Tier 2 Flash Capacity (GiB)
- Tier 2 Flash Capacity (%)
- Thin Provisioned
- Tier Distribution (%)
- Unique ID
- Used Capacity (%)
- Used Capacity (%) (Previously known as Physical Allocation)
- Used Capacity (GiB) (Previously known as Allocated Space)
- Virtualizer Disk Type
- Virtualizer Disk
- Warning Level (%)
- Written Capacity (GiB) (Previously known as Written Space)

Block pools metadata

View the list of the asset, capacity, and configuration metadata for block storage pools.

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for storage pools:

- Activity
- Available Capacity (GiB) (Previously known as Available Pool Space)
- Available Repository Capacity (GiB)
- Available Soft Capacity (GiB)
- Available Written Capacity (GiB) (Previously known as Effective Available Capacity)
- Back-end Storage Disk Type
- Back-end Storage Disks
- Back-end Storage RAID Level
- Back-end Storage System Type
- Capacity (GiB)
- Compression Savings (%)
- Custom Tag 1, 2, 3
- Deduplication Savings (%)
- Easy Tier®
- Encryption
- Encryption Group
- Enterprise HDD Available Capacity (GiB)
- Enterprise HDD Capacity (GiB)
- Extent Size (MiB)
- Format
- Last Data Collection
- LSS or LCU
- Managed Disks
- Mapped Capacity (GiB) (Previously known as Assigned Volume Space)
- Name
- Nearline HDD Available Capacity (GiB)

- Nearline HDD Capacity (GiB)
- Overhead Capacity (GiB)
- Overprovisioned Capacity (GiB) (Previously known as Unallocatable Volume Space)
- Owner Name
- Provisioned Capacity (%) (Previously known as Virtual Allocation)
- Provisioned Capacity (GiB) (Previously known as Total Volume Capacity)
- RAID Level
- Rank Group
- Repository Capacity (GiB)
- Reserved Volume Capacity (GiB) (Previously known as Unused Space)
- Safeguarded Capacity (GiB)
- SCM Capacity (GiB)
- SCM Available Capacity (GiB)
- Shortfall (%)
- Soft Capacity (GiB)
- Solid State
- SSD Available Space (GiB)
- SSD Capacity (GiB)
- Status
- Storage System
- Tier
- Tier 0 Flash Capacity (GiB)
- Tier 0 Flash Available Capacity (GiB)
- Tier 1 Flash Capacity (GiB)
- Tier 1 Flash Available Capacity (GiB)
- Tier 2 Flash Capacity (GiB)
- Tier 2 Flash Available Capacity (GiB)
- Tier Distribution (%)
- Total Capacity Savings (%) (Previously known as Total Data Reduction Savings)
- Unmapped Capacity (GiB) (Previously known as Unassigned Volume Space)
- Unused Volume Capacity (%) (Effective Previously known as Unallocated Volume Space)
- Used Capacity (%) (Previously known as Physical Allocation)
- Used Capacity (GiB) (Previously known as Allocated Space)
- Used Written Capacity (%) (Previously known as Effective Used Capacity)
- Used Written Capacity (GiB) (Previously known as Effective Used Capacity)
- Volumes
- Written Capacity Limit (GiB) (Previously known as Effective Capacity)
- Zero Capacity

I/O groups, nodes, and ports metadata

View the lists of the asset, capacity, and configuration metadata for I/O groups, nodes, Fibre Channel (FC) ports, and IP ports.

I/O groups

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for I/O groups:

- Compression
- Enclosure
- Name
- Total FlashCopy® Memory (MiB)
- Total Mirroring Memory (MiB)
- Total Remote Copy Memory (MiB)
- Used Mirroring Memory (MiB)
- Used Remote Copy Memory (MiB)
- Volumes

Nodes

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for nodes:

- Compression
- Configuration node
- Enclosures
- FC ports
- I/O group
- IP address
- IP ports
- Model
- Name
- Panel name
- Serial number
- Spare nodes
- WWN

FC Ports

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for FC ports:

- Acknowledged
- Connected NPIV Ports
- Connected Port
- Connected Resource
- Connected WWPN
- FC Port ID
- Frame
- Host Adapter
- I/O Enclosure
- Location
- Name
- Protocol
- Speed (Gbps)
- Status
- WWPN

IP Ports

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for IP ports:

- Acknowledged
- Duplex
- Failover
- Gateway
- Host Attach
- IP Address
- IQN
- Management
- MTU
- Name
- Node
- Remote Copy Relationship
- Speed (Gbps)
- Status
- Storage Attach
- Storage System
- Subnet

Disks and managed disks metadata

View the lists of the asset, capacity, and configuration metadata for disks and managed disks.

Disks

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for disks:

- Capacity (GB)
- Capacity (GiB)
- Class
- Firmware
- Hardware
- Name
- Serial number
- Slot
- Spare
- Speed (RPM)
- Status
- Vendor

Managed Disks

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for managed disks:

- Active Quorum
- Available Capacity (GiB)
- Back-end Storage System
- Capacity (GiB)
- Class
- Easy Tier®
- »Easy Tier Load«
- Mode
- Name
- Pool
- RAID Level
- Storage System
- Volumes

Block device adapters metadata

View the list of the asset, configuration, and capacity metadata for device adapters.

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for device adapters.

- Name
- I/O Enclosure
- Frame
- Device Adapter Pair
- Location
- Serial number

Block host adapters metadata

View the list of the asset, configuration, and capacity metadata for host adapters.

Depending on the type of storage system, and the features that the storage system supports, some or all of the following metadata is collected and stored for host adapters.

- Name
- I/O Enclosure
- Frame

- Type
 - Associated ports
 - Speed
 - Speed
 - Location
 - Serial number
-

Enclosures metadata

View the list of the configuration metadata for block storage system enclosures.

Metadata about enclosures is collected for the following block storage systems:

- FlashSystem 9100
- FlashSystem V9000
- FlashSystem 900
- SAN Volume Controller
- IBM® Storwize® family

Depending on the type of storage system, some or all of the following metadata is collected and stored for enclosures:

- Canisters
- Canister status
- Disks
- Disk slots
- I/O groups
- Machine Type Model
- Name
- Nodes
- Power® supplies
- Power supply status
- Site
- Status

File storage system metadata

View the list of the asset, configuration, and capacity metadata for file storage systems.

Depending on the type of file storage system, and the features that the file storage system supports, some or all of the following metadata is collected and stored:

Restriction: Applies only to IBM® Storage Insights Pro.

- Available File System Capacity (GiB)
- Cluster
- Custom Tag 1, 2, 3
- Data Collection
- Disks
- External Pool Used Capacity (GiB)
- File System Capacity (%)
- File System Capacity (GiB) (Previously known as Total File System Capacity)
- IP Address
- Location
- Model
- Name
- Raw Capacity (GB)
- Serial Number
- Type
- Used File System Capacity (GiB)
- Vendor
- Version

File system metadata

View the list of the asset, configuration, and capacity metadata for file systems.

Depending on the type of file storage system, and the features that the file storage system supports, some or all of the following metadata is collected and stored:

Restriction: Applies only to IBM® Storage Insights Pro.

- Available Inodes
- Available Capacity (%)
- Capacity (%)
- Capacity (GiB) (Previously known as Total Capacity)
- Cluster
- Custom Tag 1, 2, 3
- File System Type
- Filessets
- Last Probe Time
- Maximum Inodes
- Name
- NSDs
- Path
- Physical Capacity (GiB)
- Pools
- Storage System
- Used Inodes
- Used Inodes (%)
- Used Capacity (GiB)

Fileset metadata

View the list of the asset, configuration, and capacity metadata for filessets.

Depending on the type of file storage system, and the features that the file storage system supports, some or all of the following metadata is collected and stored:

Restriction: Applies only to IBM® Storage Insights Pro.

- Cache Role
- Comment
- File System
- Home System Name
- Name
- Path
- State
- Used Capacity (GiB)

File shares metadata

View the list of the asset, configuration, and capacity metadata for file shares.

Depending on the type of file storage system, and the features that the file storage system supports, some or all of the following metadata is collected and stored.

Restriction: Applies only to IBM® Storage Insights Pro.

- Cluster
- Discovered Time
- Name
- Path
- Protocols
- Shared Servers
- State

- Storage System
 - Ticket
-

File system pools metadata

View the list of the asset, configuration, and capacity metadata for file system pools.

Depending on the type of file storage system, and the features that the file storage system supports, some or all of the following metadata is collected and stored:

Restriction: Applies only to IBM® Storage Insights Pro.

- Available Capacity (GiB)
 - Capacity (%)
 - Capacity (GiB) (Previously known as Total Capacity)
 - Cluster
 - External Used Capacity (GiB)
 - File System
 - Inactive Used Capacity (%)
 - Inactive Used Capacity (GiB)
 - Name
 - Storage System
 - Used Capacity (GiB)
-

Network shared disks metadata

View the list of the asset, configuration, and capacity metadata for network shared disks.

Depending on the type of file storage system, and the features that the file storage system supports, some or all of the following metadata is collected and stored about network shared disks:

Restriction: Applies only to IBM® Storage Insights Pro.

- Available Capacity (GiB)
 - Capacity (%) (Previously known as Disk Capacity)
 - Capacity (GiB) (Previously known as Total Disk Capacity)
 - Cluster
 - Correlated Storage Volume
 - Custom Tag 1, 2, 3
 - Failure Group
 - File System
 - ID
 - Name
 - Pool
 - Probe Time
 - Storage System
 - Type
 - Used Capacity (GiB)
-

File nodes metadata

View the list of the asset, configuration, and capacity metadata for file nodes.

Depending on the type of file storage system, and the features that the file storage system supports, some or all of the following metadata is collected and stored about file nodes.

Restriction: Applies only to IBM® Storage Insights Pro.

- Cache Gateway Node
- Cluster
- IP Address
- Name

- Role
 - Serial number
 - Storage System
 - Version
-

Object storage systems metadata

View the lists of the asset, configuration, and capacity metadata for object storage systems and their internal resources.

Some or all of the following metadata is collected and stored for object storage systems and their internal storage resources such as:

- Access pools
- Accesser® nodes
- Storage pools
- Slicestor® nodes
- Sites
- Vaults

Restriction: Applies only to IBM® Storage Insights Pro.

Storage systems metadata

- Access pools
- Available Capacity (GiB)
- Capacity (%), Capacity (GiB) (Previously known as Total Capacity)
- Containers
- Custom Tag 1, 2, 3
- Data Collection
- IP Address
- Location
- Name
- Objects
- Type
- Used Capacity (GiB)
- Vaults
- Vendor
- Version

Access pools metadata

- Mirrors
- Name
- Protocol
- Vaults
- Site

Accesses nodes metadata

- Access Pool
- IP Address
- Model
- Name
- Serial Number
- Site
- Software Version

Storage pools metadata

- Capacity (%), Capacity (GiB) (Previously known as Total Capacity)
- Name
- Sets

- Site
- Storage Pools
- Used Capacity (GiB)
- Vaults

Slicestor nodes metadata

- Available Capacity (GiB)
- Capacity (%), Capacity (GiB) (Previously known as Total Capacity)
- Drives
- IP Address
- Model
- Name
- Serial Number
- Set ID
- Site
- Software Version
- Storage Pool
- Used Capacity (GiB)

Sites metadata

- Access Nodes
- Accessibility
- Available Capacity (GiB)
- Capacity (%), Capacity (GiB) (Previously known as Total Capacity)
- Name
- Slicestor Nodes
- Used Capacity (GiB)
- Vaults

Vaults metadata

- Access Pools
- Accessibility, Capacity Quota (%)
- Creation Date
- Hard Quota (GiB)
- IDA
- Mirror
- Name
- Sites
- Soft Quota (GiB)
- Storage Pool
- Storage System
- Used Capacity (GiB)

Switches metadata

View the list of the asset, configuration, and status metadata for switches.

Depending on the type of switch, some or all of the following metadata is collected and stored for switches.

- Acknowledged
- Chassis
- Condition
- Connected Ports
- Custom Tag 1, 2, and 3
- Data Collection
- Domain ID
- Fabric
- Firmware
- IP Address

- Last Successful Monitor
 - Last Successful Probe
 - Links
 - Location
 - Mode
 - Model
 - Name
 - Performance Monitor Status
 - Probe Status
 - Ports
 - Principal Switch of Fabric
 - Serial Number
 - System UUID
 - Vendor
 - WWN
-

Fabrics metadata

View the list of the asset, configuration, and status metadata for fabrics.

Depending on the type of fabric, some or all of the following metadata is collected and stored for fabrics.

- Acknowledged
 - Active Zone Set
 - Condition
 - Connected Ports
 - Custom tag 1, 2, and 3
 - Fabric Type
 - Links
 - Location
 - Name
 - NPV Switches
 - Principal Switch of Fabric
 - Switches
 - Switch Ports
 - System UUID
 - WWN
-

Groups metadata

View the lists of the asset, configuration, and capacity metadata for general groups, applications, and departments.

Metadata for the resources in general groups, applications, and departments is also collected and stored. That metadata includes filter definitions for applications.

Restriction: Applies only to IBM® Storage Insights Pro.

General groups metadata

- Name
- Subgroups

Applications metadata

- Block Capacity (GiB)
- Custom Tag 1, 2, 3
- Departments
- File Capacity (GiB)
- Name
- Object Capacity (GiB)

- Servers
- Subtype
- Type
- Vaults
- Volumes

Accesses nodes metadata

- Access Pool
- IP Address
- Model
- Name
- Serial Number
- Site
- Software Version

Storage pools metadata

- Capacity (%), Capacity (GiB) (Previously known as Total Capacity)
- Name
- Sets
- Site
- Storage Pools
- Used Capacity (GiB)
- Vaults

Slicestor nodes metadata

- Available Capacity (GiB)
- Capacity (%), Capacity (GiB) (Previously known as Total Capacity)
- Drives
- IP Address
- Model
- Name
- Serial Number
- Set ID
- Site
- Software Version
- Storage Pool
- Used Capacity (GiB)

Sites metadata

- Access Nodes
- Accessibility
- Available Capacity (GiB)
- Capacity (%), Capacity (GiB) (Previously known as Total Capacity)
- Name
- Slicestor® Nodes
- Used Capacity (GiB)
- Vaults

Vaults metadata

- Access Pools
- Accessibility, Capacity Quota (%)
- Creation Date
- Hard Quota (GiB)
- IDA
- Mirror
- Name
- Sites

- Soft Quota (GiB)
- Storage Pool
- Storage System
- Used Capacity (GiB)

Servers metadata

View the list of the asset, capacity, and configuration metadata for servers.

Metadata is collected about servers, their disks and controllers, and the related storage resources, such as the volumes that they use.

The following metadata is collected and stored for servers:

- Custom Tag 1, 2, 3
- Domain Name
- Drive Capacity (GiB) (Previously known as Total Disk Space)
- IP Address
- Location
- Mapped SAN Capacity (GiB) (Previously known as Assigned SAN Space)
- Name
- OS Type
- Used SAN Capacity (GiB) (Previously known as Allocated SAN Space)

The following metadata is collected and stored for controllers:

- Associated Disks
- HBA WWN
- Name
- Type

The following metadata is collected and stored for disks:

- Capacity (GiB)
- Capacity (GB)
- Name
- Paths
- Serial Number
- Vendor

Performance metadata

The data collector collects and stores performance metadata for IBM® block storage systems and non-IBM block storage systems and it collects and stores file system and node performance metadata for IBM Spectrum Scale storage systems.

Performance metadata is collected and stored for the following IBM block storage systems and non-IBM block storage systems when they are added for monitoring:

Table 1. Block performance metadata by storage system

Storage System	IBM Storage Insights Pro	IBM Storage Insights
DS8000®	Yes	Yes
Dell EMC Unity	Yes	No
Dell EMC VMAX	Yes	No
Dell EMC VNX, VNXe	Yes	No
FlashSystem 5000	Yes	Yes
FlashSystem 5100	Yes	Yes
FlashSystem 7200	Yes	Yes
FlashSystem 9100	Yes	Yes
FlashSystem 9200	Yes	Yes
FlashSystem 900	Yes	Yes
FlashSystem A9000	Yes	Yes
FlashSystem A9000R	Yes	Yes

Storage System	IBM Storage Insights Pro	IBM Storage Insights
FlashSystem V9000	Yes	Yes
Hitachi VSP	Yes	No
IBM Spectrum Accelerate	Yes	Yes
NetApp ONTAP 9	Yes	No
Pure FlashArray//M and FlashArray//X	Yes	No
SAN Volume Controller	Yes	Yes
Storwize® V3500	Yes	Yes
Storwize V3700	Yes	Yes
Storwize V5000	Yes	Yes
Storwize V7000	Yes	Yes
Storwize V7000 Unified	Yes	Yes
XIV®	Yes	Yes

Node and file system performance metadata is also collected and stored for IBM Spectrum Scale storage systems.

Restriction: Applies to IBM Storage Insights Pro.

- [**Performance metadata for storage systems that run IBM Spectrum Virtualize**](#)

View the lists of the performance metadata for IBM SAN Volume Controller, IBM Spectrum Virtualize for Public Cloud, IBM Spectrum Virtualize as Software Only, IBM Storwize storage systems, and for IBM FlashSystem® devices that run IBM Spectrum Virtualize.

- [**Performance metadata for DS8000**](#)

View the lists of performance metadata for DS8000 storage systems.

- [**Performance metadata for XIV, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R**](#)

View the lists of performance metadata for XIV systems, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R.

- [**Performance metadata for IBM Spectrum Scale**](#)

View the lists of performance metadata for IBM Spectrum Scale storage systems.

- [**Performance metadata for Dell EMC Unity, VMAX, and VNX**](#)

View the lists of performance metadata for Unity, VMAX, and VNX storage systems.

- [**Performance metadata for Hitachi VSP storage systems**](#)

View the lists of performance metadata for Hitachi VSP F and G Series storage systems/>.

- [**Performance metadata for NetApp storage systems**](#)

View the lists of performance metadata for NetApp storage systems running ONTAP 9.

- [**Performance metadata for Pure Storage systems**](#)

View the list of performance metadata for Pure FlashArray//M and FlashArray//X.

- [**Performance metadata for switches**](#)

View the lists of the performance metadata for switches.

Performance metadata for storage systems that run IBM Spectrum® Virtualize

View the lists of the performance metadata for IBM® SAN Volume Controller, IBM Spectrum Virtualize for Public Cloud, IBM Spectrum Virtualize as Software Only, IBM Storwize® storage systems, and for IBM FlashSystem® devices that run IBM Spectrum Virtualize.

Overview

The performance metadata is divided into the following categories:

- [**Volume metadata**](#)
- [**Disk metadata**](#)
- [**Pool metadata**](#)
- [**Port metadata**](#)
- [**Node metadata**](#)

Volume metadata

The following key metadata is collected for volume performance:

- Data Rate (Read, Total, Unmap, Write)
- Overall Host Attributed Response Time Percentage

- Overall I/O Rate (Read, Total, Unmap, Write)
- Pool Activity Score
- Response Time (Overall, Read, Unmap, Write)
- Volume Utilization
- Write Cache Delay Percentage

The following I/O rate metadata is collected for volume performance:

- Transfer Rate (Cache-to-Disk, Disk-to-Cache)
- Unaligned Unmap I/O Rate
- Write-Cache Delay I/O Rate

The following cache hit percentage metadata is collected for volume performance:

- Overall I/O Cache Hits (Read, Total, Write)

The following response time metadata is collected for volume performance:

- Peak Response Time (Read, Unmap, Write)

The following remote mirror metadata is collected for volume performance:

- Global Mirror (Overlapping Write I/O Rate, Overlapping Write Percentage, Secondary Write Lag, Write I/O Rate)

The following volume cache metadata is collected for volume performance:

- Cache Hits (Dirty Writes, Read, Total, Write)
- I/O Rate (Destage, Read, Total, Write)
- Response Time (Destage, Stage)
- Transfer Rates (Cache-to-Disk, Disk-to-Cache)
- Write Delay Percentage (Flush-through, Total Delay, Write-through)
- Write Delay Rate (Flush-through, Total Delay, Write-through)
- Data Rate (Fast-Write Writes)

The following volume copy cache metadata is collected for volume performance:

- Cache Hits (Dirty Writes, Read, Read-ahead, Total, Write)
- I/O Rate (Destage, Prestage, Stage, Total)
- Response Time (Destage, Prestage, Stage)
- Transfer Rates (Cache-to-Disk, Disk-to-Cache)
- Write Delay Percentage (Flush-through, Total Delay, Write-through)
- Write Delay Rate (Flush-through, Total Delay, Write-through)
- Data Rate (Fast-Write Writes)

The following compression metadata is collected for volume performance:

- Compressed Volumes (Data Rate, I/O Rate, Response Time)
- Uncompressed Volumes (Data Rate, I/O Rate, Response Time)

The following miscellaneous metadata is collected for volume performance:

- Cache to Host Transfer Response Time
- Non-Preferred Node Usage Percentage
- Transfer Size (Overall, Read, Write)
- Unaligned Write I/O Rate

The following legacy cache metadata is collected for volume performance:

- Dirty Write Percentage of Cache Hits
- Write-Cache I/O Rate (Flush-through, Overflow, Write-through)
- Write-Cache Percentage (Flush-through, Overflow, Write-through)

Disk metadata

The following key metadata is collected for disk performance:

- Data Rate (Read, Total, Write)
- I/O Rate (Read, Total, Write)
- Response Time (Overall, Read, Write)

The following response time metadata is collected for disk performance:

- Peak Back-end Response Time (Read, Write)
- Peak Back-end Queue Time (Read, Write)
- Queue Time (Overall, Read, Write)

The following miscellaneous metadata for disk performance:

- Cache Destage (In-Flight I/O, Target I/O)
- Transfer Size (Overall, Read, Write)

Pool metadata

The following key metadata is collected for pool performance:

- Max Write Cache Fullness
- Write Cache Fullness

Port metadata

The following key metadata is collected for port performance:

- Data Rate (Receive, Send, Total)
- I/O Rate (Receive, Send, Total)

The following I/O rate metadata is collected for port performance:

- Port-to-Disk I/O Rate (Receive, Send, Total)
- Port-to-Host I/O Rate (Receive, Send, Total)
- Port-to-Local Node I/O Rate (Receive, Send, Total)
- Port-to-Remote Node I/O Rate (Receive, Send, Total)

The following data rate metadata is collected for port performance:

- Port-to-Disk Data Rate (Receive, Send, Total)
- Port-to-Host Data Rate (Receive, Send, Total)
- Port-to-Local Node Data Rate (Receive, Send, Total)
- Port-to-Remote Node Data Rate (Receive, Send, Total)

The following response time metadata is collected for port performance:

- Port-to-Local Node Response Time (Overall, Receive, Send)
- Port-to-Remote Node Response Time (Overall, Receive, Send)

The following error rate metadata is collected for port performance:

- Frame Errors (CRC Error Rate)
- Link Errors (Invalid Link Transmission Rate, Invalid Transmission Word Rate, Link Failure Rate, Primitive Sequence Protocol Error Rate, Loss of Signal Rate, Loss of Sync Rate)
- Port Congestion Index
- Port Protocol Errors (Port Send Delay I/O Percentage, Port Send Delay Time, Zero Buffer Credit Percentage, Zero Buffer Credit Timer)

The following miscellaneous metadata is collected for port performance:

- Port-to-Local Node Queue Time (Overall, Receive, Send)
- Port-to-Remote Node Queue Time (Overall, Receive, Send)

Node metadata

The following metadata is collected for node performance:

- Cache Fullness (Max Read Cache Fullness, Max Write Cache Fullness, Read Cache Fullness, Write Cache Fullness)
- Compression CPU Utilization (Core 1 to Core 8)
- CPU Utilization (Compression CPU, System CPU)
- Garbage Collection (Data Movement Rate, Data Rewrite Rate, Extent Collection Rate, New Address Write Rate, Reclaimable Capacity, Recovered Capacity Rate)
- Node Utilization by Node
- System CPU Utilization (Core 1 to Core 8)

Performance metadata for DS8000

View the lists of performance metadata for DS8000® storage systems.

Overview

The performance metadata is divided into the following categories:

- [Volume metadata](#)
- [Disk metadata](#)
- [Port metadata](#)

Volume metadata

The following key metadata is collected for volume performance:

- Cache Holding Time
- Data Rate (Read, Total, Write)
- Overall I/O Rate (Read, Total, Write)
- Pool Activity Score
- Response Time (Overall, Read, Write)
- Volume Utilization
- Write-Cache Delay Percentage

The following I/O rate metadata is collected for volume performance:

- Average Transfer Rate (Cache-to-Disk, Disk-to-Cache)
- High Performance FICON® (Read, Total, Write)
- Normal I/O Rate (Read, Total, Write)
- PPRC Transfer Rate
- Record Mode Read I/O Rate
- Sequential I/O Rate (Read, Total, Write)
- Write-Cache Delay I/O Rate

The following cache hit metadata is collected for volume performance:

- Normal I/O Cache Hits (Read, Total, Write)
- Overall I/O Cache Hits (Read, Total, Write)
- Record Mode Read Cache Hit Percentage
- Sequential I/O Cache Hits (Read, Total, Write)

The following average miscellaneous metadata is collected for volume performance:

- Average Transfer Size (Overall, Read, Write)
- HPF I/O Percentage
- Sequential I/O Percentage

Disk metadata

The following key metadata is collected for disk performance:

- Data Rate (Read, Total, Write)
- Disk Utilization Percentage
- I/O Rate (Read, Total, Write)
- Response Time (Overall, Read, Write)

The following transfer size metadata is collected for disk performance:

- Average Transfer Size (Overall, Read, Write)

Port metadata

The following key metadata is collected for port performance:

- Bandwidth (Overall, Receive, Send)
- Data Rate (Receive, Send, Total)
- I/O Rate (Receive, Send, Write)
- Port Utilization (Overall, Receive, Send)
- Response Time (Overall, Receive, Send)

The following I/O rate metadata is collected for port performance:

- FCP I/O Rate (Receive, Send, Total)
- FICON I/O Rate (Receive, Send, Total)

The following data rate metadata is collected for port performance:

- FCP Data Rate (Receive, Send, Total)
- FICON Data Rate (Receive, Send, Total)

The following response time metadata is collected for port performance:

- FCP Response Time (Overall, Send, Total)
- FICON Response Time (Overall, Send, Total)

The following error rate metadata is collected for port performance:

- Frame Errors (CRC Errors, Error Frame, Invalid Relative Offset Rate)
- Link Errors (Invalid Link Transmission, Invalid Transmission Words, Link Failures, Primitive Sequence Protocol Error Rate, Sequence Timeouts, Signal Loss, Sync Loss)
- Overload Errors (Extreme I/O Concurrency Percentage, I/O Busy Percentage, I/O Busy Rate, I/O Overrun Percentage, I/O Overrun Rate)
- Port Protocol Errors (Credit Recovery Link Resets, Duplicate Frames, Link Reset Received, Link Reset Transmitted, Out of Order ACK, Out of Order Data)
- Zero Receive Buffer Credit Percentage
- Zero Send Buffer Credit Percentage

The following remote mirror metadata is collected for port performance:

- PPRC Data Rate (Receive, Send, Total)
- PPRC I/O Rate (Receive, Send, Total)
- PPRC Response Time (Receive, Send)

The following transfer size metadata is collected for port performance:

- Average Transfer Size (Overall, Receive, Send)

Performance metadata for XIV, IBM Spectrum Accelerate, IBM FlashSystem A9000, and IBM FlashSystem A9000R

View the lists of performance metadata for XIV® systems, IBM Spectrum Accelerate, IBM FlashSystem® A9000, and IBM FlashSystem A9000R.

Overview

The performance metadata is divided into the following categories:

- [Volume metadata](#)
- [Port metadata](#)

Volume metadata

The following key metadata is collected for volume performance:

- Data Rate (Read, Total, Write)
- Overall I/O Rate (Read, Total, Write)
- Response Time (Overall, Read, Write)

The following cache hit metadata is collected for volume performance:

- Data Cache Hits (Overall, Read, Write)
- Overall I/O Cache Hits (Read, Total, Write)
- SSD Read Cache Hits (I/O, Data)

The following response time metadata is collected for volume performance:

- Cache Hit Response Time (Overall, Read, Write)
- Cache Miss Response Time (Overall, Read, Write)
- Response Time by Transfer Size (Small, Medium, Large, Very Large)
- SSD Read Cache Hit Response Time

The following miscellaneous metadata is collected for volume performance:

- Average Transfer Size (Overall, Read, Write)
- Data Transfer Size (Small, Medium, Large, Very Large)
- I/O Transfer Size (Small, Medium, Large, Very Large)
- Pool Activity Score
- Volume Utilization

Port metadata

The following I/O rate metadata is collected for port performance:

- I/O Rate (Receive, Send, Total)

The following data rate metadata is collected for port performance:

- Data Rate (Receive, Send, Total)

The following response time metadata is collected for port performance:

- Response Time (Receive, Send, Total)

The following miscellaneous metadata is collected for port performance:

- Bandwidth (Overall, Receive, Send)

Performance metadata for IBM Spectrum Scale

View the lists of performance metadata for IBM Spectrum Scale storage systems.

Overview

The performance metadata that is collected and stored is divided into these categories:

- [Node metadata](#)
- [File system metadata](#)

Node metadata

The following key metadata is collected for IBM Spectrum Scale cluster node performance:

- CPU Utilization (User, System, Total)
- Memory Used (Cache and Buffer, Total)
- I/O Rate (Read, Total, Write)

File system metadata

File system metadata is collected for these resources:

- File systems
 - IBM Spectrum Scale storage systems
- Tip: For a storage system, the metadata consists of summary values for all the file systems on the storage system.

The following file system performance metadata is collected:

- Data Rate (Read, Total, Write)
- I/O Rate (Read, Total, Write)
- Maximum Data Rate (Read, Total, Write)
- Maximum I/O Rate (Read, Total, Write)
- Response Time (Overall, Read, Write)

Performance metadata for Dell EMC Unity, VMAX, and VNX

View the lists of performance metadata for Unity, VMAX, and VNX storage systems.

Overview

Performance metadata is collected and stored for the following storage systems:

- [Unity storage systems](#)
- [VMAX storage systems](#)
- [VNX storage systems](#)

Restriction: For Dell EMC, performance metadata is available only for block storage systems.

Unity storage systems

The following performance metadata is collected and stored for Unity resources:

- [Volume metadata for Unity](#)
- [Disk metadata for Unity](#)
- [Port metadata for Unity](#)
- [Node metadata for Unity](#)
- [File system metadata for Unity](#)

Volume metadata for Unity

The following key metadata is collected for volume performance on Unity storage systems:

- Overall I/O Rate (Read, Write, Total)
- Transfer Size (Read, Write, Overall)
- Data Rate (Total)

The following cache hit metadata is collected for volume performance on Unity storage systems:

- Overall I/O Cache Hits (Read, Write, Total)

The following data rate metadata is collected for volume performance on Unity storage systems:

- Data Rate (Read, Write)

The following response time metadata is collected for volume performance on Unity storage systems:

- Response Time (Overall)

The following miscellaneous metadata is collected for volume performance on Unity storage systems:

- Transfer Size (Read, Write)

Disk metadata for Unity

The following key metadata is collected for disk performance on Unity storage systems:

- Overall I/O Rate (Read, Write, Total)
- Response Time (Overall)
- Data Rate (Read, Write, Total)
- Transfer Size (Read, Write, Overall)

Port metadata for Unity

The following key metadata is collected for port performance on Unity storage systems:

- Overall I/O Rate (Total)
- Data Rate (Send, Receive, Total)
- Transfer Size (Send, Receive, Overall)

The following I/O rate metadata is collected for port performance on Unity storage systems:

- I/O Rate (Send, Receive)

The following data rate metadata is collected for port performance on Unity storage systems:

- Data Rate (Send, Receive)

Node metadata for Unity

The following key metadata is collected for node performance on Unity storage systems:

- CPU Utilization (System CPU)

File system metadata for Unity

The following key metadata is collected for file system performance on Unity storage systems:

- Overall I/O Rate (Read, Write, Total)
- Data Rate (Read, Write, Total)
- Transfer Size (Read, Write, Overall)

VMAX storage systems

The following performance metadata is collected and stored for VMAX storage systems:

- [Volume metadata for VMAX](#)
- [Disk metadata for VMAX](#)
- [Port metadata for VMAX](#)

Volume metadata for VMAX

The following key metadata is collected for volume performance on VMAX storage systems:

- Data Rate (Read, Total, Write)
- Normal I/O Rate (Read, Total, Write)
- Overall I/O Rate (Read, Total, Write)
- Response Time (Overall, Read, Write)
- Sequential I/O Rate (Read, Total, Write)
- Volume Utilization

The following cache hit metadata is collected for volume performance on VMAX storage systems:

- Normal I/O Cache Hits (Read, Total, Write)
- Overall I/O Cache Hits (Read, Total, Write)
- Sequential I/O Cache Hits (Read, Total, Write)

The following transfer size metadata is collected for volume performance on VMAX storage systems:

- Average Transfer Size (Overall, Read, Write)

Disk metadata for VMAX

The following key metadata is collected for disk performance on VMAX block storage systems:

- Data Rate (Read, Total, Write)
- Disk Utilization Percentage
- I/O Rate (Read, Total, Write)

- Response Time (Overall)

The following transfer size metadata is collected for disk performance on VMAX block storage systems:

- Transfer Size (Overall, Read, Write)

Port metadata for VMAX

The following key metadata is collected for port performance on VMAX storage systems:

- Data Rate (Total)
- I/O Rate (Total)
- Response Time (Overall)
- Transfer Size (Overall)

VNX storage systems

The following performance metadata is collected and stored for VNX storage systems:

- [Volume metadata](#)
- [Disk metadata](#)
- [Port metadata](#)

Volume metadata for VNX

The following key metadata is collected for volume performance on VNX storage systems:

- Data Rate (Read, Total, Write)
- Overall I/O Rate (Read, Total, Write)

The following transfer size metadata is collected for volume performance on VNX storage systems:

- Average Transfer Size (Overall, Read, Write)

Disk metadata for VNX

The following key metadata is collected for disk performance on VNX storage systems:

- Data Rate (Read, Total, Write)
- I/O Rate (Read, Total, Write)

The following transfer size metadata is collected for disk performance on VNX storage systems:

- Transfer Size (Overall, Read, Write)

Port metadata for VNX

The following key metadata is collected for port performance on VNX storage systems:

- Data Rate (Total)
- I/O Rate (Total)
- Transfer Size (Overall)

Performance metadata for Hitachi VSP storage systems

View the lists of performance metadata for Hitachi VSP F and G Series storage systems/>.

The following performance metadata is collected and stored for Hitachi resources:

- [Volume metadata for Hitachi](#)
- [Port metadata for Hitachi](#)
- [Node metadata for Hitachi](#)

Volume metadata for Hitachi

The following key metadata is collected for volume performance on Hitachi storage systems:

- Overall I/O Rate (Read, Write, Total)
- Data Rate (Read, Write, Total)
- Response Time (Read, Write, Overall)
- Transfer Size (Read, Write, Overall)

The following cache hit metadata is collected for volume, pools, and storage systems performance on Hitachi storage systems:

- Overall I/O Cache Hits (Read, Write)

Port metadata for Hitachi

The following key metadata is collected for port performance on Hitachi storage systems:

- Overall I/O Rate (Total)
- Data Rate (Total)
- Response Time (Overall)
- Transfer Size (Overall)

Node metadata for Hitachi

The following key metadata is collected for node performance on Hitachi storage systems:

- CPU Utilization (System CPU)

Performance metadata for NetApp storage systems

View the lists of performance metadata for NetApp storage systems running ONTAP 9.

The following performance metadata is collected and stored for NetApp resources:

- [Volume metadata for NetApp](#)
- [Disk metadata for NetApp](#)
- [Port metadata for NetApp](#)
- [Node metadata for NetApp](#)
- [File system metadata for NetApp](#)

Volume metadata for NetApp

The following key metadata is collected for volume performance on NetApp storage systems:

- Overall I/O Rate (Read, Write, Total)
- Transfer Size (Overall)
- Data Rate (Total)

The following cache hit metadata is collected for volume performance on NetApp storage systems:

- Overall I/O Cache Hits (Read, Total)

The following data rate metadata is collected for volume performance on NetApp storage systems:

- Data Rate (Read, Write)

The following response time metadata is collected for volume performance on NetApp storage systems:

- Response Time (Read, Write, Overall)

The following miscellaneous metadata is collected for volume performance on NetApp storage systems:

- Transfer Size (Read, Write)

Disk metadata for NetApp

The following key metadata is collected for disk performance on NetApp storage systems:

- Overall I/O Rate (Read, Write, Total)
- Response Time (Overall)
- Data Rate (Read, Write, Total)
- Transfer Size (Read, Write, Overall)

The following response time metadata is collected for disk performance on NetApp storage systems:

- Response Time (Read, Write)

Port metadata for NetApp

The following key metadata is collected for port performance on NetApp storage systems:

- Overall I/O Rate (Total)
- Response Time (Send, Receive, Overall)
- Data Rate (Total)
- Transfer Size (Send, Receive, Overall)

The following I/O rate metadata is collected for port performance on NetApp storage systems:

- I/O Rate (Send, Receive)

The following data rate metadata is collected for port performance on NetApp storage systems:

- Data Rate (Send, Receive)

Node metadata for NetApp

The following key metadata is collected for node performance on NetApp storage systems:

- CPU Utilization (System CPU)

File system metadata for NetApp

The following key metadata is collected for file system performance on NetApp storage systems:

- Overall I/O Rate (Read, Write, Total)
- Response Time (Overall)
- Data Rate (Read, Write, Total)
- Transfer Size (Read, Write, Overall)

The following response time metadata is collected for volume performance on NetApp storage systems:

- Response Time (Read, Write)

Performance metadata for Pure Storage systems

View the list of performance metadata for Pure FlashArray//M and FlashArray//X.

Volume metadata for Pure

The following key metadata is collected for volume performance on Pure FlashArray//M and FlashArray//X.

- Overall I/O Rate (Read, Write, Total)
- Data Rate (Read, Write, Total)
- Response Time (Read, Write, Overall)

Performance metadata for switches

View the lists of the performance metadata for switches.

Overview

The performance metadata is divided into the following categories:

- [Key metadata](#)
- [I/O rates metadata](#)
- [Error rates metadata](#)
- [Port Protocol Errors metadata](#)
- [Link Errors metadata](#)
- [Miscellaneous metadata](#)

Key metadata

The following key metadata is collected for switch performance:

- Data Rate (Receive, Sent, Total)
- Bandwidth (Overall, Receive, Send)
- Other (Total Port Error Rate)

I/O rates metadata

The following I/O rate metadata is collected for switch performance:

- Frame Rate (Receive, Send, Total)

Error rates metadata

The following error rate metadata is collected for switch performance:

- Bad EOF CRC Error Rate
- CRC Errors
- Discarded Class 3 Frames
- Error Frames
- F_BSY Frames
- F-RJT Frames
- Long Frames
- Short Frames

Port Protocol Errors metadata

The following port protocol error metadata is collected for switch performance:

- Class 3 Receive Timeout Frame Rate
- Class 3 Send Timeout Frame Rate
- Credit Recovery Link Reset Rate
- Discarded Frames
- Link Reset Received
- Link Reset Transmitted
- Port Congestion Index
- Zero Buffer Credit Percentage
- Zero Buffer Credit Rate

Link Errors metadata

The following link error metadata is collected for switch performance:

- Encoding Disparity
- Invalid Link Transmission Rate
- Invalid Transmission Words
- Link Failures
- Primitive Sequence Protocol Errors
- Signal Loss

- Synch Loss

Miscellaneous metadata

The following miscellaneous metadata is collected for switch performance:

- Frame Size (Overall, Receive, Send)
 - Other (Link Quality Percentage)
-

FAQ

Find answers to frequently asked questions about IBM® Storage Insights.

The questions are categorized as follows:

- [Orders and subscriptions](#)
- [IBM Storage Insights Pro offering](#)
- [Get support](#)
- [Data collection](#)
- [User IDs, roles, and access](#)

Orders and subscriptions

How do I get IBM Storage Insights?

If you manage IBM block storage systems, but don't already have the *free* version of IBM Storage Insights, sign up today at <https://ibm.biz/insightsreg>.

With IBM Storage Insights, you get a unified view of a storage environment that includes diagnostic event information, an integrated support experience, and key capacity and performance metrics. It's also free and provides you with an easy path to try or buy IBM Storage Insights Pro, so why wait?

Is there a trial option available for IBM Storage Insights Pro?

Yes, if you already have IBM Storage Insights, you can easily activate a 60-day trial of IBM Storage Insights Pro. To start your trial, open IBM Storage Insights and click Unlock the full potential of IBM Storage Insights Pro at the top of the page.

See [Want to try or buy IBM Storage Insights Pro?](#).

What is the subscription duration and renewal options?

IBM Storage Insights Pro is a subscription-based license that is billed monthly, based on the amount of capacity that is being managed. The default subscription periods are 3, 6, 9, 12, or 24 months.

How do I know if I exceed the capacity that I'm entitled to manage?

From the Configuration menu in IBM Storage Insights Pro, click Managed Capacity to check how much capacity IBM Storage Insights Pro is currently managing and then check how much capacity you are entitled to manage in your Proof of Entitlement document. You are notified when you exceed your capacity limit and, you are charged for overage until the capacity that is managed drops to your licensed capacity limit.

To upgrade your license, go to your Products and services page on IBM Marketplace.

How do I renew my subscription?

Your subscription is automatically renewed, and you have the opportunity to change the subscription period at each renewal.

Subscription periods are 3, 6, 9, 12, and 24 months. If you want to change the subscription period, go to your Products and services page on IBM Marketplace or contact your IBM sales representative or Business Partner.

Can I transfer my subscription to other IBM products or offerings?

No, currently, you can't transfer credits from IBM Storage Insights Pro to other IBM products or offerings.

How do I cancel my subscription?

Go to your Products and services page on IBM Marketplace or notify your IBM representative or Business Partner 90 days before your subscription expires.

If I cancel my subscription, what happens to the data that was sent to IBM Storage Insights Pro?

Your data is deleted unless you renew your subscription within 15 days of the receipt of your cancellation.

How often is the service updated?

IBM is constantly improving the reliability, security, and capabilities of IBM Storage Insights and IBM Storage Insights Pro. To do that, planned updates are scheduled to occur about four times per year, or once per quarter.

See [Updates and maintenance for IBM Storage Insights](#).

How do I transfer the ownership of a subscription to another employee in the same company?

You can open an IBM Support case against IBM Storage Insights and request the change. See [Changing the owner of IBM Storage Insights](#).

IBM Storage Insights Pro offering

How much does IBM Storage Insights Pro cost?

Use our quick and easy pricing calculator to determine your cost. See <http://ibm.biz/insightspricing>.

What certification does IBM Storage Insights Pro have?

IBM Storage Insights Pro, on the basis of regular audits that are carried out by Bureau Veritas Certification Holding SAS, UKAS Management Systems, London, United Kingdom, has [ISO/IEC 27001 Information Security Management certification](#).

To find out about the security policies that are in place to collect, protect, and store the metadata that is collected for analysis, download the [IBM Storage Insights Security Guide](#).

How do I get started?

Download and install the data collector, and then specify the storage resources that you want to monitor and analyze in the GUI. The data collector works in the background, which allows you to focus on the data and analytics that are shown in IBM Storage Insights Pro.

Learn more [Downloading and installing data collectors](#).

What does IBM Storage Insights Pro do?

IBM Storage Insights Pro is a software as a service offering that provides you with the information that you need about the storage in your data center. You get insights that help you to reduce costs by reclaiming unused storage and by placing the right data on the right tiers. With IBM Storage Insights Pro, you can also rapidly detect storage availability and performance issues at the data center, storage system, and application level. The data that you collect not only provides insights into current capacity and space usage but, over time, provides insights into your future capacity needs.

Learn more [Gaining insights](#).

Can I manage multiple data centers with IBM Storage Insights?

You can download multiple data collectors to connect to storage systems located in different data centers and gain insights into the asset, capacity, and performance data that is collected and analyzed in IBM Storage Insights.

How many storage systems can I monitor with IBM Storage Insights?

Subject to licensed capacity restrictions, you can monitor as many storage systems as you want.

As the number of devices grows, the analysis might take more time to complete.

Can I export the data that is collected by IBM Storage Insights Pro to other IBM products?

This is not currently supported, but the data that is displayed in the tables can be manually exported into various file formats.

Do IBM Spectrum Control and IBM Storage Insights Pro work together ?

You can use IBM Storage Insights Pro to monitor storage systems that are not being managed by IBM Spectrum Control, but you can't share information between the IBM offerings or export information from one offering to the other offering.

Get support

Support is available for subscribers and for IBM Storage Insights users.

My IBM Storage Insights dashboard isn't working. How can I get help?

For information about how to get help, see [Getting support](#).

How do I get help for storage systems?

If you encounter issues with the IBM block storage systems that you're monitoring, you can create and update tickets and automatically upload logs directly in IBM Storage Insights and IBM Storage Insights Pro. You can also give IBM Support permission to collect and upload log packages for storage systems without contacting you every time.

See [Opening, updating, and tracking IBM Support tickets](#) and [Giving IBM Support permission to collect log packages](#).

Are there any online resources that I can use to help troubleshoot issues myself?

Yes. Multiple online resources are available to help you troubleshoot issues or learn more about the product. See [Getting support](#).

I need to comply with Health Insurance Portability and Accountability Act (HIPAA) regulations so my storage exists within a Blue Diamond Enhanced Secure Support environment. Can I use IBM Storage Insights to open tickets and upload logs for my storage devices?

You can open tickets and send packages for Blue Diamond customers. The packages will be sent to a secure/special ECuRep data store.

Can IBM Support access my data?

IBM Support can access metadata and collect support logs remotely if you have set the permissions to do so. IBM Support has read-only access to your data and IBM Storage Insights instance and can't change any of your settings.

See [Giving IBM Support permission to collect log packages](#).

Are there service description and agreement documents available for the offering?

- Service Description for IBM Storage Insights Pro: <https://www-03.ibm.com/software/sla/sladb.nsf/sla/sd-6951-04>
- IBM Cloud service agreement: <https://www.ibm.com/support/customer/csol/contractexplorer/cloud/csa/us-en/10>

Data collection

Do I need to prepare my environment before getting started with IBM Storage Insights?

Because IBM Storage Insights is an IBM Cloud service, getting started is a snap. However, every environment is different, so to ensure that your getting started experience goes smoothly, see this handy checklist for some hints and tips: [Before you begin](#)

[checklist for IBM Storage Insights](#)

What operating systems are supported for the data collector?

You can install the data collector on the following operating systems:

- Windows Server 2012 and later.
- The Linux® data collector runs on 64-bit Linux operating systems on x86-64 and PPC64LE systems only. The supported Linux operating systems for x86-64 are Red Hat® Enterprise Linux 7 and later versions and CentOS 7 and later versions. The supported Linux operating system for PPC64LE (POWER8® only) is Red Hat Enterprise Linux 7.x. The data collector on Linux PPC64LE has the additional limitation that you cannot monitor FlashSystem A9000, XIV®, IBM Spectrum Accelerate, and non-IBM devices.
Restriction: The data collector is not supported for Linux operating systems on IBM Power® systems (PPC64, Big Endian).
- POWER6® or later systems that use AIX® versions 7.x and later. The AIX data collector can run on a physical AIX installation or a logical partition (LPAR).

Tip: To avoid potential problems, ensure that the operating system on the server or virtual machine where you install the data collector has general or extended support for maintenance and security.

Important: IBM support for AIX version 7.1 on POWER6 systems ends in April 2023. At that point, IBM Storage Insights will no longer support deploying data collectors to those platforms. It's strongly recommended that you deploy your data collectors to supported versions of AIX and POWER® systems. For more information about end of support for AIX versions, [AIX support lifecycle information](#).

What data does IBM Storage Insights collect? How is it used?

IBM Storage Insights collects two types of data: metadata for storage systems and diagnostic data for support logs.

Metadata for storage systems

The following metadata about your storage systems is collected regularly and streamed to IBM Storage Insights:

- Information about the status of a storage system and its internal resources.
- Information about the configuration of a storage system, such as name, firmware, and capacity.
- Information about the internal resources of a storage system, such as volumes, pools, nodes, ports, and disks. This information includes the names and the configuration and capacity metrics for each internal resource.
- Information about the performance of storage system resources and internal resources such as pools and volumes.

This metadata is never stored locally, and is encrypted with 128-bit encryption while streaming and 256-bit encryption while at rest. For more information about the metadata that is collected and how it's used, check out the [IBM Storage Insights Security Guide](#).

Diagnostic data for support logs

Support logs for your IBM block storage systems are only collected when a support ticket is open and you request it. The logs include diagnostic information so that IBM Support can more efficiently and quickly investigate and close tickets. In Blue Diamond environments, support logs are sent to a secure ECuRep data store, just as if you were to do it manually.

Important: IBM Storage Insights can't access the actual application data that is stored on your storage systems.

What is involved in downloading data collectors?

Data collectors are downloaded as compressed files that can be extracted and installed on any server that runs Windows, Linux, or AIX operating systems or virtual machines that have access to both the internal SAN attached infrastructure as well as access to the internet to communicate with the cloud portal.

See [Downloading and installing data collectors](#).

What compute, network, and memory resources do data collectors use?

The data collector is a light-weight application. On the server or virtual machine where you install the data collector, you must provide at least 1 GB of RAM and 3 GB of disk space.

[Learn more about how disk space is used during service outages](#).

How can I configure the data collector to use a proxy server?

You can specify whether you want to connect to a proxy server when you install the data collector. You can also add the user's credentials to authenticate with the proxy server.

See [Adding or changing the connection to the proxy server](#).

What do I need to configure on my firewall to enable the data collector to access the IBM cloud?

If you do not have a proxy server, then ensure that the default HTTPS port 443 is open on the firewall. You should not need to configure it for the FQDN.

Tip: If a firewall exists between the data collector and the storage systems that it monitors, configure the firewall to allow SNMP traffic.

Can I get a new data collector if something happens to my current data collector?

If the data collector is deleted or otherwise stops operating, IBM Storage Insights Pro will be unable to gather any new information. Information that has already been collected by IBM Storage Insights Pro will be kept. To restart the data collection, download a data collector and reinstall it.

How will I know if a data collector stops working?

You will get an email and a message is shown at the bottom of the page of the GUI. To check the status of the data collector, you can click Configuration >...Data Collectors.

Learn more [Resolving connection issues](#).

How do I uninstall the data collector from a server and install it on a different server?

To uninstall the data collector, log in as Administrator on Windows operating systems or as a user with root privileges on AIX or Linux operating systems. After you uninstall, remove the data collector entry in the GUI. You must log in to the GUI as Administrator.

To install the data collector, choose an operating system, copy or download the data collector to the server where you want to install it, extract the data collector, and then add the storage systems that you want to monitor.

See [Removing and uninstalling data collectors](#) and [Downloading and installing data collectors](#).

When I add a storage system, I provide user credentials and an IP address for that storage system so IBM Storage Insights can collect metadata about it. Is that information stored onsite at my location or is it storage in the IBM Cloud?

The user credentials and IP addresses that you provide for connecting to a storage system are encrypted and stored securely in the IBM Cloud instance for IBM Storage Insights. To collect metadata for the storage system, that information is transmitted over a secure channel to the locally installed data collector. The information is never stored on the host where the data collector is installed; it exists temporarily in the application memory for the data collector only.

Do the user credentials (user name and password) that I provide for connecting to a storage system have any special requirements?

Yes. The role or user group that is assigned to the user name must have the appropriate privileges to collect configuration, capacity, and performance metadata about the storage system. The type of storage system and the metadata that you want to collect determine the privileges that are required.

Learn more [User roles for collecting metadata from storage systems](#).

How often can I collect performance metadata for the storage resources that I monitor with IBM Storage Insights Pro?

The performance metadata for IBM storage systems that manage block storage is automatically collected every five minutes and the performance metadata for Dell EMC storage systems that manage block storage is automatically collected every fifteen minutes.

For IBM Spectrum Scale storage systems that are enabled to collect performance metadata for file storage, the collection schedule can be configured when or after the storage system is added. The intervals that can be selected for collecting performance metadata are every 5, 10, 15, 20, 30 or 60 minutes.

Do I need to back up my metadata on-premises in case a restore is required?

No, and it's not necessary. A backup of all IBM Storage Insights metadata is automatically stored in the ISO-certified IBM cloud in the unlikely event that a restore is required.

Can I create different views of the dashboard?

Yes. If you have the Administrator role in IBM Storage Insights, you can create dashboards to selectively monitor specific storage systems in your environment. For example, you might want a dashboard for each of your data centers that monitors all of the storage systems in the data center and another dashboard for your production systems.

If you don't have an Administrator role, contact a person within your organization who has that role to help create a custom dashboard for you.

See [Creating customized dashboards to monitor your storage](#) and [Adding and removing users](#).

How can I add a DS8000® storage system that uses SSL Version 3 or earlier versions or that use MD5 signed certificates?

See [Adding DS8000 storage systems that use SSLv3 and MD5 signed certificates](#).

User IDs, roles, and access

Why do I need an IBM ID? How do I get one?

You need an IBM ID and password to log in to IBM Storage Insights or the [IBM Support portal](#). To register for an IBM ID, complete the following steps:

1. Go to [Create your IBM account](#). The My IBM registration form is displayed.
2. Complete the form, create a password, and click Continue.
3. Review the information about email and communications. Check the boxes if appropriate.
4. Click Submit. You can now log in to IBM Storage Insights or the IBM Support portal with your IBM ID.

Tip: Your IBM ID is also your passport to IBM applications, services, communities, support, online purchasing, and more. The information that you provide is maintained and kept in a secure location. If you have any questions about IBM IDs, review the [Help and FAQ for IBMids](#).

Who is notified when there are issues with the data collectors?

By default, only the subscriber is notified. The subscriber can open a ticket to remove themselves from the notification list. The subscriber can also open a ticket to add or remove other email addresses from the subscription list.

How do I control access to IBM Storage Insights?

By default, only the initial subscriber is authorized to use IBM Storage Insights Pro. To add or remove users and assign roles to users, go to your Products and services page. Alternatively, you can go to the [IBM Storage Community](#) or contact IBM Support at [IBM Marketplace](#). To assign a role, you must provide, the IBM ID of the user, the user's user name, the email address of the user, and the type of role you want to assign to the user.

Can I control the information that is visible to specific users?

No, currently all users are able to view all of the information that is shown in IBM Storage Insights Pro.

Related reference

- [Supported devices in IBM Storage Insights](#)
- [IBM Storage Insights vs IBM Storage Insights Pro](#)
- [Getting support](#)

Related information

- [IBM Marketplace FAQ](#).

Troubleshooting

Find solutions to common problems that you might encounter in IBM® Storage Insights.

- [Getting started troubleshooting](#)
Find answers to questions that you might have when you're getting started with IBM Storage Insights.
- [General troubleshooting](#)
Find solutions to common problems that you might encounter when you use IBM Storage Insights.
- [Getting support](#)
Explore the support options and self help resources for IBM Storage Insights.

Related reference

- [FAQ](#)
- [Getting support](#)

Getting started troubleshooting

Find answers to questions that you might have when you're getting started with IBM® Storage Insights.

- [Getting started troubleshooting](#)
- [Troubleshooting a Windows installation](#)
- [Troubleshooting an AIX or Linux installation](#)
- [Troubleshooting a data collector upgrade](#)

Getting started troubleshooting

Table 1. Troubleshooting at the start

Problems and questions	Answers
I don't know the URL of my dashboard and can't find the Welcome email.	<p>Go to https://myibm.ibm.com/dashboard/ and log in with your IBM ID. If you're the owner of the IBM Storage Insights instance, the URL is shown on the page.</p> <p>The dashboard URL is also included in the Welcome email that was sent when you signed up for IBM Storage Insights. To find the Welcome email, go to your email inbox and search for emails that were sent by the following email addresses:</p> <ul style="list-style-type: none">• IBM Storage Insights: sidevops@de.ibm.com• IBM Storage Insights Pro: sistar@us.ibm.com (Storage Insights Welcome/Dallas/IBM)
My organization has security concerns about using a cloud service to monitor and collect metadata about our storage.	<p>Because IBM Storage Insights is an IBM Cloud® offering, protecting information about your storage is critical. Key highlights:</p> <ul style="list-style-type: none">• ISO/IEC 27001 ISM certified• Communication is one way, encrypted and compressed• Data at rest is AES 256-bit encrypted• Only metadata about your storage is collected• Personal, identity, and application data are never accessed <p>Need more information about security? See the IBM Storage Insights Security Guide [PDF]. For a 1-page security overview, see the IBM Storage Insights Fact Sheet.</p>

Problems and questions	Answers
I don't know which operating systems are supported by the data collector.	<p>You can install the data collector on the following operating systems:</p> <ul style="list-style-type: none"> • Windows Server 2012 and later. • POWER6® or later systems that use AIX® versions 7.x and later. The AIX data collector can run on a physical AIX installation or a logical partition (LPAR). • The Linux® data collector runs on 64-bit Linux operating systems on x86-64 and PPC64LE systems only. The supported Linux operating systems for x86-64 are Red Hat® Enterprise Linux 7 and later versions and CentOS 7 and later versions. The supported Linux operating system for PPC64LE (POWER8® only) is Red Hat Enterprise Linux 7.x. The data collector on Linux PPC64LE has the additional limitation that you cannot monitor FlashSystem A9000, XIV®, IBM Spectrum Accelerate, and non-IBM devices. <p>Restriction: The data collector is not supported for Linux operating systems on IBM Power® systems (PPC64, Big Endian).</p>
I don't know the requirements for the data collector.	<ul style="list-style-type: none"> • Deploy data collectors on any server or virtual machine that has access to both the internal SAN-attached infrastructure and access to the internet to communicate with IBM Cloud. • Deploy data collectors on a server or virtual machine that is located in the VLAN used for SAN switch and storage management within your environment. You can also deploy a data collector in a VLAN where routing is configured to allow it access across VLANs. • On the server or virtual machine, you must provide at least 1 GB of RAM and 3 GB of disk space. • Ensure that the operating system where you install the data collector has general or extended support for maintenance and security fixes. <p>Important: It's recommended that you do not install a data collector on a laptop or personal workstation. Shutting down a laptop or personal workstation or putting it into sleep mode will interrupt data collection. The server or virtual machine where you install a data collector must be available 24X7.</p>
Can I install more than one data collector?	<p>You can install multiple data collectors to fail over to another data collector when a metadata collection fails or to optimize the metadata collection from data centers in different locations.</p> <p>See Metadata collection with multiple data collectors.</p>
How do I download the data collector?	<p>In the IBM Storage Insights GUI, go to Configuration > Data Collectors, and click your operating system to download the data collector compressed file.</p>
<ul style="list-style-type: none"> • I can't install the data collector on my target server. • My antivirus software is preventing me from installing the data collector. 	<ul style="list-style-type: none"> • You must provide at least 1 GB of RAM and 3 GB of disk space on each server or virtual machine, in addition to the disk space that is required to install the data collector. • Configure your antivirus software product on the server or virtual machine where you install the data collector to allow new executable files to be created in its installation directory. If your antivirus software is set on the maximum mode, it might prevent some of your changes from being accepted.
My data centers are behind a firewall and I'm having trouble configuring data collectors to communicate with IBM Storage Insights.	<ul style="list-style-type: none"> • Allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). To connect to your instance of IBM Storage Insights from the data collector, your firewall must be configured to allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). The User Datagram Protocol (UDP) is not supported. • If a firewall exists between the data collector and the storage systems that it monitors, configure the firewall to allow SNMP traffic.
<ul style="list-style-type: none"> • Information about my storage systems isn't showing up in the IBM Storage Insights dashboard. • IBM Storage Insights can't communicate with the data collector. 	<p>To connect to your instance of IBM Storage Insights from the data collector, your firewall must be configured to allow outbound communication on the default HTTPS port 443 using the Transmission Control Protocol (TCP). The User Datagram Protocol (UDP) is not supported.</p>

Problems and questions	Answers
<ul style="list-style-type: none"> I can't add storage systems for monitoring. What TCP/IP ports are used by IBM Storage Insights? What are the ports used by the data collector to connect with storage systems? Are there any specific IP ports that must be open to give the data collector access to storage? 	<ul style="list-style-type: none"> To collect metadata, the data collector connects to specific ports on your storage systems. To find out which ports must be open in your internal network, see Ports for collecting metadata from storage systems. You must deploy data collectors on a server or virtual machine that is located in a VLAN that can access any other VLANs where your storage is located.

Troubleshooting a Windows installation

If you install data collectors on servers or virtual machines that run Windows Server 2012 and later, keep in mind the following information.

Table 2. Troubleshooting a Windows installation

Problems and questions	Answers
Are there any special directory requirements for the data collector?	<ul style="list-style-type: none"> The directory must be on a local system disk that is available at system startup time and is not associated with a Windows user profile, home directory, or network share. Directory names must not include these special characters: % & ! () { } [] ; , ' ` ^ = \$ # ~ + @ \ / : * ? " < > The number of characters, which includes the number of characters in the path and in the file name, must not exceed 256 characters.
I don't know what script to run to install the data collector.	After you extract data collector .zip file, here are some key files for you to use: <ul style="list-style-type: none"> The readme file with instructions for installing the data collector. The batch file for installing the data collector: installDataCollectorService.bat.
<ul style="list-style-type: none"> I'm trying to run the installation script but it keeps failing. Do I need any special authority to install the data collector? 	To install the data collector, you must run installDataCollectorService.bat as an administrator. To run the batch file as an administrator, you can use the following methods: <ul style="list-style-type: none"> Windows explorer: Locate the file with Windows Explorer, right-click it, and click Run as administrator. Command prompt: Press Windows key+R to open the Run window, type cmd, and press Ctrl+Shift+Enter to run the command prompt as an administrator. To view all the steps for installing a data collector on Windows, see Installing data collectors on Windows .

Troubleshooting an AIX or Linux installation

If you install data collectors on servers or virtual machines that run AIX or Linux, keep in mind the following information.

Table 3. Windows checklist

Problems and questions	Answers
Are there any special directory requirements for the data collector?	<ul style="list-style-type: none"> Directory names must not include special characters such as these: % & ! () { } [] ; , ' ` ^ = \$ # ~ + @ \ / : * ? " < > The number of characters, which includes the number of characters in the path and in the file name, must not exceed 256 characters.
I don't know what script to run to install the data collector.	After you extract data collector .gz file, here are the key files for you to use: <ul style="list-style-type: none"> The readme file with instructions for installing the data collector. The script file for installing the data collector: installDataCollectorService.sh.

Problems and questions	Answers
<ul style="list-style-type: none"> I'm trying to run the installation script but it keeps failing. Do I need any special authority to install the data collector? 	<p>To install the data collector, you must have root authority on the server or virtual machine where you run <code>installDataCollectorService.sh</code>.</p> <p>To view all the steps for installing a data collector on AIX or Linux, see Installing data collectors on AIX or Linux.</p>

Troubleshooting a data collector upgrade

Table 4. Troubleshooting a data collector upgrade

Problems and questions	Answers
The data collector upgrade failed and IBM Storage Insights can't communicate with the data collector.	<p>The data collector is offline. It's likely that a problem on the server or virtual machine where the data collector is installed caused the upgrade to fail. Complete the following steps to resolve the issue:</p> <ol style="list-style-type: none"> Fix the problem on the server or virtual machine. For example, if your antivirus software is set on the maximum mode, it might prevent some of your changes from being accepted. Configure the antivirus software on the target server or virtual machine to allow new executable files to be created in the installation directory of the data collector. Follow the steps in Resolving upgrading issues to uninstall the current version of the data collector and deploy the latest version.
The data collector upgrade failed to download to the server or virtual machine.	<p>Ensure that there is enough space on the server where the data collector is deployed. You must provide at least 3 GB of disk space on the server, in addition to the disk space that is required to install the data collector. Then, retry the upgrade manually on the Data Collectors page.</p> <p>See Upgrading data collectors manually.</p>

Need more help?

If you're still encountering problems, IBM is here to help. Check out these resources:

- Connect directly with experts in the [IBM Storage Community](#).
- Open a support ticket on the IBM Support portal at <https://www.ibm.com/mysupport/>.

For a complete directory of help options, see [Getting support](#).

Related reference

- [FAQ](#)

General troubleshooting

Find solutions to common problems that you might encounter when you use IBM® Storage Insights.

Problems and questions	Answers
I am not sure my environment is ready for IBM Storage Insights. Is any information available for me to prepare?	For a handy checklist on how to get ready for IBM Storage Insights, see Before you begin checklist for IBM Storage Insights .
My IBM Storage Insights dashboard is not working.	For instructions about how to get help, see Getting support .
I received a notification to upgrade my data collectors, but I am having trouble completing the upgrade.	If you run into issues when you try to upgrade data collectors, you might need to download and install the latest version. For instructions, see Resolving upgrading issues .

Problems and questions	Answers
What does the "Degraded" status mean for data collection?	<p>A "Degraded" status means that configuration, capacity, or performance metadata is being collected, but that metadata might not be up-to-date or warning messages were generated when it was being collected. In some cases, when you first add storage systems for monitoring, this condition might occur.</p> <p>Wait until the data collection completes and recheck the status. If the Degraded status persists, restart the data collection.</p>
Data is not being collected for my device.	A number of reasons might cause data collection to be interrupted for a device. To view some quick steps about how to start up data collection again, go to Resolving connection issues .
Log packages that are created for storage systems that run IBM Spectrum Virtualize sometimes not getting added to Enhanced Customer Data Repository (ECuRep).	If the file system is full on a storage system that runs IBM Spectrum Virtualize, the storage system cannot package the individual log files together to create a log package. Delete older state save log files from the storage system so that the log package can be created.
A problem occurred on a storage system that I am monitoring with IBM Storage Insights and I want to report the problem.	<p>If you encounter issues with the IBM block storage systems that you're monitoring, you can create and update tickets and automatically upload logs directly in IBM Storage Insights. You can also give IBM Support permission to collect and upload log packages for storage systems without contacting you every time.</p> <p>See Opening, updating, and tracking IBM Support tickets and Giving IBM Support permission to collect log packages.</p>
<p>I am seeing one of the following when I am running performance monitoring on my Hitachi VSP storage systems:</p> <ul style="list-style-type: none"> • Data gaps in my performance charts • "Performance monitor status is failed". 	<p>When the Hitachi Service Processor is busy with configuration changes or the system that is running the Hitachi Export Tool is slow, you might experience timeouts and performance monitor failures from the data collector server.</p> <p>If possible, try placing the Hitachi Export Tool on a faster machine.</p>
<ul style="list-style-type: none"> • The current owner of the IBM Storage Insights instance left my company and I need to transfer ownership to a different ID. • The user ID and the email address of the IBM Storage Insights instance owner does not match. How can I change it so that they match? 	<p>If you are a subscriber, you can open an  IBM Support case and provide the following information so that the new subscriber can be added:</p> <ul style="list-style-type: none"> • First name and surname • Phone number • Company name • Country • IBM ID and email address <p>You can also state whether access to IBM Support and IBM Storage Insights is to be revoked for the original owner of the subscription and whether the IBM ID of the original owner of the subscription is to be removed from the company's account.</p> <p>For instructions on how to open a case, see Getting support.</p>
IBM Storage Insights is down for maintenance	<p>IBM is constantly improving the reliability and security of IBM Storage Insights. If an unscheduled update is required to address an urgent situation, a page is displayed that describes the cause of the update and the expected duration of any service interruptions. In cases where IBM Storage Insights becomes temporarily unavailable, rest assured that the IBM team is working hard to bring the service back online quickly.</p> <p>To view information about updates to IBM Storage Insights, see Updates and maintenance for IBM Storage Insights.</p>

Problems and questions	Answers
HTTP error code 404 (page not found) is shown when I try to access IBM Storage Insights	<p>The 404 error might be caused by one of the following problems:</p> <p>The page cannot be found because of an error in the URL Ensure that the URL is correct for your IBM Storage Insights service. You can check the URL on your IBM products and services page.</p> <p>If you are the original owner of the service, the Welcome email that you received when you signed up includes the link to your service. To find the Welcome email in your email inbox, search for emails that were sent by the following email addresses:</p> <ul style="list-style-type: none"> • IBM Storage Insights: sidevops@de.ibm.com • IBM Storage Insights Pro: sistart@us.ibm.com (Storage Insights Welcome/Dallas/IBM) <p>Your IBM Storage Insights service is not ready If you are new to IBM Storage Insights and just received the Welcome email, we might still be busy creating your service. Try again in a few minutes.</p> <p>Your service was canceled because you did not activate it by deploying a data collector You can create another service by registering again for IBM Storage Insights at https://www.ibm.com/it-infrastructure/storage/storage-insights/registration.</p>
After a IBM Storage Insights outage I have gaps in my performance data.	Ensure you have enough space available for data collection. Check that the value of the cacheMaxTotalSpaceMiB property in the custom.properties file is set to a large enough amount to store the performance data that is gathered during the outage. For more information, see Learn more about installing data collectors .

»

Troubleshooting switches and chassis

Problems and questions	Answers
I am not able to add a chassis to IBM Storage Insights	<p>Before you add the chassis, verify the following check points:</p> <ul style="list-style-type: none"> • Ensure that the chassis meets the hardware and software requirements. • Check that the user account has the essential properties. • If you are adding Cisco chassis, check that NX-API is enabled. • If you are adding Brocade switches, check that the user has chassis role and Logical Fabrics list 1-128. • Ensure that the protocol and port number are matching with your requirement. <ul style="list-style-type: none"> ◦ Brocade chassis can enable either HTTPS or HTTP, but not both. Enabling HTTPS disables HTTP automatically. ◦ Cisco configures HTTPS when the NX-API feature is enabled. You can also enable HTTP. • If you attempt to add a chassis that is shown in the IBM Storage Insights with Not Monitored condition, the add chassis action fails. Instead use the Configure Data Collection action on the chassis page to configure data collection for Not Monitored chassis. <p>For more instructions, see Configuring Brocade switches for monitoring for adding Brocade switches and Planning for Cisco switches and fabrics for adding Cisco switches.</p>

Problems and questions	Answers
<p>I am able to see my chassis in the IBM Storage Insights, but in Not Monitored condition. How can I get my chassis in monitored condition?</p>	<p>If your chassis is showing in Not Monitored condition, you cannot add the same chassis to IBM Storage Insights again. You cannot start the data collection on that chassis. Instead use the Configure Data Collection action on the chassis page to configure data collection for Not Monitored chassis.</p> <p>If the issue is not resolved, verify the following check points:</p> <ul style="list-style-type: none"> • Ensure that the chassis meets the hardware and software requirements. • Check that the user account has the essential properties. • If you are adding Cisco chassis, check that NX-API is enabled. • If you are adding Brocade switches, check that the user has chassis role and Logical Fabrics list 1-128. • Ensure that the protocol and port number are matching with your requirement. <ul style="list-style-type: none"> ◦ Brocade chassis can enable either HTTPS or HTTP, but not both. Enabling HTTPS disables HTTP automatically. ◦ Cisco configures HTTPS when the NX-API feature is enabled. You can also enable HTTP. • If a chassis is discovered through an added chassis, but has different user credentials, port or protocol settings than the connected chassis, use Configure Data Collection action on the chassis page and enter the correct port, protocol, and user credentials. • Make sure the changes to the NX-API configuration of Cisco switch is saved by using copy command before the switch is rebooted. • If the Cisco chassis is configured to run NX-API with HTTPS on port 443, it creates a conflict with the web server that runs on the same port. So, do not use the port 443. Use another unused port number.

«

Getting support

Explore the support options and self help resources for IBM® Storage Insights.

Getting help for IBM Storage Insights

IBM Support is located in countries across the world to better assist you if you encounter issues in IBM Storage Insights, including locations in the United States, Germany, France, and India. To contact IBM Support for help and report issues, complete these steps:

1. [Open a support case*](#) against IBM Storage Insights. When you are prompted to enter a product name, type Storage Insights to help auto complete the field.
2. Describe the problem. Include the following information:
 - The URL of your IBM Storage Insights instance.
 - Your Direct Access Code (DAC) number. If you are in the United States and are eligible for IBM Premium Support services, include your DAC number so IBM Support can best assist you with the case.
3. Submit the case.

* You must have an IBM ID to log in to the IBM Support portal and IBM Storage Insights. If you don't have an IBM ID, go to [Create your IBM account](#) and complete the form.

Videos: The IBM Support portal is supported by IBM Watson® and provides you with enhanced transparency into ticket resolution workflow and improved self-service options. Watch a few short videos to learn more:

- [Introducing A New Customer Portal](#)
- [Open And Manage Cases](#)
- [IBM Support Community: Search](#)
- [IBM Support Community: Forums](#)

Getting help for storage systems

If you encounter issues with the IBM block storage systems that you're monitoring, you can create and update tickets and automatically upload logs directly in the IBM Storage Insights interface. You can also give IBM Support permission to collect and upload log packages for storage systems without contacting you every time.

- [Opening, updating, and tracking IBM Support tickets](#)
- [Giving IBM Support permission to collect log packages](#)

Viewing self-help resources

Use the following resources to learn about and help troubleshoot issues that you might encounter in IBM Storage Insights:

↳ [IBM Support community](#)

Connect, learn, and share with storage management experts and other IBM Storage Insights users.

↳ [Security Guide](#)

Learn about the security and data collection features of IBM Storage Insights.

[FAQ](#)

View answers to common questions about IBM Storage Insights.

[Social media](#)

Watch videos and read blogs to learn more about how to use IBM Storage Insights to monitor and manage your storage environment.

- [Subscribing to IBM announcements](#)

Subscribe to My Notifications to be notified automatically of IBM announcements such as security bulletins and flashes for IBM Storage Insights.

- [Collaborating with the team](#)

Collaborate with the IBM Storage Insights team to help improve the product.

Related reference

- [IBM Storage Insights](#)
-

Subscribing to IBM announcements

Subscribe to My Notifications to be notified automatically of IBM® announcements such as security bulletins and flashes for IBM Storage Insights.

About this task

With My Notifications, you can specify that you want to receive daily or weekly email announcements. You can specify what type of information you want to receive (such as publications, hints and tips, product flashes (also known as alerts), downloads, and drivers). You can also customize and categorize the products about which you want to be informed and the delivery methods that best suit your needs.

Procedure

1. Go to <http://www.ibm.com/software/support/einfo.html>.
 2. Click Subscribe now!.
 3. Log in with your IBMid.
 4. In Product lookup, type IBM Storage Insights.
 5. Click Subscribe.
 6. Select the types of documents for which you want to receive notifications and click Submit.
-

Collaborating with the team

Collaborate with the IBM® Storage Insights team to help improve the product.

About this task

Got a great idea for making IBM Storage Insights even better? Do you want to vote for an enhancement that was requested by another user? The IBM RFE Community is a place where you can collaborate with the development team for IBM Storage Insights and other product users through your ability to search, view, comment on, submit and track product requests.

Procedure

1. Go to the Servers and Systems Software RFE community at [https://www.ibm.com/developerworks/rfe/execute?
use_case=changeRequestLanding&BRAND_ID=352&PROD_ID=1341](https://www.ibm.com/developerworks/rfe/execute?use_case=changeRequestLanding&BRAND_ID=352&PROD_ID=1341).
 2. To submit an enhancement request, click the Submit tab.
 3. Log in with your IBMID.
 4. View existing requests to ensure that your idea hasn't already been submitted.
A link to the search page is included in the form.
 5. Complete the form and click Submit.
-

Messages

This section provides information about messages for IBM® Storage Insights.

- **Introduction to messages**

The message ID consists of a group ID, message identifier and message type that help you interpret the feedback you receive when working with IBM Storage Insights. DCS

- **Message types**

Read detailed information on specific messages.

Introduction to messages

The message ID consists of a group ID, message identifier and message type that help you interpret the feedback you receive when working with IBM Storage Insights. DCS

The following example illustrates the message ID format:

BPCUI 0053E

Where:

BPCUI

A 3- to 5-character prefix that identifies the message group.

Identifier	Function
BPCCA	Data collector installation messages
BPCCM	Data collector messages
BPCDP	Data processor messages
BPCSS	Scheduler messages
BPCUI	Web client
BTADS	Message and job logging
HWN	Disk manager
HWNAS	Agentless Server messages
HWNDNA	Data Manager API messages
HWNEP	Native API
HWNPM	Performance manager

0053

A 4- to 6-number message identifier.

E

The message type:

E

Error. An Error message indicates a situation where you need to take remedial action. The message help provides an explanation and suggests possible action.

W

Warning. A Warning message alerts you to a situation that may need your attention. The message help provides an explanation and suggests action or pointers for investigation.

I

Information. An Information message provides additional detail on the outcome of an action. No further action is required.

Message text variables are displayed in italics.

Message types

Read detailed information on specific messages.

- [Call Home Messages](#)
Call Home is a communication link between IBM storage systems, IBM Software Support, and IBM Storage Insights that monitors the health and status of your storage. When Call Home is enabled for a storage system, key messages for that storage system are displayed within IBM Storage Insights to alert you and IBM Software Support about hardware failures and potentially serious events.
- [BPCCA - Data collector installation messages](#)
- [BPCDP - Data processor messages](#)
- [BPCPD - Probe data processor messages](#)
- [BPCSS - Scheduler messages](#)
- [BPCUI - User Interface messages](#)
- [BTADS/BTAFM/BTAVM/HWN - Job logging messages](#)
- [HWNAS - Agentless Server messages](#)
- [HWNDA - Data Manager API messages](#)
- [HWNPM - Performance manager messages](#)

Call Home Messages

Call Home is a communication link between IBM storage systems, IBM Software Support, and IBM Storage Insights that monitors the health and status of your storage. When Call Home is enabled for a storage system, key messages for that storage system are displayed within IBM Storage Insights to alert you and IBM Software Support about hardware failures and potentially serious events.

- [The power supply failed](#)
- [A fan is operating outside the expected range](#)
- [The fan status is unknown due to a communication error](#)
- [The power supply has a direct current \(DC\) failure](#)
- [The serial-attached SCSI \(SAS\) drive has error counts that exceed the warning thresholds](#)
- [A storage pool is offline](#)

Related information

- [Enabling Call Home](#)

The power supply failed

Replace the power supply.

Related information

- [Replacing a Storwize® V7000 Gen2 power supply unit for a control enclosure](#)
- [Replacing a power supply unit for a Storwize® V7000 Gen2 expansion enclosure](#)

A fan is operating outside the expected range

Reseat the power supply. If the problem persists, replace the power supply.

Related information

- [Removing and replacing a power supply unit for a control enclosure](#)
- [Replacing a power supply unit for a Storwize® V7000 Gen2 expansion enclosure](#)

The fan status is unknown due to a communication error

Reseat the power supply. If the problem persists, replace the power supply.

Related information

- [➡ Removing and replacing a power supply unit for a control enclosure](#)
 - [➡ Replacing a power supply unit for a Storwize® V7000 Gen2 expansion enclosure](#)
-

The power supply has a direct current (DC) failure

Replace the power supply.

Related information

- [➡ Replacing a Storwize® V7000 Gen2 power supply unit for a control enclosure](#)
 - [➡ Replacing a power supply unit for a Storwize® V7000 Gen2 expansion enclosure](#)
-

The serial-attached SCSI (SAS) drive has error counts that exceed the warning thresholds

Reseat the drive. If the problem persists, replace the drive.

Related information

- [➡ Removing and replacing a drive assembly: Storwize V7000 Gen2 or Storwize V7000 Gen2+](#)
 - [➡ Removing and replacing a drive assembly: Storwize V7000 Gen2](#)
-

A storage pool is offline

Follow these steps to bring the storage pool back online:

1. Repair the faults in the order shown in the log.
2. Start a cluster discovery operation by rescanning the Fibre Channel network.
3. Check the managed disk status to see whether it is online.

Related information

- [➡ Discovering MDisks using the CLI on V9000](#)
 - [➡ Discovering MDisks using the CLI on V7000](#)
-

BPCCA - Data collector installation messages

- [BPCCA0001I The data collector started, connected to the service_name, and is ready to process requests from the service_name.](#)
- [BPCCA0002E The data collector failed to connect or register to the service_name at server_url.](#)
- [BPCCA0003E The data collector started but detected a problem with the directory_directory_name and must stop.](#)
- [BPCCA0004E The data collector cannot run because it is not configured correctly.](#)

- [BPCCA0005E](#) The data collector failed to connect to the storage management service at `server_url` because the host name could not be resolved.
- [BPCCA0006E](#) The data collector failed to connect to the storage management service at `server_url` because of an unknown error.
- [BPCCA0007E](#) The data collector failed to connect to a service from the storage management system.
- [BPCCA0008E](#) The data collector failed to connect to the storage management service because of invalid credentials.
- [BPCCA0009I](#) The data collector connected to the storage management service. The data collector had failed to connect since `date_and_time`.
- [BPCCA0010E](#) The data collector in the `directory_name` directory of the host `host_name` was running and an attempt was made to start a second instance of the same data collector. The second instance of the data collector stopped.
- [BPCCA0011I](#) The data collector stopped because a user requested it to shut down.
- [BPCCA0012I](#) The data collector stopped to enable the installation of an upgraded version of the data collector.
- [BPCCA0013E](#) The storage management service did not allow the data collector to connect because another data collector was already connected to the service.
- [BPCCA0100I](#) The updateCollector utility started.
- [BPCCA0101E](#) The collector directory was not specified in the `collectorDirectory.properties` file.
- [BPCCA0102E](#) The collector directory `directory_name` that was specified in the `collectorDirectory.properties` file is invalid. The collector directory is the directory to which the updateCollector utility must copy the upgrade image files.
- [BPCCA0103E](#) The collector directory `directory_name` that was specified in the `collectorDirectory.properties` file cannot be used as the collector directory.
- [BPCCA0104E](#) The updateCollector utility started but there was a problem with the upgrade image directory `current_directory`.
- [BPCCA0105E](#) The collector directory `directory_name` that was specified in the `collectorDirectory.properties` file is a subdirectory of the upgrade image directory `upgrade_image_directory_name`.
- [BPCCA0106E](#) Cannot upgrade the data collector in the collector directory `directory` because the directory contains the following locked files: `locked_files_list`
- [BPCCA0107I](#) The content of the directory `collector_directory` will be deleted and replaced with subdirectories and files from the upgrade image directory `directory`. Some configuration files, the log directory, and the contents of the log directory will not be deleted.
- [BPCCA0108E](#) The data collector service cannot be uninstalled from the operating system. The upgrade process cannot be completed.
- [BPCCA0109E](#) The updateCollector utility could not upgrade the data collector. The data collector service is now in an inconsistent state.
- [BPCCA0110E](#) The contents of the collector directory `directory` could not be deleted. The upgrade process cannot be completed. The data collector might be in an inconsistent state.
- [BPCCA0111E](#) The files and directories of the data collector from the directory `upgrade_image_directory` could not be copied into the directory `collector_directory`. The upgrade process cannot be continued. The data collector might be in an inconsistent state.
- [BPCCA0112I](#) The data collector in the directory `collector_directory` was upgraded successfully to version `downloaded_version`.
- [BPCCA0113E](#) The data collector in the directory `collector_directory` could not be upgraded.
- [BPCCA0114I](#) The data collector was upgraded to the new version and will start automatically.
- [BPCCA0115I](#) The attempt to upgrade the data collector failed. The existing data collector will start automatically.
- [BPCCA0116E](#) The attempt to upgrade the data collector failed. You must download and install the latest version of the data collector.
- [BPCCA0117E](#) The upgraded data collector could not be installed as a service on the operating system. You must install the new data collector service manually.
- [BPCCA0118I](#) The data collector was upgraded to the new version and started successfully.
- [BPCCA0119I](#) The data collector could not be upgraded, but was not modified. The existing data collector was restarted successfully.
- [BPCCA0120E](#) The upgraded data collector did not start.
- [BPCCA0121E](#) The existing data collector did not restart.
- [BPCCA0122E](#) The data collector cannot authenticate to the HTTPS proxy server `proxy_server_hostname`. Therefore, the data collector cannot connect to the storage management service.

BPCCA0001I The data collector started, connected to the `service_name`, and is ready to process requests from the `service_name`.

Explanation

The data collector is running and ready to process requests from the storage management service.

Action

No action is required.

BPCCA0002E The data collector failed to connect or register to the *service_name* at *server_url*.

Explanation

The data collector failed to connect or register to the storage management service. This condition might occur if you do not have a network connection to the microservice or if a firewall is preventing network access to the storage management service. The condition might also occur if the storage management service is unavailable.

Action

Verify that you have a network connection to the storage management service. Verify that a firewall is not preventing network access to specified storage management service. Verify that the specified storage management service connection is available.

Related concepts

- [Learn more about installing the data collector](#)

BPCCA0003E The data collector started but detected a problem with the directory *directory_name* and must stop.

Explanation

The data collector started in the directory where the downloaded collector image was extracted. However, the structure of the directory is damaged. For example, some of the required subdirectories such as bin, jre, or lib might have been deleted.

Action

Download and extract the data collector image again.

Related reference

- [Downloading and installing the data collector](#)

BPCCA0004E The data collector cannot run because it is not configured correctly.

Explanation

The data collector is not configured correctly. The configuration file was not loaded, or at least one required configuration parameter was missing or had an invalid value.

Action

Check the trace_0.log file in the log directory of the data collector. Check the error message text that is associated with the InitializationException message. Check the other log files to try to determine the problem.

BPCCA0005E The data collector failed to connect to the storage management service at `server_url` because the host name could not be resolved.

Explanation

The host name could not be resolved by a name server.

Action

Verify that the host name for the storage management service can be resolved from the computer where the data collector is running. Verify that the name server is configured correctly.

BPCCA0006E The data collector failed to connect to the storage management service at `server_url` because of an unknown error.

Explanation

An error occurred while connecting to the storage management service, but the root cause cannot be determined.

Action

Verify that the local area network is available and that a firewall is not preventing network access. If you still cannot resolve the error, go to Service Engage support (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

Related reference

- [Products and services page](#)
 - [Resolving connection issues](#)
-

BPCCA0007E The data collector failed to connect to a service from the storage management system.

Explanation

A service from the storage management system failed to start or encountered a problem and stopped.

Action

Go to Service Engage support (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

Related reference

- [Products and services page](#)
 - [Resolving connection issues](#)
-

BPCCA0008E The data collector failed to connect to the storage management service because of invalid credentials.

Explanation

The credentials of the data collector were not authenticated by the storage management service.

Action

Verify that the data collector has the correct credentials. If you still cannot resolve the error, go to Service Engage support (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

Related reference

- [Products and services page](#)
-

BPCCA0009I The data collector connected to the storage management service. The data collector had failed to connect since *date_and_time*.

Explanation

The data collector was able to connect to the storage management service, however it previously encountered connection errors.

Action

No action is required.

BPCCA0010E The data collector in the *directory_name* directory of the host *host_name* was running and an attempt was made to start a second instance of the same data collector. The second instance of the data collector stopped.

Explanation

Only one instance of the data collector can run in a directory at a time.

Action

No action is required because the second instance of the data collector stopped.

BPCCA0011I The data collector stopped because a user requested it to shut down.

Explanation

No further information is available.

Action

BPCCA0012I The data collector stopped to enable the installation of an upgraded version of the data collector.

Explanation

No further information is available.

Action

BPCCA0013E The storage management service did not allow the data collector to connect because another data collector was already connected to the service.

Explanation

Multiple data collectors cannot connect simultaneously to the same storage management service.

Action

If you want to use a new data collector instead of the data collector that is already connected, stop the data collector that is already connected. The new data collector will connect to the storage management service.

BPCCA0100I The updateCollector utility started.

Explanation

The data collector downloaded a new version of the data collector into an upgrade image directory. The updateCollector utility will update the data collector with the version from the upgrade image directory, and then restart the data collector.

Action

No action is required.

BPCCA0101E The collector directory was not specified in the *collectorDirectory.properties* file.

Explanation

The collector directory is the directory to which the updateCollector utility must copy the upgrade image files. The collector directory is specified in the collectorDirectory.properties file.

Action

Verify that the collector directory is specified in the collectorDirectory.properties file. Verify that the updateCollector utility was started by the data collector and not by any other means.

BPCCA0102E The collector directory *directory_name* that was specified in the *collectorDirectory.properties* file is invalid. The collector directory is the directory to which the updateCollector utility must copy the upgrade image files.

Explanation

The collector directory is the directory to which the updateCollector utility must copy the upgrade image files. The collector directory is specified in the collectorDirectory.properties file. The collector directory must be a directory that already exists and must not be the root directory.

Action

Verify that the directory that is specified in the collectorDirectory.properties file exists and is not the root directory.

BPCCA0103E The collector directory *directory_name* that was specified in the *collectorDirectory.properties* file cannot be used as the collector directory.

Explanation

The collector directory is the directory to which the updateCollector utility must copy the upgrade image files. The collector directory is specified in the collectorDirectory.properties file. The collector directory cannot be a directory that is reserved for use by the operating system.

Action

Verify that the directory that is specified in the collectorDirectory.properties file is not reserved for use by the operating system.

BPCCA0104E The updateCollector utility started but there was a problem with the upgrade image directory *current_directory*.

Explanation

The updateCollector utility must be started from the upgrade image directory, that is, the directory to which the upgraded collector was downloaded.

Action

Verify that the updateCollector utility started from the upgrade image directory.

BPCCA0105E The collector directory *directory_name* that was specified in the *collectorDirectory.properties* file is a subdirectory of the upgrade image directory *upgrade_image_directory_name*.

Explanation

The collector directory is the directory to which the updateCollector utility must copy the upgrade image files. The collector directory is specified in the *collectorDirectory.properties* file. The collector directory cannot be a subdirectory of the upgrade image directory.

Action

Verify that the directory that is specified in the *collectorDirectory.properties* file is not a subdirectory of the upgrade image directory.

BPCCA0106E Cannot upgrade the data collector in the *collector_directory* directory because the directory contains the following locked files: *locked_files_list*

Explanation

The directory for the data collector that you want to upgrade contains some locked files. The files might be in use by other processes. The files cannot be deleted or overwritten. The data collector cannot be upgraded. The data collector, which has not been upgraded, will restart automatically.

Action

After the data collector restarts, try to upgrade the collector again from a browser.

BPCCA0107I The content of the directory *collector_directory* will be deleted and replaced with subdirectories and files from the *upgrade_image_directory* directory. Some configuration files, the log directory, and the contents of the log directory will not be deleted.

Explanation

No further information is available.

Action

No action is required.

BPCCA0108E The data collector service cannot be uninstalled from the operating system. The upgrade process cannot be completed.

Explanation

The updateCollector utility cannot uninstall the data collector service from the operating system.

Action

Run the uninstallDataCollectorService.sh script from the collector directory to uninstall the data collector service. Delete the contents of the collector directory, then download and install the latest version of the data collector.

BPCCA0109E The updateCollector utility could not upgrade the data collector. The data collector service is now in an inconsistent state.

Explanation

The updateCollector utility could not uninstall the data collector service from the operating system.

Action

If the collector directory has not been deleted, run the uninstallDataCollectorService.bat script. Alternatively, use a command window to run the uninstallDataCollectorService.bat script from the upgrade image directory. Use the absolute path to the collector directory with the uninstallDataCollectorService.bat command from the upgrade image directory.

If you still cannot uninstall the data collector service, get the name of the service from the Services tab on the Windows Task Manager. Use the Windows Server "sc" command with the name of the data collector service to delete the service. For example, run the following command:

```
sc delete datacollector1
```

Delete the contents of the collector directory, then download and install the latest version of the data collector.

BPCCA0110E The contents of the *collector_directory* directory could not be deleted. The upgrade process cannot be completed. The data collector might be in an inconsistent state.

Explanation

No further information is available.

Action

Delete the data collector files from the collector directory, then download and install the latest version of the data collector.

BPCCA0111E The files and directories of the data collector from the directory *upgrade_image_directory* could not be copied into the directory *collector_directory*. The upgrade process cannot be continued. The data collector might be in an inconsistent state.

Explanation

No further information is available.

Action

Delete the data collector files from the collector directory, then download and install the latest version of the data collector.

BPCCA0112I The data collector in the directory *collector_directory* was upgraded successfully to version *downloaded_version*.

Explanation

No further information is available.

Action

No action is required.

BPCCA0113E The data collector in the directory *collector_directory* could not be upgraded.

Explanation

The log files in the log directory of the data collector might contain information about why the upgrade failed.

Action

Check the message.log and the trace_0.log files in the log directory of the data collector. The existing data collector will restart automatically. If the existing data collector does not restart, you must download and install the latest version of the data collector.

BPCCA0114I The data collector was upgraded to the new version and will start automatically.

Explanation

No further information is available.

Action

No action is required.

BPCCA0115I The attempt to upgrade the data collector failed. The existing data collector will start automatically.

Explanation

No further information is available.

Action

After the existing data collector is restarted, try again to download and install the latest version of the data collector.

BPCCA0116E The attempt to upgrade the data collector failed. You must download and install the latest version of the data collector.

Explanation

The attempt to upgrade the data collector failed. It is likely that the data collector is now in an inconsistent state.

Action

Delete the existing collector directory and its contents, then download and install the latest version of the data collector.

BPCCA0117E The upgraded data collector could not be installed as a service on the operating system. You must install the new data collector service manually.

Explanation

The data collector was upgraded to the new version but the upgraded data collector could not be installed as a service in the operating system. You must install the new data collector service manually.

Action

Log into the computer that the data collector and its file are on. On a UNIX system, run `installDataCollectorService.sh` as a root user. On a Windows system, run `installDataCollectorService.bat` as a Windows administrator. If other security restrictions are enabled, you might need to use the "Run as administrator" option to run `installDataCollectorService.bat`.

BPCCA0118I The data collector was upgraded to the new version and started successfully.

Explanation

The data collector was upgraded to the new version that was downloaded. The upgraded data collector started successfully.

Action

No action is required.

BPCCA0119I The data collector could not be upgraded, but was not modified. The existing data collector was restarted successfully.

Explanation

No further information is available.

Action

Try again to download and install the latest version of the data collector.

BPCCA0120E The upgraded data collector did not start.

Explanation

The data collector was upgraded, but did not start. You must start the data collector from the operating system.

Action

Log into the computer that the data collector and its file are on. On a UNIX system, run the `dataCollector.sh` script to start the data collector. On a Windows system, start the service from the Services tab on the Windows Task Manager.

BPCCA0121E The existing data collector did not restart.

Explanation

The data collector was not upgraded. The existing data collector was not modified. The `updateCollector` utility tried to restart the existing data collector, but failed.

Action

To restart the data collector, log into the computer that the data collector and its file are on. On a UNIX system, run the `dataCollector.sh` script to start the data collector. On a Windows system, start the service from the Services tab on the Windows Task Manager.

Try again to download and install the latest version of the data collector.

BPCCA0122E The data collector cannot authenticate to the HTTPS proxy server proxy_server_hostname.

Therefore, the data collector cannot connect to the storage management service.

Explanation

The data collector must authenticate to the HTTPS proxy server.

Action

The authentication credentials for the proxy server might have changed. Verify that the data collector has the correct credentials for HTTPS proxy server.

Verify that the data collector is configured correctly to access the HTTPS proxy server.

Related reference

- [Adding, changing, or removing the connection to a proxy server](#)
-

BPCDP - Data processor messages

- [BPCDP0000I Performance data for natural key resource at date and time timestamp was collected and processed successfully.](#)
- [BPCDP0001E Error while collecting and processing performance data for natural key resource at date and time timestamp. Performance data was not collected and processed.](#)
- [BPCDP0002E The processing of performance data for the resource could not be completed.](#)
- [BPCDP0003E No performance data is available at the current time for this resource.](#)
- [BPCDP0004I Performance data was retrieved and persisted but aggregation of data to higher-level components didn't complete because the relationship to the higher-level components couldn't be determined.](#)
- [BPCDP0005E Could not save the performance data that was collected from the resource.](#)
- [BPCDP0006I Performance data at date and time timestamp was processed and saved successfully for the resource.](#)
- [BPCDP0007E The resource is missing. The resource is required.](#)
- [BPCDP0008E Identifying information for the resource is missing. This information is required.](#)
- [BPCDP0009E Information identifying the resource type is invalid: system type .](#)
- [BPCDP0010E Information uniquely identifying the resource is missing. This information is required.](#)
- [BPCDP0011E Information uniquely identifying the resource is invalid.](#)
- [BPCDP0012E The UUID for the tenant's resource is invalid.](#)
- [BPCDP0013E The start time for the performance data is invalid: start time](#)
- [BPCDP0014E The end time for the performance data is invalid: end time](#)
- [BPCDP0015I Performance data at date and time timestamp was processed and saved successfully for the resource, but the data processing raised warnings.](#)
- [BPCDP0016W Performance data for natural key resource at date and time timestamp was collected and processed successfully, but the data processing raised warnings.](#)

BPCDP0000I Performance data for natural key resource at date and time timestamp was collected and processed successfully.

Explanation

The Data Processor successfully completed performance monitoring for the resource. The performance data was collected at the indicated resource time stamp in the server time zone. The saved information was either received from the resource or was computed based on the information that was received from the resource.

Action

No action is required.

BPCDP0001E Error while collecting and processing performance data for natural key resource at date and time timestamp. Performance data was not collected and processed.

Explanation

The Data Processor failed to complete performance monitoring for the resource. The performance data was not collected for the indicated resource time stamp in the server time. The information was not received from the resource or computed by the Data Processor based on the information that was received from the resource.

Action

No action is required.

BPCDP0002E The processing of performance data for the resource could not be completed.

Explanation

The current attempt to process performance data did not complete. No performance data is persisted for this time period. The collection of performance data that is running is not affected by this error.

Related reference

- [Getting help for IBM Storage Insights](#)

BPCDP0003E No performance data is available at the current time for this resource.

Explanation

The data collector did not provide any performance data at the current time.

Related reference

- [Getting help for IBM Storage Insights](#)

BPCDP0004I Performance data was retrieved and persisted but aggregation of data to higher-level components didn't complete because the relationship to the higher-level components couldn't be determined.

Explanation

Performance statistics for some high-level components are aggregated from base component statistics. For example, pool statistics are aggregated from volumes belonging to the pool, and the volume to pool relationship is needed to do such an aggregation. The relationship data might not be available if the device probe hasn't yet completed. When this relationship can't be determined, statistics for the pool can't be aggregated.

Related reference

-  [Getting help for IBM Storage Insights](#)

BPCDP0005E Could not save the performance data that was collected from the resource.

Explanation

The data processor was unable to persist the performance data for this time period.

Related reference

-  [Getting help for IBM Storage Insights](#)

BPCDP0006I Performance data at *date and time* timestamp was processed and saved successfully for the resource.

Explanation

The performance data was collected at the indicated time. The saved information was either received from the data collector, or was computed based on the information received from the data collector.

Action

None. No action is required.

BPCDP0007E The resource is missing. The resource is required.

Explanation

The data collector did not provide a required property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

-  [Getting help for IBM Storage Insights](#)

BPCDP0008E Identifying information for the resource is missing. This information is required.

Explanation

The data collector did not provide a required property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

- [Getting help for IBM Storage Insights](#)
-

BPCDP0009E Information identifying the resource type is invalid: *system type* .

Explanation

The data collector provided an invalid property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

- [Getting help for IBM Storage Insights](#)
-

BPCDP0010E Information uniquely identifying the resource is missing. This information is required.

Explanation

The data collector did not provide a required property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

- [Getting help for IBM Storage Insights](#)
-

BPCDP0011E Information uniquely identifying the resource is invalid.

Explanation

The data collector provided an invalid property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

- [Getting help for IBM Storage Insights](#)
-

BPCDP0012E The UUID for the tenant's resource is invalid.

Explanation

The data collector provided an invalid property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

- [Getting help for IBM Storage Insights](#)
-

BPCDP0013E The start time for the performance data is invalid: *start time*

Explanation

The data collector provided an invalid property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

- [Getting help for IBM Storage Insights](#)
-

BPCDP0014E The end time for the performance data is invalid: *end time*

Explanation

The data collector provided an invalid property to the data processor. Without this property, the data processor can't process performance data for this time period.

Related reference

- [Getting help for IBM Storage Insights](#)
-

BPCDP0015I Performance data at *date and time timestamp* was processed and saved successfully for the resource, but the data processing raised warnings.

Explanation

The Data Processor successfully completed performance monitoring for the resource. The performance data was collected at the indicated resource time stamp in the server time zone. The saved information was either received from the resource or was computed based on the information that was received from the resource. The warnings indicate that either some performance information wasn't received from the resource, or couldn't be computed from the information that was received.

Action

None. No action is required.

BPCDP0016W Performance data for *natural key resource at date and time* timestamp was collected and processed successfully, but the data processing raised warnings.

Explanation

The Data Processor successfully completed performance monitoring for the resource. The performance data was collected at the indicated resource time stamp in the server time zone. The saved information was either received from the resource or was computed based on the information that was received from the resource. The warnings indicate that either some performance information wasn't received from the resource, or couldn't be computed from the information that was received.

Action

No action is required.

BPCPD - Probe data processor messages

- [BPCPD0001E Information identifying the resource type is invalid: system type .](#)
- [BPCPD0002E Information uniquely identifying the resource is missing. This information is required.](#)

BPCPD0001E Information identifying the resource type is invalid: *system type* .

Explanation

The data collector provided an invalid property to the data processor. Without this property, the data processor can't process Probe data for this time period.

BPCPD0002E Information uniquely identifying the resource is missing. This information is required.

Explanation

The data collector did not provide a required property to the data processor. Without this property, the data processor can't process Probe data for this time period.

BPCSS - Scheduler messages

- [BPCSS0000E An error occurred while collecting performance data from the device. The collection is being attempted by a different collector.](#)
- [BPCSS0001W The data collection is taking longer than expected.](#)
- [BPCSS0002E Currently, there is no data collector available for this device.](#)
- [BPCSS0005I Performance monitor is starting at an interval of *interval* interval units. This action was requested by user name.](#)
- [BPCSS0008I Collection can no longer continue due to invalid credentials. Use the 'Modify Connection' dialog to fix the storage system credentials and resume collection.](#)
- [BPCSS0009E Failed to save the performance monitor schedule.](#)
- [BPCSS0010E A job cannot be run for resource *resourceName* because there is a job already running for the resource.](#)
- [BPCSS0011W The schedule change was saved but the update to the active collection did not happen.](#)

- [BPCSS0012I Performance monitor is stopped. This action was requested by user name.](#)
- [BPCSS0013I Performance monitor is stopped.](#)
- [BPCSS0014I Performance monitor is starting at an interval of interval interval units.](#)
- [BPCSS0015I Performance monitor collection interval was updated to interval interval units. This action was requested by user name.](#)
- [BPCSS0016I Performance monitor collection interval was updated to interval interval units.](#)
- [BPCSS0017I Performance monitor is enabled. This action was requested by user name.](#)
- [BPCSS0018I Performance monitor is enabled.](#)
- [BPCSS0019I Performance monitor is disabled. This action was requested by user name.](#)
- [BPCSS0020I Performance monitor is disabled.](#)
- [BPCSS0021W Performance monitor is starting. The initial attempt to start collection failed so it is retried. This action was requested by user name.](#)
- [BPCSS0022W Performance monitor is starting. The initial attempt to start collection failed so it is retried.](#)
- [BPCSS0023I Performance monitor collection interval is enabled and updated to interval interval units. This action was requested by user name.](#)
- [BPCSS0024I Performance monitor collection interval is enabled and updated to interval interval units.](#)
- [BPCSS0025E Access to the agent or device is denied. Ensure that valid credentials are specified for agent agent name.](#)
- [BPCSS0026E New performance data is not yet available for the device. Statistics with time stamps later than time stamp could not be found.](#)
- [BPCSS0027E The performance monitor failed due to an internal error.](#)
- [BPCSS0028E The value that is specified as parameter \(value\) is invalid.](#)
- [BPCSS0029E Cannot connect to the device with the address IP address.](#)
- [BPCSS0030E Cannot connect to the SNMP data source IP address.](#)
- [BPCSS0031E Cannot authenticate with the provided user credentials.](#)
- [BPCSS0032E Passphrase is incorrect for subsystem param1.](#)
- [BPCSS0033E Passphrase is required. Specify one for subsystem param1.](#)
- [BPCSS0034E Verify that they private key that was provided for subsystem param1 was in the OpenSSH file format. If it is in another format, it needs to be converted before it can be used.](#)
- [BPCSS0035E The user does not have the required authority to complete the task or command.](#)
- [BPCSS0036E Cannot connect to the storage system or cluster.](#)
- [BPCSS0037W The device cannot be reached.](#)
- [BPCSS0038E The device or device agent did not respond within the allotted time.](#)
- [BPCSS0039E The host name or IP address {0} is not valid.](#)
- [BPCSS0040E The host name or IP address is not valid.](#)
- [BPCSS0041E Cannot connect to the device.](#)
- [BPCSS0042E Cannot connect to the SNMP data source.](#)
- [BPCSS0043E Passphrase is incorrect.](#)
- [BPCSS0044E Passphrase is required.](#)
- [BPCSS0045E Access to the device is denied. Ensure that valid credentials are specified.](#)
- [BPCSS0046E Verify that they private key that was provided was in the OpenSSH file format. If it is in another format, it needs to be converted before it can be used.](#)
- [BPCSS0047E New performance data is not yet available for the device.](#)
- [BPCSS0048E The parameter for the Performance Manager API is invalid.](#)
- [BPCSS0049E Schedule is not enabled for the resource resource.](#)
- [BPCSS0050W Performance data could not be collected for device device name because the device or data source cannot be reached \(reason reason code\). The current samples are skipped.](#)
- [BPCSS0051E The device or device agent did not respond within the allotted time \(timeout valueseconds\).](#)
- [BPCSS0052W Performance data continuity is broken. The device might have been reset or rebooted. record count performance data records were discarded.](#)
- [BPCSS0053W No valid performance data was provided by the monitored resource. Zero performance data records were inserted into the database.](#)
- [BPCSS0054E A timeout occurred while polling the performance statistics for this device: device name](#)
- [BPCSS0055E Performance data was not collected for device device name due to error error trace. The current samples are skipped.](#)
- [BPCSS0056E The last performance Data Collection was not readable for device device name, the collection failed with error error trace.](#)
- [BPCSS0057E Cannot connect to the switch with the provided IP address, host name, protocol, and port.](#)
- [BPCSS0058E Cannot authenticate to the switch with the provided user name and password.](#)
- [BPCSS0059E The specified user name does not have the required permissions for the switch.](#)
- [BPCSS0060E Performance monitoring is unavailable for resource resource_name because the ZiMon agent is not available.](#)
- [BPCSS0061W Out of request count requests, only processed request count were successfully started.](#)
- [BPCSS0062W The data collector monitoring system system is missing. Will attempt to switch to a new data collector.](#)
- [BPCSS0063W Configuration data is already being collected for system system. A new collection can not be started till the current one finished.](#)
- [BPCSS0064E The request encountered an internal error and could not be completed. Please try again.](#)

- [BPCSS0065E The Data Collector Manager could not retrieve system actions for all devices being monitored by collector collector.](#)
- [BPCSS0066E The firmware level on the switch is not supported.](#)
- [BPCSS0067E The firmware level of the switch cannot be parsed.](#)
- [BPCSS0068E The show hardware command failed.](#)
- [BPCSS0069E The issued command is not supported by the device. The action can't be completed.](#)
- [BPCSS0070E The device is returning invalid data.](#)
- [BPCSS0105I Probe is starting at an interval of interval interval units. This action was requested by user name.](#)
- [BPCSS0109E Can't save the schedule for the probe.](#)
- [BPCSS0110E The download of Data Collector installer package failed.](#)
- [BPCSS0111E The extraction of Data Collector installer package failed.](#)
- [BPCSS0112I The probe was stopped. This action was requested by user name.](#)
- [BPCSS0113I The probe is stopped.](#)
- [BPCSS0114I The probe is starting at an interval of interval interval units.](#)
- [BPCSS0115I The probe interval was updated to interval. This change was requested by user name.](#)
- [BPCSS0116I The probe interval was updated to interval.](#)
- [BPCSS0117I The probe is enabled. This action was requested by user name.](#)
- [BPCSS0118I The probe is enabled.](#)
- [BPCSS0119I The probe is disabled. This action was requested by user name.](#)
- [BPCSS0120I The probe is disabled.](#)
- [BPCSS0121W The probe started, but the initial attempt to collect metadata failed. This action was requested by user name.](#)
- [BPCSS0122W The probe started, but the initial attempt to collect metadata failed.](#)
- [BPCSS0123I The Probe collection interval is enabled and updated to interval. This action was requested by user name.](#)
- [BPCSS0124I Probe interval is enabled and updated to interval.](#)
- [BPCSS0125E The Data Collector upgrade operation failed with invalid parameters.](#)
- [BPCSS0126E The Data Collector upgrade operation failed due to locked files detection.](#)
- [BPCSS0127E The Data Collector upgrade operation failed during the uninstallation process of the existing Data Collector.](#)
- [BPCSS0128E The Data Collector upgrade operation failed while trying to delete old files.](#)
- [BPCSS0129E The Data Collector upgrade operation failed while trying to copy new files.](#)
- [BPCSS0130E The upgrade operation failed to install the new Data Collector for unknown reasons.](#)
- [BPCSS0131E The Data Collector upgrade failed.](#)
- [BPCSS0132E The data collector was not upgraded because there wasn't enough space in the installation directory.](#)
- [BPCSS0133E The data collector was not upgraded because the path to the compressed installation file is not valid.](#)
- [BPCSS0134E The data collector was not upgraded because the upgrade process does not have the required permissions on the installation directory.](#)
- [BPCSS0135E The data collector was not upgraded because the compressed file that contains the installation files could not be located.](#)
- [BPCSS0136E The data collector wasn't upgraded because there wasn't enough space in the installation directory.](#)
- [BPCSS0137E The data collector wasn't upgraded because the download of the data collector upgrade package took too long to complete. The default time in which the download should complete is 60 minutes.](#)
- [BPCSS0138E The data collector wasn't upgraded because the extraction of the data collector upgrade package took too long to complete. The default time in which the extraction should complete is 10 minutes.](#)
- [BPCSS2000I Cannot connect to the device as the user account is locked.](#)
- [BPCSS2001I Cannot connect to the device.](#)
- [BPCSS2002I The download of installer package that runs Data Collector upgrade operation is completed.](#)
- [BPCSS2003I The extraction of Data Collector installer package is completed.](#)
- [BPCSS2004W Performance data was not received for the device within the expected time. The current sample is skipped.](#)
- [BPCSS2005E Task timed out because it did not complete in the expected time.](#)
- [BPCSS2006I System discovery data is being processed for system natural key.](#)
- [BPCSS2007I Running task task type for system system natural key.](#)
- [BPCSS2008I Running task task type for data collector collector.](#)
- [BPCSS2009E A policy group with the same name already exists.](#)
- [BPCSS2010I Opened ticket ticket number and started collecting logs from the device with serial number device serial number.](#)
- [BPCSS2011I Collecting logs from device with serial number device serial number for ticket ticket number.](#)
- [BPCSS2012I The log package for device with serial number device serial number was collected for ticket ticket number.](#)
- [BPCSS2013E Opened ticket ticket number, but logs were not collected from the device with serial number device serial number.](#)
- [BPCSS2014E Opened ticket ticket number, but log collection from the device with serial number device serial number timed out.](#)
- [BPCSS2015I The logs for device with serial number device serial number are being uploaded for ticket ticket number.](#)
- [BPCSS2016I The logs for device with serial number device serial number have been uploaded for ticket ticket number.](#)
- [BPCSS2017E Upload of the logs for device with serial number device serial number for ticket ticket number failed.](#)
- [BPCSS2018E Upload of the logs for device with serial number device serial number for ticket ticket number timed out.](#)
- [BPCSS2019E The Ticket Service Upload of the logs for device with serial number device serial number for ticket ticket number failed.](#)

- [BPCSS2020W An upgrade is already in progress for system system . A new upgrade can not be started till the current one finishes.](#)
- [BPCSS2021E The upgrade process of all data collectors stopped. Go to the Data Collectors page to upgrade manually.](#)
- [BPCSS2022I The data collector installer package is being downloaded.](#)
- [BPCSS2023I The data collector installer package is being extracted.](#)
- [BPCSS2024I Old data collector files are being replaced with new files from the data collector download package.](#)
- [BPCSS2025I Performance data is being uploaded.](#)
- [BPCSS2026I Started collecting logs from device with serial number device serial number for ticket ticket number.](#)
- [BPCSS2027E Logs were not collected from the device with serial number device serial number for ticket ticket number.](#)
- [BPCSS2028E Opened ticket ticket number, but logs were not collected from device with serial number device serial number, because the device firmware version device version is lower than the minimum supported version 7.7.52.19.](#)
- [BPCSS2029E Logs were not collected from device with serial number device serial number for ticket ticket number, because the device firmware version device version is lower than the minimum supported version 7.7.52.19.](#)

BPCSS0000E An error occurred while collecting performance data from the device. The collection is being attempted by a different collector.

Explanation

There are multiple reasons why this condition could be encountered. Generally the error is something that could be specific to one collector and not occur on other collectors.

Some examples are as follows:

1. The data collector cannot resolve the hostname of the subsystem.
2. Network communication between the data collector and the device is blocked.

Action

If this problem persists and it is not caused by the data collector being down, consider reducing the data collection frequency.

BPCSS0001W The data collection is taking longer than expected.

Explanation

The amount of time that has elapsed since the last performance sample was collected and processed is longer than expected considering the selected collection interval.

This error might be a result of all collectors that can contact the device are down. Or because the amount of time required to collect and process the data is more than the collection interval.

Action

Confirm that the data collectors are running and are able to connect to the server. Try reducing the collection frequency. If the problem persists, contact IBM Support.

Related reference

-  [Getting help for IBM Storage Insights](#)

BPCSS0002E Currently, there is no data collector available for this device.

Explanation

No data collector has been found that has successfully been able to connect to the device.

Action

Verify that the device is running and fully operational.

If it is in a hung state, it might be necessary to reboot the device.

Ensure that the IP address and hostname are correct and that the user has the required permissions to complete the task.

BPCSS0005I Performance monitor is starting at an interval of *interval* *interval units*. This action was requested by *user name*.

Explanation

Performance statistics are collected from the device.

BPCSS0008I Collection can no longer continue due to invalid credentials. Use the 'Modify Connection' dialog to fix the storage system credentials and resume collection.

Explanation

Access is denied by the storage system with the credentials currently specified.

The credentials usually consist of a username and password, but can also encompass other security related parameters such as ssh keys, depending on the type of device being accessed and, where applicable, the access method selected.

Action

Go to the Block Storage Systems overlay, and right click on the storage system.

Hover over 'Connections' and select 'Modify Connection' to fix the credentials for the device.

Ensure that the user entered has the correct permissions for collection, and that the password, passphrase, or ssh key file for the device are correct.

BPCSS0009E Failed to save the performance monitor schedule.

Explanation

For more information about the cause of the error, see the trace logs.

Action

Try updating the performance monitor schedule again. If the problem persists, contact IBM Support.

Related reference

- [Getting help for IBM Storage Insights](#)

BPCSS0010E A job cannot be run for resource *resourceName* because there is a job already running for the resource.

Explanation

A new job cannot be run for a schedule definition if a previous job from that schedule definition did not finish running. Only one running job per schedule at a time is permitted.

Action

Stop the job or wait for the job to finish and try again.

BPCSS0011W The schedule change was saved but the update to the active collection did not happen.

Explanation

The schedule changes take effect the next time the job is started.

Action

Restart the job to force the update.

BPCSS0012I Performance monitor is stopped. This action was requested by user name.

Explanation

The performance monitor is stopped and no performance data are collected for this device until the performance monitor is restarted.

Action

Restart the performance monitor, as needed.

BPCSS0013I Performance monitor is stopped.

Explanation

The performance monitor is stopped and no performance data are collected for this device until the performance monitor is restarted.

Action

Restart the performance monitor, as needed.

BPCSS0014I Performance monitor is starting at an interval of *interval* interval units.

Explanation

Performance statistics are collected from the device.

BPCSS0015I Performance monitor collection interval was updated to *interval* interval units. This action was requested by *user name*.

Explanation

Performance statistics are collected at the new interval.

BPCSS0016I Performance monitor collection interval was updated to *interval* interval units.

Explanation

Performance statistics are collected at the new interval.

BPCSS0017I Performance monitor is enabled. This action was requested by *user name*.

Explanation

Performance statistics are collected.

BPCSS0018I Performance monitor is enabled.

Explanation

Performance statistics are collected.

BPCSS0019I Performance monitor is disabled. This action was requested by user name.

Explanation

Performance statistics collection is disabled.

BPCSS0020I Performance monitor is disabled.

Explanation

Performance statistics collection is disabled.

BPCSS0021W Performance monitor is starting. The initial attempt to start collection failed so it is retried. This action was requested by user name.

Explanation

Performance monitor started but the collector failed to start the collection. The server continues to look for a collector that can perform the collection.

BPCSS0022W Performance monitor is starting. The initial attempt to start collection failed so it is retried.

Explanation

Performance monitor started but the collector failed to start the collection. The server continues to find a collector that can perform the collection.

BPCSS0023I Performance monitor collection interval is enabled and updated to *interval interval units*. This action was requested by user name.

Explanation

Performance statistics are collected at the new interval.

BPCSS0024I Performance monitor collection interval is enabled and updated to *interval interval units*.

Explanation

Performance statistics are collected at the new interval.

BPCSS0025E Access to the agent or device is denied. Ensure that valid credentials are specified for agent agent name.

Explanation

When retrieving performance statistics for the device, access is denied by the device or the device agent.

Therefore, no performance statistics could be retrieved.

No performance data is inserted for the device in this time period.

The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the correct agent address is specified. Ensure that the specified credentials are valid and allow access to the device or agent for performance data collection.

The credentials usually consist of a user name and password, but can also encompass other security-related parameters such as ssh keys or authentication tokens.

The type of credentials used depends on the type of device or agent that is being accessed and, where applicable, the access method selected.

BPCSS0026E New performance data is not yet available for the device. Statistics with time stamps later than time stamp could not be found.

Explanation

In case performance data is cached by the device or device agent, the performance manager ensures that the most recently retrieved performance statistics are indeed newer than the previously retrieved statistics.

If the time stamp in the message is "null", then no statistics were previously retrieved, and the performance manager is unable to get ANY statistics for the device.

No performance data is inserted for the device in this time period. The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the device and device agent are fully operational.

It might be necessary to restart either device or agent, if it is in a hung state.

Ensure that if the device has multiple clocks (for example for multiple nodes or controllers), that the clocks are synchronized to within a few minutes.

BPCSS0027E The performance monitor failed due to an internal error.

Related reference

-  [Getting help for IBM Storage Insights](#)
-

BPCSS0028E The value that is specified as parameter (value) is invalid.

Explanation

The parameter value passed as the argument on the Performance Manager API call is invalid. The method called returns this error indicator.

Action

Refer to the method or class documentation to determine the allowed values for the particular parameter.

Modify the caller of this method to pass a valid value to the API.

BPCSS0029E Cannot connect to the device with the address *IP address*.

Related reference

-  [Getting help for IBM Storage Insights](#)
-

BPCSS0030E Cannot connect to the SNMP data source *IP address*.

Explanation

A test connection cannot be established to the data source at the specified IP address.

This error might occur if the data source is not available or the SNMP community is entered incorrectly. The SNMP community name is shared by one or more SNMP hosts and is used to authenticate messages that are received by those hosts.

BPCSS0031E Cannot authenticate with the provided user credentials.

Explanation

The user name or password entered for the device is not correct.

Action

Make sure that the user name and password are correct for the device that is being added.

Reenter the user name or password and click Add again.

If you are adding a Storwize V7000 Unified storage system, specify the IP address of the block component, not the filer component.

BPCSS0032E Passphrase is incorrect for subsystem *param1*.

Explanation

The passphrase for the truststore is incorrect.

Action

Provide the correct passphrase.

BPCSS0033E Passphrase is required. Specify one for subsystem *param1*.

Explanation

The passphrase for the truststore is missing.

Action

Provide the missing passphrase.

BPCSS0034E Verify that they private key that was provided for subsystem *param1* was in the OpenSSH file format. If it is in another format, it needs to be converted before it can be used.

Explanation

Action

BPCSS0035E The user does not have the required authority to complete the task or command.

Action

Ensure that the user has the required permissions to complete the task.

BPCSS0036E Cannot connect to the storage system or cluster.

Explanation

The device that is being added might not be up and running.

Also, the IP address, host name, or user credentials entered for the storage system or cluster might not be valid.

Action

Verify that the device is up and running.

Also, make sure that the IP address, host name, and user credentials are correct for the device that is being added. Reenter the values and click Add again.

BPCSS0037W The device cannot be reached.

Explanation

The current attempt to retrieve a set of performance data from the device failed.

No performance data is inserted for the device in this time period.

The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

The immediate operation of the running performance monitor is unaffected.

Action

If the problem persists for an hour or longer, ensure that your device and data source (if applicable) are operational.

Also, ensure that a network path exists between the IBM Spectrum Control server and the device or data source, including any appropriate firewall pass-throughs.

If nothing is wrong with the device or device agent, or with the network path, try canceling and restarting the performance monitor job.

If the problem is still not resolved, contact IBM Support.

BPCSS0038E The device or device agent did not respond within the allotted time.

Explanation

When retrieving performance statistics for the device, the requested performance data was not returned before the timeout expired.

Either the device or agent is unresponsive, or is much slower than expected.

No performance data is inserted for the device in this time period.

The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the device and device agent are fully operational.

It might be necessary to restart either device or agent, if it is in a hung state.

If you have reason to believe that the device and agent are operational but are slower than expected, you can also attempt to increase the timeout value that is used by the performance manager, which is set in configuration file device/conf/pm.conf..

BPCSS0039E The host name or IP address {0} is not valid.

Explanation

The IP address or host name entered for the device is not valid.

Action

Make sure that the IP address and host name are valid for the device being added.

Reenter the IP address or host name and click Add again.

BPCSS0040E The host name or IP address is not valid.

Explanation

The IP address or host name entered for the device is not valid.

Action

Make sure that the IP address and host name are valid for the device being added.

Reenter the IP address or host name and click Add again.

BPCSS0041E Cannot connect to the device.

Related reference

-  [Getting help for IBM Storage Insights](#)

BPCSS0042E Cannot connect to the SNMP data source.

Explanation

A test connection cannot be established to the data source at the specified IP address.

This error might occur if the data source is not available or the SNMP community is entered incorrectly.

The SNMP community name is shared by one or more SNMP hosts and is used to authenticate messages that are received by those hosts.

BPCSS0043E Passphrase is incorrect.

Explanation

The passphrase for the truststore is incorrect.

Action

Provide the correct passphrase.

BPCSS0044E Passphrase is required.

Explanation

The passphrase for the truststore is missing.

Action

Provide the missing passphrase.

BPCSS0045E Access to the device is denied. Ensure that valid credentials are specified.

Explanation

When retrieving performance statistics for the device, access is denied by the device or the device agent.

Therefore, no performance statistics could be retrieved. No performance data is inserted for the device in this time period.

The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the correct agent address is specified, and that the specified credentials are valid and allow access to the device or agent for performance data collection.

The credentials usually consist of a user name and password, but can also encompass other security-related parameters such as ssh keys or authentication tokens, depending on the type of device or agent that is being accessed and, where applicable, the access method selected.

BPCSS0046E Verify that they private key that was provided was in the OpenSSH file format. If it is in another format, it needs to be converted before it can be used.

Explanation

Action

BPCSS0047E New performance data is not yet available for the device.

Explanation

In case performance data is cached by the device or device agent., the performance manager ensures that the most recently retrieved performance statistics are indeed newer than the previously retrieved statistics.

If the time stamp in the message is "null", then no statistics were previously retrieved, and the performance manager is unable to get ANY statistics for the device.

No performance data is inserted for the device in this time period.

The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the device and device agent are fully operational.

It might be necessary to restart either device or agent, if it is in a hung state.

Ensure that if the device has multiple clocks (for example for multiple nodes or controllers), that the clocks are synchronized to within a few minutes.

BPCSS0048E The parameter for the Performance Manager API is invalid.

Explanation

The parameter value passed as argument on the Performance Manager API call is invalid.

The method called returns this error indicator.

Action

Refer to the method or class documentation to determine the allowed values for the particular parameter.

Modify the caller of this method to pass a valid value to the API.

BPCSS0049E Schedule is not enabled for the resource resource.

Explanation

Schedule is not enabled. Cannot be started.

Action

In order to be started the job should be enabled first.

BPCSS0050W Performance data could not be collected for device *device name* because the device or data source cannot be reached (reason *reason code*). The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed.

No performance data is inserted for the device in this time period.

The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

The immediate operation of the running performance monitor is unaffected.

The reason code can be used to help identify the exact cause of the problem encountered:

- Reason Code 0 indicates that the exact reason for the failure could not be determined.
- Reason Code 1 indicates a bad target (device or data source) address. This condition can occur when the user-specified host name or IP address, or the target port number are invalid such that they would cause the formation of an invalid URL or IP address. This type of failure is rare and can usually also be identified by a java.net.UnknownHostException printed in the trace logs.
- Reason Code 2 indicates the problem to be an unknown target address. This condition can occur when a host name rather than an IP address was specified as target address, and:
 - either the network is down,
 - the specified host name cannot be resolved (for example, the name server cannot be contacted, or the name server is down, or the specified host name is not known to the name server), or
 - the specified host name can be resolved by the name server but no longer exists on the network.

This type of failure can usually also be identified by a java.net.UnknownHostException printed in the trace logs.

- Reason Code 3 indicates the problem to be an unreachable target address. This condition can occur when an IP address rather than a host name is specified as target address, and either the network or a part of the network is down or is blocked by a firewall (the host cannot be contacted), or the specified IP address does not exist on the network. This type of failure can usually also be identified by a java.net.NoRouteToHostException in the trace logs.
- Reason Code 4 indicates the problem to be an unresponsive target. This condition can occur when the target server is powered off, or when the server is not listening on the port, which is the target of the communication. For example, when the web server or SMI-S provider is not operational. This type of failure can usually also be identified by a java.net.ConnectException printed in the trace logs.
- Reason Code 5 indicates a communication timeout for communication that uses UDP rather than TCP, for example when you use SNMP data sources. This condition can occur when the target server cannot be reached, or when the SNMP data source is disabled on the target server, or when the SNMP port (161) is blocked by a firewall.

Action

If the problem persists for an hour or longer, ensure that your device and data source (if applicable) are operational.

Also, ensure that a network path exists between the IBM Spectrum Control server and the device or data source, including any appropriate firewall pass-throughs.

If nothing is wrong with the device or device agent, or with the network path, try canceling and restarting the performance monitor job.

If the problem is still not resolved, contact IBM Support.

Related reference

-  [Getting help for IBM Storage Insights](#)

BPCSS0051E The device or device agent did not respond within the allotted time (*timeout valueseconds*) .

Explanation

When retrieving performance statistics for the device, the requested performance data did not return before the timeout expired.

Either the device or agent is unresponsive, or is much slower than expected.

No performance data is inserted for the device in this time period.

The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the device and device agent are fully operational.

It might be necessary to restart either device or agent, if it is in a hung state.

If you have reason to believe that the device and agent are operational but are slower than expected, you can also attempt to increase the timeout value that is used by the performance manager, which is set in configuration file device/conf/pm.conf.

BPCSS0052W Performance data continuity is broken. The device might have been reset or rebooted. record count performance data records were discarded.

Explanation

This message indicates that invalid performance information was received from the device.

In general, performance information is represented as a set of ever-increasing counters, and actual statistics are computed by taking the difference between two consecutive sets of such counters.

However if a counter appears to have decreased instead of increased between consecutive sets, the information is unusable and is discarded.

Note that counters can be expected to decrease if they are reset to zeroes, which might happen normally when a device is reset or rebooted (for example when new firmware is loaded), or in some cases when a device agent (CIMOM for example) is reset or rebooted.

In those situations, this warning message can be safely ignored.

If this warning occurs when no reset or reboot has occurred, the device or device agent might be generating incorrect performance statistics, and you might have to contact your device vendor for further instructions.

Action

Determine if the device or device agent has been reset or rebooted.

Those situations include loading of new firmware, or fail-over and fail-back scenarios for ESS, DS6000, and DS8000 storage subsystems.

In any of these cases, the reset of performance counters is expected behavior, and this warning message can be safely ignored.

If not one of these cases, the device might be generating incorrect performance data, which might or might not lead to inaccurate performance reports.

Contact your device vendor for further instructions in those cases.

BPCSS0053W No valid performance data was provided by the monitored resource. Zero performance data records were inserted into the database.

Explanation

The performance monitor contacted the resource and tried to collect data. However, the resource did not provide valid performance counter information.

If message HWNPM2124W is also displayed, the resource was able to provide performance data, but it was determined to be invalid and discarded.

Action

The operation of the performance monitor is not affected, and it will attempt to retrieve performance data again for the next sample interval.

If the monitored resource continues to provide no performance data, ensure it is fully operational.

Where appropriate, also ensure that performance functionality is enabled for the resource.

BPCSS0054E A timeout occurred while polling the performance statistics for this device: device name

Explanation

The performance collection did not complete in specified time.

Action

The operation of the performance monitor is not affected, and it will attempt to retrieve performance data again for the next sample interval. If the monitored resource continues to receive timeout, ensure that it is fully operational. If appropriate, also ensure that performance functionality is enabled for the resource.

BPCSS0055E Performance data was not collected for device device name due to error error trace. The current samples are skipped.

Explanation

The performance collection encountered an unknown error.

Action

The operation of the performance monitor is not affected, and it will attempt to retrieve performance data again for the next sample interval. If the monitored resource continues to receive timeout, ensure that it is fully operational. If appropriate, also ensure that performance functionality is enabled for the resource.

BPCSS0056E The last performance Data Collection was not readable for device device name, the collection failed with error error trace.

Explanation

The read operation of the last collected performance data failed.

Action

The last collected performance data might be corrupted. Restart the Data Collection or add the device again.

BPCSS0057E Cannot connect to the switch with the provided IP address, host name, protocol, and port.

Explanation

One or more of the following details for the switch are incorrect: IP address, host name, protocol, port.

Action

Enter the correct IP address, host name, protocol, and port for the switch. Make sure that the switch meets the minimum version requirements and is configured to use the specified protocol.

BPCSS0058E Cannot authenticate to the switch with the provided user name and password.

Explanation

One or more of the following details for the switch are incorrect: User name, password.

Action

Enter the correct user name and password for the switch.

BPCSS0059E The specified user name does not have the required permissions for the switch.

Explanation

The user name is a valid user on the switch, but does not have the chassis-role permission.

Action

Specify another user name that has the chassis-role permission. Alternatively, enter another user name and password for the switch.

BPCSS0060E Performance monitoring is unavailable for resource `resource_name` because the ZiMon agent is not available.

Explanation

The problem might occur if the data collection service cannot connect to port 9084 on the node where the collector component of the IBM Spectrum Scale performance monitoring tool is running.

For the product to collect performance statistics and other necessary information to monitor a resource, an agent that manages the resource must be defined. An agent can be an SMI-S provider, ZiMon agent for IBM Spectrum Scale, or a native API for a resource.

Action

Before you can collect performance data for IBM Spectrum Scale, the server that hosts the data collector must be able to connect to port 9084 on the node where the collector component of the IBM Spectrum Scale performance monitoring tool is running.

To ensure that the server that hosts the data collector can connect to the collector node, complete the following steps:

1. Determine the node that is configured as the collector node by viewing the /opt/IBM/zimon/ZIMonSensors.cfg file on one of the sensor nodes. The collector node is set in the host property of the collectors section in this file. For example, collectors = { host = "node3" port = "4739"}
2. Ensure that the host property is set to one of the following options:
 - An IP address that can be reached by the server that hosts the data collector
 - A hostname that can be resolved to a reachable IP address by the server that hosts the data collector

BPCSS0061W Out of *request count* requests, only *processed request count* were successfully started.

Explanation

An internal error occurred while processing the requests and only a subset of them could be started.

Action

View the status of the started requests within the Storage Insights UI and reissue the other requests.

BPCSS0062W The data collector monitoring system *system* is missing. Will attempt to switch to a new data collector.

Explanation

The data collector assigned to monitor this system is offline, so Storage Insights will check other data collectors to see if any of them can be used to monitor this system instead.

Action

If data collection does not resume properly for this system, ensure that other data collectors are able to connect to this system. If Data Collector assignments have been enabled, ensure that at least one active data collector is allowed to communicate with this system.

BPCSS0063W Configuration data is already being collected for system *system*. A new collection can not be started till the current one finished.

Explanation

To avoid placing unnecessary load on monitored systems, only a single probe or collection of configuration metadata is allowed to run per monitored device. A new data collection task can be run when the current one completes.

Action

No action is required.

BPCSS0064E The request encountered an internal error and could not be completed. Please try again.

Explanation

An unexpected problem occurred when trying to perform the requested action, please try again.

Action

If the problem continues, please contact support.

BPCSS0065E The Data Collector Manager could not retrieve system actions for all devices being monitored by collector *collector*.

Explanation

An error occurred when trying to retrieve system actions for all monitored devices from the database.

Action

If the problem persists, please try again.

BPCSS0066E The firmware level on the switch is not supported.

Explanation

No additional description of the issue is available.

Action

Upgrade the firmware to a supported level.

BPCSS0067E The firmware level of the switch cannot be parsed.

Explanation

A firmware level value was presented that cannot be parsed. The support status of the switch cannot be determined.

The command output might be corrupted, or the firmware level on the switch might not be supported.

Action

Upgrade the firmware to a supported level.

BPCSS0068E The show hardware command failed.

Explanation

The show hardware command does not return valid results. The firmware on the switch is probably at an unsupported firmware level.

Action

Upgrade the firmware to a supported level.

BPCSS0069E The issued command is not supported by the device. The action can't be completed.

Explanation

This problem might occur if the firmware of the device is not at the required level.

Action

Upgrade the firmware level of the device to the required level. For information about the required firmware levels for devices, see <https://www.ibm.com/support/pages/node/6249369>.

After you upgrade the firmware level of the device, try the action again. If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0070E The device is returning invalid data.

Explanation

This problem might occur due to a hardware or software issue with the device.

Action

Reboot the device. If the problem persists, open a support case at <https://www.ibm.com/mysupport/> and describe the problem. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0105I Probe is starting at an interval of *interval* *interval units*. This action was requested by *user name*.

Explanation

The probe will collect status, configuration, and capacity metadata about the device at the new interval.

BPCSS0109E Can't save the schedule for the probe.

Explanation

The schedule for the probe can't be saved because of an error when processing the request. This problem might occur when the service is interrupted.

Action

Wait a few minutes and try updating the probe schedule again. If you still can't update and save the schedule, go to <https://www.ibm.com/mysupport/> and open a support case against IBM Storage Insights. In the support case, describe the problem and include the URL of your instance.

BPCSS0110E The download of Data Collector installer package failed.

Explanation

The download of Data Collector installer package for initiating upgrade operation failed.

Action

Ensure that there is sufficient space available on the device for the download to succeed. If the problem still persists, contact IBM Support.

BPCSS0111E The extraction of Data Collector installer package failed.

Explanation

The extraction of Data Collector installer package for performing upgrade operation failed.

Action

Ensure that there is sufficient space available on the device for extract to succeed. If the problem still persists, contact IBM support.

BPCSS0112I The probe was stopped. This action was requested by user name.

Explanation

Metadata will not be collected about the device until the probe is restarted.

Action

Restart the probe, as needed. To start a probe, complete these steps:

1. From the menu bar, go to the resource list page for a resource type. For example, to start a probe for a block storage system, select Resources > Block Storage Systems.
2. Right-click the resource and select Data Collection > Start Probe.

BPCSS0113I The probe is stopped.

Explanation

No metadata will be collected about the device until the probe is restarted.

Action

Restart the probe, as needed. To start a probe, complete these steps:

1. From the menu bar, go to the resource list page for a resource type. For example, to start a probe for a block storage system, select Resources > Block Storage Systems.
2. Right-click the resource and select Data Collection > Start Probe.

BPCSS0114I The probe is starting at an interval of *interval* *interval units*.

Explanation

The probe will collect status, configuration, and capacity metadata about the device.

BPCSS0115I The probe interval was updated to *interval*. This change was requested by *user name*.

Explanation

The probe will collect status, configuration, and capacity metadata about the device at the new interval.

BPCSS0116I The probe interval was updated to *interval*.

Explanation

The probe will collect status, configuration, and capacity metadata about the device at the new interval.

BPCSS0117I The probe is enabled. This action was requested by *user name*.

Explanation

The probe will collect status, configuration, and capacity metadata about the device.

BPCSS0118I The probe is enabled.

Explanation

The probe will collect status, configuration, and capacity metadata about the device.

BPCSS0119I The probe is disabled. This action was requested by *user name*.

Explanation

Status, configuration, and capacity metadata will not be collected about the device.

BPCSS0120I The probe is disabled.

Explanation

Status, configuration, and capacity metadata will not be collected about the device.

BPCSS0121W The probe started, but the initial attempt to collect metadata failed. This action was requested by *user name*.

Explanation

IBM Storage Insights is searching for a data collector that can collect metadata about the device.

BPCSS0122W The probe started, but the initial attempt to collect metadata failed.

Explanation

IBM Storage Insights is searching for a data collector that can collect metadata about the device.

BPCSS0123I The Probe collection interval is enabled and updated to *interval*. This action was requested by *user name*.

Explanation

The probe will collect status, configuration, and capacity metadata about the device at the new interval.

BPCSS0124I Probe interval is enabled and updated to *interval*.

Explanation

The probe will collect status, configuration, and capacity metadata about the device at the new interval.

BPCSS0125E The Data Collector upgrade operation failed with invalid parameters.

Explanation

The Data Collector upgrade operation failed with invalid parameters while it was trying to upgrade to the latest version.

Action

Check whether the Data Collector installation directory is valid and not a known reserve directory. For example, in UNIX directories such as the root, /bin, /usr are defined as reserve directories. Similarly, in Windows locations such as C:\\, C:\\Program Files, C:\\Users are known as reserved directories. It's also possible that some of the mandatory directories or files might be missing from the Data Collector installer package, contact IBM Support.

BPCSS0126E The Data Collector upgrade operation failed due to locked files detection.

Explanation

The upgrade operation failed because it cannot access locked files in the Data Collector installation path that are currently in use by other processes.

Action

Identify the processes that are using the locked files and free up the resources. Restart Data Collector and check status of the Upgrade operation. If the problem persists, contact IBM Support.

BPCSS0127E The Data Collector upgrade operation failed during the uninstallation process of the existing Data Collector.

Explanation

The Data Collector upgrade operation failed while trying to uninstall the existing Data Collector.

Action

Try manually uninstalling the existing Data Collector. For UNIX run the `uninstallDataCollectorService.sh` script from the Data Collector base directory. For Windows, run the `uninstallDataCollectorService.bat` script. If the problem persists, contact IBM Support.

BPCSS0128E The Data Collector upgrade operation failed while trying to delete old files.

Explanation

The upgrade operation failed because it cannot delete old files in the existing Data Collector directories.

Action

Restart the existing Data Collector and check if it starts up successfully. If the problem persists, contact IBM Support.

BPCSS0129E The Data Collector upgrade operation failed while trying to copy new files.

Explanation

The upgrade failed because it cannot copy new files to the Data Collector installation path.

Action

Restart the existing Data Collector and check if it starts up successfully. If the problem persists, contact IBM Support.

BPCSS0130E The upgrade operation failed to install the new Data Collector for unknown reasons.

Explanation

The Data Collector upgrade operation failed while trying to install the new Data Collector.

Action

Try manually installing the Data Collector. For UNIX run the `installDataCollectorService.sh` script from the Data Collector base directory. For Windows, run the `installDataCollectorService.bat` script. If the problem persists, contact IBM Support.

BPCSS0131E The Data Collector upgrade failed.

Explanation

The operation to start the data collector upgrade failed because the upgrade script, `updateCollector.sh`/`updateCollector.bat` could not be located.

Action

Restart the existing Data Collector and check if it starts up successfully. If the problem persists, contact IBM Support.

BPCSS0132E The data collector was not upgraded because there wasn't enough space in the installation directory.

Explanation

During the upgrade process, the data collector package wasn't extracted. This problem occurred because there wasn't enough space in the installation directory of the data collector. When this problem occurs, the upgrade of data collector can't be completed.

Action

Verify that the installation directory has enough space for the data collector upgrade. If needed, provide more space. For information about space requirements for the data collector, see <https://www.ibm.com/docs/en/storage-insights?topic=started-before-you-begin-checklist>.

After you provide more space on the installation directory, try to upgrade the data collector manually. If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0133E The data collector was not upgraded because the path to the compressed installation file is not valid.

Explanation

During the upgrade process, the compressed upgrade package for the data collector was not found. This problem might occur when the original installation directory for the data collector is deleted or moved.

Action

If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0134E The data collector was not upgraded because the upgrade process does not have the required permissions on the installation directory.

Explanation

To extract the download package and upgrade the data collector, the upgrade process must have read and write permissions on the installation directory.

Action

Ensure that the required read and write permissions are set on the installation directory for the data collector where the data collector was originally installed. If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0135E The data collector was not upgraded because the compressed file that contains the installation files could not be located.

Explanation

During the upgrade process, the compressed file that contains the installation files for the data collector upgrade was not found.

Action

If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0136E The data collector wasn't upgraded because there wasn't enough space in the installation directory.

Explanation

During the upgrade process, the data collector package wasn't downloaded. This problem occurred because there wasn't enough space in the installation directory of the data collector. When this problem occurs, the upgrade of the data collector can't be completed.

Action

Verify that the installation directory has enough space for the data collector upgrade. If needed, provide more space. For information about space requirements for the data collector, see <https://www.ibm.com/docs/en/storage-insights?topic=started-before-you-begin-checklist>.

After you provide more space on the installation directory, try to upgrade the data collector manually. If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0137E The data collector wasn't upgraded because the download of the data collector upgrade package took too long to complete. The default time in which the download should complete is 60 minutes.

Explanation

During the upgrade process, the data collector package took too long to download. This problem may occur due to the host machine on which the data collector is installed not having access to the network or a firewall blocking outbound communication. When this problem occurs, the upgrade of the data collector can't be completed.

Action

Verify that the host machine has access to the network and that the firewall or antivirus is not blocking outbound communication. For information about communication requirements for the data collector, see <https://www.ibm.com/docs/en/storage-insights?topic=started-before-you-begin-checklist>.

After the host machine is able to connect to the network, try to upgrade the data collector manually. If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS0138E The data collector wasn't upgraded because the extraction of the data collector upgrade package took too long to complete. The default time in which the extraction should complete is 10 minutes.

Explanation

During the upgrade process, the upgrade package took too long to extract. This problem may occur because your host machine does not have enough memory to perform this operation. When this problem occurs, the upgrade of the data collector can't be completed.

Action

Verify that the host machine has sufficient free memory space to perform the operation. If needed, free up some memory on the drive. For information about memory requirements for the data collector, see <https://www.ibm.com/docs/en/storage-insights?topic=started-before-you-begin-checklist>.

After you free up some memory on the host machine, try to upgrade the data collector manually. If the problem persists, open a support case at <https://www.ibm.com/mysupport/>. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS2000I Cannot connect to the device as the user account is locked.

Explanation

The username or password entered for the device is no longer valid.

Action

Your account is locked and resetting the device credentials is required to complete the task or command.

BPCSS2001I Cannot connect to the device.

Explanation

Data Collector is unable to connect to device and it cannot determine the reason for the failure to connect.

Action

Check that the device credentials are correct. Also, check that there are no problems with the network connectivity to the device.

If you still see the issue after a short time, try resetting device credentials.

BPCSS2002I The download of installer package that runs Data Collector upgrade operation is completed.

Explanation

The download of installer package that corresponds to the underlying operating system for performing Data Collector upgrade operation is completed.

BPCSS2003I The extraction of Data Collector installer package is completed.

Explanation

The extraction of Data Collector installer package for performing Data Collector upgrade operation is completed.

BPCSS2004W Performance data was not received for the device within the expected time. The current sample is skipped.

Explanation

The Data Collector did not send performance data for the device within the expected time. The current sample is skipped.

Action

The operation of the performance collection is not affected, and it will attempt to retrieve performance data again for the next sample interval.

BPCSS2005E Task timed out because it did not complete in the expected time.

Explanation

A task is expected to complete within the timeout interval. If it does not complete within the timeout interval, it is marked as failed.

BPCSS2006I System discovery data is being processed for system natural key.

Explanation

Storage Insights was able to contact the storage system and is now processing the system information to begin performance and configuration monitoring.

BPCSS2007I Running task *task type* for system *system natural key*.

Explanation

Storage Insights is running the specified task.

BPCSS2008I Running task *task type* for data collector *collector*.

Explanation

Storage Insights is running the specified task.

BPCSS2009E A policy group with the same name already exists.

Explanation

The specified policy group name already exists and cannot be duplicated.

Action

Enter a unique name for the policy group.

BPCSS2010I Opened ticket *ticket number* and started collecting logs from the device with serial number *device serial number*.

Explanation

When a ticket is opened, the process for collecting a log package from the device is automatically started. When complete, IBM Support uses the information in the ticket and the log package to help address the issue with the device.

Action

No action is required.

BPCSS2011I Collecting logs from device with serial number *device serial number* for ticket *ticket number*.

Explanation

The log package for the device is being collected. When complete, IBM Support uses the information in the ticket and log package to help address the issue with the device.

Action

No action is required.

BPCSS2012I The log package for device with serial number *device serial number* was collected for ticket *ticket number*.

Explanation

The log package for the device was collected. IBM Support uses the information in the ticket and log package to help address the issue with the device.

Action

No action is required.

BPCSS2013E Opened ticket *ticket number*, but logs were not collected from the device with serial number *device serial number*.

Explanation

The log package for the device could not be created or collected. IBM Support needs the log package to help address the issue with the device.

Action

Try the following actions:

1. Ensure that the device is available and can be reached.
2. Verify that your data collectors are up and running.

Then wait a few minutes and try again. If the logs still can't be collected, open a support case at <https://www.ibm.com/mysupport/> and describe the problem. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS2014E Opened ticket *ticket number*, but log collection from the device with serial number *device serial number* timed out.

Explanation

System log collection from the specified device timed out. No log package was generated. IBM Support needs the log package to help address the issue with the device.

Action

Try the following actions:

1. Ensure that the device is available and can be reached.
2. Verify that your data collectors are up and running.

Then wait a few minutes and try again. If the logs still can't be collected, open a support case at <https://www.ibm.com/mysupport/> and describe the problem. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS2015I The logs for device with serial number *device serial number* are being uploaded for ticket *ticket number*.

Explanation

The log package for the device is being uploaded to IBM Support. The information in the log package is used to help address the issue with the device.

Action

No action is required.

BPCSS2016I The logs for device with serial number *device serial number* have been uploaded for ticket *ticket number*.

Explanation

The log package for the device has been uploaded to IBM Support. The information in the log package is used to help address the issue with the device.

Action

No action is required.

BPCSS2017E Upload of the logs for device with serial number *device serial number* for ticket *ticket number* failed.

Explanation

Upload of the log package for the device to IBM Support failed.

Action

Contact IBM Support.

BPCSS2018E Upload of the logs for device with serial number *device serial number* for ticket *ticket number* timed out.

Explanation

Upload of the log package for the device to IBM Support timed out.

Action

Contact IBM Support.

BPCSS2019E The Ticket Service Upload of the logs for device with serial number *device serial number* for ticket *ticket number* failed.

Explanation

Upload of the log package for the device to IBM Support failed.

Action

Contact IBM Support.

BPCSS2020W An upgrade is already in progress for system *system*. A new upgrade can not be started till the current one finishes.

Explanation

To avoid failures in the upgrade process only one upgrade request will execute at once per data collector. A new upgrade can be run once the current one completes.

Action

No action is required.

BPCSS2021E The upgrade process of all data collectors stopped. Go to the Data Collectors page to upgrade manually.

Explanation

Something went wrong during data collector rolling upgrades. No other data collector upgrade will be attempted.

BPCSS2022I The data collector installer package is being downloaded.

Explanation

The download of the data collector package is in progress.

BPCSS2023I The data collector installer package is being extracted.

Explanation

The extraction of the data collector package is in progress.

BPCSS2024I Old data collector files are being replaced with new files from the data collector download package.

Explanation

The old data collector files are being deleted, and new files from the data collector download package are being copied to the old data collector directory.

BPCSS2025I Performance data is being uploaded.

Explanation

The data collector upgrade has been paused to allow for the upload of performance data.

BPCSS2026I Started collecting logs from device with serial number *device serial number* for ticket *ticket number*.

Explanation

Log package collection for the device has started. When complete, IBM Support uses the information in the ticket and log package to help address the issue with the device.

Action

No action is required.

BPCSS2027E Logs were not collected from the device with serial number *device serial number* for ticket *ticket number*.

Explanation

The log package for the device could not be created or collected. IBM Support needs the log package to help address the issue with the device.

Action

Try the following actions:

1. Ensure that the device is available and can be reached.
2. Verify that your data collectors are up and running.

Then wait a few minutes and try again. If the logs still can't be collected, open a support case at <https://www.ibm.com/mysupport/> and describe the problem. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS2028E Opened ticket *ticket number*, but logs were not collected from device with serial number *device serial number*, because the device firmware version *device version* is lower than the minimum supported version 7.7.52.19.

Explanation

The log package for the device could not be created or collected, because the device firmware version is lower than the minimum supported version. IBM Support needs the log package to help address the issue with the device.

Action

Open a support case at <https://www.ibm.com/mysupport/> and describe the problem. Don't forget to include the URL of your IBM Storage Insights service.

BPCSS2029E Logs were not collected from device with serial number device serial number for ticket ticket number, because the device firmware version device version is lower than the minimum supported version 7.7.52.19.

Explanation

The log package for the device could not be created or collected, because the device firmware version is lower than the minimum supported version. IBM Support needs the log package to help address the issue with the device.

Action

Open a support case at <https://www.ibm.com/mysupport/> and describe the problem. Don't forget to include the URL of your IBM Storage Insights service.

BPCUI - User Interface messages

- [**BPCUI0000E** The action can't be completed because the following error occurred: Error message text.](#)
- [**BPCUI0001E** An action could not be completed and the following error message was generated: TPCRemoteException message](#)
- [**BPCUI0002E** Failed to retrieve the requested data because the service is unavailable.](#)
- [**BPCUI0003E** The NAPI with the IP address Napi IP was not added because of an Internal Error](#)
- [**BPCUI0004E** The SSH private key for the NAPI Napi IP could not be uploaded](#)
- [**BPCUI0005E** The action cannot be completed because the following internal error has occurred: message.](#)
- [**BPCUI0007E** The discovery job failed to complete.](#)
- [**BPCUI0009E** The SSH key could not be loaded for the following reason: IOException message](#)
- [**BPCUI0010E** The host name or IP address that you entered is a resource type, but you selected to add a different type of storage system.](#)
- [**BPCUI0011E** The Device Server did not discover any device](#)
- [**BPCUI0012E** Cannot connect to the device with the address Ip Address.](#)
- [**BPCUI0019E** No data is available for this selection.](#)
- [**BPCUI0025E** Probe job job Id failed.](#)
- [**BPCUI0029E** Invalid parameter param passed.](#)
- [**BPCUI0030I** This task was already executed.](#)
- [**BPCUI0032E** An unexpected response was received from the server.](#)
- [**BPCUI0034E** Invalid number of runs to keep for each schedule. The number should be between param1 and param2.](#)
- [**BPCUI0035E** Invalid number of days' worth of log-files to keep. The number should be between param1 and param2.](#)
- [**BPCUI0036E** The schedule id scheduleID associated with this job is no longer valid. It might have been deleted. Refresh the view and try again.](#)
- [**BPCUI0037E** The replication server is not installed or is unavailable.](#)
- [**BPCUI0038E** Invalid number of days to retain alerts. The number should be between param1 and param2.](#)
- [**BPCUI0039E** A Storage Resource agent cannot be found.](#)
- [**BPCUI0040E** Parsing results from a call to the Data server failed with the following error message: param1.](#)
- [**BPCUI0042E** Communication with the Data Server failed with the following error: param1](#)

- [BPCUI0043E Cannot connect to the Data server.](#)
- [BPCUI0044E The entity was not found in the database.](#)
- [BPCUI0045E Host name length exceeds the 255 character limit](#)
- [BPCUI0046E Report 'configurationId' not found](#)
- [BPCUI0047E Parameter 'parameterName' is not defined in report configurationId'](#)
- [BPCUI0048E No property is not defined for report configurationId'](#)
- [BPCUI0049E No such property.propertyName for report configurationId'](#)
- [BPCUI0050E variableName can not be overridden](#)
- [BPCUI0051E variableName not valid report output format.](#)
- [BPCUI0052E variableName not reachable](#)
- [BPCUI0053E Cannot authenticate with the provided user credentials.](#)
- [BPCUI0054E The host name or IP address {0} is not valid.](#)
- [BPCUI0055E Cannot connect to the storage system.](#)
- [BPCUI0056E Cannot connect to the storage system or cluster.](#)
- [BPCUI0058I No supported resources were discovered on the data source data Source Address.](#)
- [BPCUI0060I File param was successfully uploaded to the Data Server.](#)
- [BPCUI0061E Upload file type param is not supported.](#)
- [BPCUI0062E The requested action failed with the following error message: error message](#)
- [BPCUI0063E Cannot find jobs for scheduleId param and deviceId param. No logs are displayed.](#)
- [BPCUI0064E A log file cannot be displayed for the job.](#)
- [BPCUI0065E The job log file cannot be accessed. The log file may have been manually removed or may have been deleted because it was older than retain_days days or it exceeded the maximum number of no_of_lofs runs.](#)
- [BPCUI0067E The schedule for collecting status and asset data cannot be created.](#)
- [BPCUI0068E A proposed schedule for collecting status and asset data cannot be created.](#)
- [BPCUI0069E The proposed schedule for collecting status and asset data cannot be deleted.](#)
- [BPCUI0071E The task task_name could not be completed.](#)
- [BPCUI0072E Cannot connect to the Device server. Verify that the database service and Device server are running, and that the Device server is accessible.](#)
- [BPCUI0073E Can't make a connection to the storage_resource storage resource.](#)
- [BPCUI0074E The wizard could not set an attribute for the storage resource.](#)
- [BPCUI0075E The certificate wasn't saved on the server.](#)
- [BPCUI0076W The initial job to collect status and asset data did not start.](#)
- [BPCUI0077E A failure occurred loading the certificate.](#)
- [BPCUI0078I The certificate was loaded successfully.](#)
- [BPCUI0079E The SSL certificate is not in the expected format.](#)
- [BPCUI0084W The wizard could not retrieve the default interval information for performance monitoring.](#)
- [BPCUI0085E The user name or password for the hypervisor or vCenter hypervisor or vCenter Server is invalid.](#)
- [BPCUI0086E The SSL certificate is invalid for the hypervisor or vCenter hypervisor or vCenter Server, or the firewall is blocking access to it.](#)
- [BPCUI0087E The version of the hypervisor or vCenter hypervisor or vCenter Server is not supported.](#)
- [BPCUI0088E The host name, protocol, or port for the hypervisor or vCenter hypervisor or vCenter Server is invalid, or the hypervisor or vCenter Server is unreachable.](#)
- [BPCUI0089W Cannot retrieve a valid set of data collection intervals for performance monitoring.](#)
- [BPCUI0090I All alerts were removed.](#)
- [BPCUI0091W error count of total_count alerts were not removed.](#)
- [BPCUI0093I No data path is available for deviceNameVariable.](#)
- [BPCUI0094E Authorization failed due to an internal error.](#)
- [BPCUI0097E Authorization failed due to an invalid request context.](#)
- [BPCUI0098E The current user is not authorized to perform the requested function.](#)
- [BPCUI0099E Information about the storage resource is not available.](#)
- [BPCUI0100I success_count alerts were marked as acknowledged.](#)
- [BPCUI0101I The alert was marked as acknowledged.](#)
- [BPCUI0102E None of the alerts were marked as acknowledged.](#)
- [BPCUI0104I success_count alerts were marked as unacknowledged.](#)
- [BPCUI0105I The alert was marked as unacknowledged.](#)
- [BPCUI0108I All informational alerts were marked as acknowledged.](#)
- [BPCUI0110W Some informational alerts were not marked as acknowledged.](#)
- [BPCUI0111I All alerts were marked as acknowledged.](#)
- [BPCUI0112I success_count alerts were removed.](#)
- [BPCUI0113I The alert was removed.](#)
- [BPCUI0114I All acknowledged alerts were removed.](#)
- [BPCUI0116W Some acknowledged alerts were not removed.](#)
- [BPCUI0120W Some acknowledged alerts were not marked as unacknowledged.](#)
- [BPCUI0121E Unable to communicate with the product server. Make sure that the server is running properly.](#)
- [BPCUI0122E No job log file was created for this job run.](#)
- [BPCUI0123E The action cannot be completed.](#)

- [BPCUI0124E An unexpected error occurred during the execution of the action.](#)
- [BPCUI0125E The alert is not available.](#)
- [BPCUI0126E The status of the Performance Monitors could not be retrieved.](#)
- [BPCUI0127E The currently installed version of the product does not have the required product license for the function that you requested.](#)
- [BPCUI0128E An undefined capacity chart metric was requested.](#)
- [BPCUI0129I Alerts that were migrated from a previous version of the product are not shown on this page.](#)
- [BPCUI0130E The alerts cannot be acknowledged because they were deleted.](#)
- [BPCUI0131E The alerts cannot be unacknowledged because they were deleted.](#)
- [BPCUI0132W success_count alerts were marked as acknowledged. unsuccess_count alerts cannot be marked as acknowledged because they were deleted.](#)
- [BPCUI0133W success_count alerts were marked as unacknowledged. unsuccess_count alerts cannot be marked as unacknowledged because they were deleted.](#)
- [BPCUI0134E The alert cannot be acknowledged because it was deleted.](#)
- [BPCUI0135E The alert cannot be unacknowledged because it was deleted.](#)
- [BPCUI0136E The device was not removed because the action is not supported for devices of type devType.](#)
- [BPCUI0137E Input text provided has invalid character\(s\): characters. Input text: text](#)
- [BPCUI0141E Host name or IP address hostname specified on line line of file file is not valid.](#)
- [BPCUI0143E Host port WWPN wwpn specified on line line of file file is not valid.](#)
- [BPCUI0144E Duplicate server name specified on lines line1 and line2 of file file.](#)
- [BPCUI0145E Could not parse file file.](#)
- [BPCUI0146E Could not parse file file. Invalid entry on line line.](#)
- [BPCUI0148I Successfully deleted server server_name.](#)
- [BPCUI0149I Successfully modified ports of server server_name.](#)
- [BPCUI0150I The server was created.](#)
- [BPCUI0151E The host name or IP address is associated with another resource.](#)
- [BPCUI0152I The data source data_Source_Address was successfully added as a data source for monitoring. The following new resources were detected:](#)
- [BPCUI0155W You cannot provision volumes because there is no Fibre Channel host port information for at least one server.](#)
- [BPCUI0156W You cannot provision volumes to servers that use different operating systems.](#)
- [BPCUI0157W You cannot provision volumes to servers and virtual machines at the same time. To provision volumes, ensure that you select either only servers or only virtual machines.](#)
- [BPCUI0158I Volumes are assigned to the hypervisors that host virtual machines. Volumes are not assigned directly to virtual machines.](#)
- [BPCUI0159W You cannot provision volumes because at least one of the hypervisors that host the virtual machines is not being monitored. Ensure that all the hypervisors that are hosting the virtual machines that were selected for provisioning were probed.](#)
- [BPCUI0160E Duplicate port WWPN wwpn specified on lines line1 and line2 of file file.](#)
- [BPCUI0162W File file does not contain any servers to create.](#)
- [BPCUI0166W Optimization cannot be done in place to the subsystem since storage_subsystem.param1 and/or its pools belong to more than one capacity_pool. Following are capacity_pools the subsystem is associated with: param2](#)
- [BPCUI0167W Optimization cannot be done in place to the subsystem since storage_subsystem.param1 and/or its pools are not part of any capacity_pool.](#)
- [BPCUI0168W Optimization cannot be done in place to the server.param1 since storage_subsystems or storage_pools associated with luns assigned to the server belong to more than one capacity_pool. Following are associated capacity_pools: param2](#)
- [BPCUI0169W Optimization cannot be done in place to the server.param1 since storage_subsystems or storage_pools associated with luns assigned to the server are not part of any capacity_pool.](#)
- [BPCUI0170W Optimization cannot be done in place to the storage_entity.param1 since storage_subsystems or storage_pools associated with it belong to more than one capacity_pool. Following are associated capacity_pools: param2](#)
- [BPCUI0171W Optimization cannot be done in place to the storage_entity.param1 since storage_subsystems or storage_pools associated with it are not part of any capacity_pool.](#)
- [BPCUI0172E The operation timed out while waiting for a response from the server.](#)
- [BPCUI0173E File file does not exist or is empty.](#)
- [BPCUI0174E The device does not support the credential mechanism used.](#)
- [BPCUI0175E A required parameter is missing.](#)
- [BPCUI0176E The highlighted field contains an invalid value.](#)
- [BPCUI0177E The highlighted field contains a value that is outside of the allowed range. The value must be between minVal and maxVal.](#)
- [BPCUI0178E A service class with the same name and type already exists.](#)
- [BPCUI0179I The service class was created.](#)
- [BPCUI0180I Based on the known configuration of storage system host connections, fabric zone aliases, and HBA ports, additional ports may have been added to the selection below.](#)
- [BPCUI0181I You selected to add a expectedDevice resource, but a foundDevice resource was detected and will be added.](#)
- [BPCUI0182I The data source data_Source_Address was added as a data source for monitoring. No new resources were detected.](#)

- [BPCUI0183E](#) The text in the highlighted field exceeds the maxLength character limit.
- [BPCUI0185W](#) Unable to lookup the IP Address for Host Name hostName. Enter the IP Address manually.
- [BPCUI0189I](#) Configuration of SRA deployment and probe schedules were done successfully.
- [BPCUI0190W](#) Configuration of SRA finished with some warnings or errors. Check the detail messages.
- [BPCUI0191E](#) An internal error occurred while testing conneciton to param1.
- [BPCUI0192E](#) The supplied service class type is invalid.
- [BPCUI0193E](#) The specified SMI-S provider was not found. Make sure that the protocol, SMI-S provider host name or IP address, and port are specified correctly and that the SMI-S provider is properly configured at that location.
- [BPCUI0194E](#) An unknown error has occurred. Please review all values entered.
- [BPCUI0195E](#) The Interop Namespace is not correct. Please correct this entry.
- [BPCUI0196E](#) A timeout occurred while processing the request. Please retry request.
- [BPCUI0197E](#) A connection was not established. Make sure that the protocol, SMI-S provider host name or IP address, and port are specified correctly.
- [BPCUI0198E](#) The authentication to the SMI-S provider failed.
- [BPCUI0199E](#) An SSLHandshakeException or SSLProtocolException has occurred. This exception might be due to an invalid SLP registration, e.g. 'http' instead of 'https'.
- [BPCUI0201E](#) There is a pending delete in process for this SMI-S provider.
- [BPCUI0202I](#) Success
- [BPCUI0203E](#) The selected resources were not removed.
- [BPCUI0204W](#) successfulDeletes of attemptedDeletes of the selected resources were removed.
- [BPCUI0205W](#) successfulDeletes selected resources were removed, however warnings did occur.
- [BPCUI0209E](#) A database operation cannot be completed.
- [BPCUI0210I](#) Device param1 supports performance monitoring.
- [BPCUI0211E](#) No performance data is available for a resource.
- [BPCUI0212E](#) There is no Secure Shell running at this host/IP.
- [BPCUI0213E](#) Unsupported Secure Shell protocol was used.
- [BPCUI0214E](#) Invalid public key location for subsystem param1.
- [BPCUI0215E](#) Invalid public key format for subsystem param1.
- [BPCUI0216E](#) Passphrase was incorrect for subsystem param1.
- [BPCUI0217E](#) Unable to transfer the key(s) to the server param1.
- [BPCUI0218E](#) The specified private key file format is not supported. Please convert it to Open SSH (.pem) key file format for subsystem param1.
- [BPCUI0219E](#) The specified key file or key file name is already linked to another user.
- [BPCUI0220E](#) The IP address that was entered was the address of the management console for the storage system. You must enter the valid IP address of the block component of the storage system.
- [BPCUI0221E](#) The IP address you entered is the address of another device's management console.
- [BPCUI0222E](#) The IP address you entered points to a device of another type.
- [BPCUI0223E](#) Passphrase is required. Specify one for subsystem param1.
- [BPCUI0224E](#) Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: http://www.ibm.com/support/docview.wss?uid=swg21976237
- [BPCUI0225I](#) The agent log files for server Name have been collected and copied to log Location.
- [BPCUI0226I](#) Discovery of data source is taking longer than expected. Click Close to run the discovery in the background.
- [BPCUI0227E](#) Thin provisioning must be enabled when compression is enabled.
- [BPCUI0229I](#) 1 resource was added to name.
- [BPCUI0231I](#) count resources were added to name.
- [BPCUI0233E](#) The specified host name is already associated with an existing server.
- [BPCUI0234E](#) The specified IP address is already associated with an existing server.
- [BPCUI0235E](#) The specified host name and IP address are already associated with an existing server.
- [BPCUI0236E](#) The disabling of the agents failed.
- [BPCUI0237E](#) Errors occurred when attempting to disable some of the agents.
- [BPCUI0238W](#) Warnings occurred when attempting to disable warningCount of the agents.
- [BPCUI0239I](#) attemptedCount of the selectedCount selected agents were disabled.
- [BPCUI0240E](#) The agents were not enabled.
- [BPCUI0241E](#) Errors occurred when attempting to enable some of the agents.
- [BPCUI0242W](#) Warnings occurred when attempting to enable warningCount of the agents.
- [BPCUI0243I](#) attemptedCount of the selectedCount selected agents were enabled.
- [BPCUI0244I](#) The credentials of an agent were updated.
- [BPCUI0245I](#) The credentials of updateCount agents were updated.
- [BPCUI0246E](#) Cannot authenticate to the file module with the provided user credentials.
- [BPCUI0247E](#) Unknown file module key user.
- [BPCUI0248E](#) The SSH key could not be loaded for the following reason: IOException message
- [BPCUI0249E](#) Passphrase is incorrect.
- [BPCUI0250E](#) Passphrase is required.
- [BPCUI0251E](#) Cannot connect to the storage system or cluster.
- [BPCUI0252E](#) The host name or IP address {0} is not valid.

- [BPCUI0253E](#) Cannot connect to the data source for the resource with the address ip_address.
- [BPCUI0254E](#) Invalid private key location.
- [BPCUI0255W](#) The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?
- [BPCUI0256W](#) The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?
- [BPCUI0257W](#) The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?
- [BPCUI0258W](#) The following internal resources of a storage system you are attempting to add are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?
- [BPCUI0259W](#) The following storage systems and storage-system internal resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?
- [BPCUI0260E](#) The specified private key file format for the file module is not supported. Please convert it to Open SSH (.pem) key file.
- [BPCUI0261E](#) The service class was not found in the database.
- [BPCUI0262E](#) The capacity pool was not found in the database.
- [BPCUI0263E](#) The scheduling of the agent upgrade jobs failed.
- [BPCUI0264E](#) Errors occurred when attempting to schedule the upgrade jobs of some of the agents.
- [BPCUI0265W](#) Warnings occurred when scheduling the upgrade of warningCount of the agents.
- [BPCUI0266I](#) attemptedCount of the selected agents were scheduled for upgrade.
- [BPCUI0267I](#) The upgrade agent job was successfully scheduled for hostName.
- [BPCUI0268W](#) Deleting a capacity pool does not affect any volumes or shares that were provisioned from the capacity pool. However, the volumes or shares are no longer associated with the capacity pool. Associations with the following volumes or shares will be removed:
- [BPCUI0269W](#) The following volumes are associated with the service class scName. When the volumes were created, they satisfied the requirements of the service class. If you modify the service class, the volumes are still associated with the service class, but might not satisfy the new requirements of the service class. Depending on your changes to the service class, users might incorrectly assume that the volumes have properties that they do not possess.
- [BPCUI0270W](#) The following shares are associated with the service class scName. When the shares were created, they satisfied the requirements of the service class. If you modify the service class, the shares are still associated with the service class, but might not satisfy the new requirements of the service class. Depending on your changes to the service class, users might incorrectly assume that the shares have properties that they do not possess.
- [BPCUI0271W](#) The following volumes are associated with the service class scName. If you delete the service class, the volumes are no longer associated with any service class.
- [BPCUI0272W](#) The following shares are associated with the service class scName. If you delete the service class, the shares are no longer associated with any service class.
- [BPCUI0273E](#) The action does not support the specified type of device.
- [BPCUI0274I](#) The connection test to resource data_Source_Name was successful.
- [BPCUI0275I](#) To collect data about zoning or complete zoning actions during provisioning, you must deploy Storage Resource agents to one or more servers that are on the fabric.
- [BPCUI0276I](#) Agent agentName was disabled.
- [BPCUI0277I](#) Agent agentName was enabled.
- [BPCUI0278I](#) The credentials for agentName were updated.
- [BPCUI0279I](#) There is no job defined for the device Name. Please create a job first before running it again.
- [BPCUI0280I](#) No switches are managed by the data_Source_Address data source.
- [BPCUI0282I](#) The resources that are managed by data_Source_Address are already known. One or more resources were added.
- [BPCUI0284I](#) No fabrics are managed by the data_Source_Address data source.
- [BPCUI0286I](#) The fabrics that are managed by data_Source_Address are already being monitored.
- [BPCUI0289W](#) The following network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these NSDs to a different capacity pool?
- [BPCUI0290W](#) The following file systems and network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?
- [BPCUI0291W](#) The following network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these NSDs to a different capacity pool?
- [BPCUI0292E](#) The host name or IP address ip_address or hostname cannot be reached.
- [BPCUI0293I](#) A probe is started for deviceName.
- [BPCUI0294I](#) A performance monitor is started for deviceName.
- [BPCUI0295I](#) The performance monitor is stopped for deviceName.
- [BPCUI0297W](#) One resource was added to capacity_pool_name. One resource could not be added because it could not be found.
- [BPCUI0298W](#) count resources were added to capacity_pool_name. One resource could not be added because it could not be found.
- [BPCUI0299W](#) One resource was added to capacity_pool_name. count_Not_Found resources could not be added because they could not be found.
- [BPCUI0300W](#) count resources were added to capacity_pool_name. count_Not_Found resources could not be added because they could not be found.

- [BPCUI0301E Failed to assign the role name role.](#)
- [BPCUI0302E Failed to retrieve the existing role assignments.](#)
- [BPCUI0303E Failed to remove all role assignments from the specified groups.](#)
- [BPCUI0304W An error occurred when saving the user-defined properties of the resourcesType.](#)
- [BPCUI0305E A capacity pool with the same name already exists.](#)
- [BPCUI0306W The selected resource was removed, however warnings did occur.](#)
- [BPCUI0307E The schedule could not be deleted.](#)
- [BPCUI0308I The resource does not have a connection configured. To add a connection to the resource, click Add Storage System.](#)
- [BPCUI0309I A probe schedule is defined for deviceName.](#)
- [BPCUI0310I A performance monitor schedule is defined for deviceName.](#)
- [BPCUI0311I Probe and performance monitor schedules are defined for deviceName.](#)
- [BPCUI0312I SNMP Discovery of switches is taking longer than expected. Click Close to run the discovery in the background.](#)
- [BPCUI0313I An upgrade is started for server deviceName.](#)
- [BPCUI0314E Failed to retrieve the list of user groups from the WebSphere user repository.](#)
- [BPCUI0315E Failed to retrieve the list of user groups from user repository due to an invalid search string.](#)
- [BPCUI0316W Failed to update the role cache maintained by the Device server.](#)
- [BPCUI0317E Access can not be removed, because at least one Administrator user must remain in the system.](#)
- [BPCUI0318E The group mapping can not be modified, because at least one Administrator user must remain in the system.](#)
- [BPCUI0319I A task is started for resource resourceName.](#)
- [BPCUI0320I Probe and performance monitor schedules are defined for deviceName. A performance monitor is scheduled to collect performance data after the probe is done.](#)
- [BPCUI0321I A task is paused for resource resourceName.](#)
- [BPCUI0322E A task could not be paused for resource resourceName.](#)
- [BPCUI0323I A task is resumed for resource resourceName.](#)
- [BPCUI0324E A task could not be resumed for resource resourceName.](#)
- [BPCUI0325E Failed to retrieve the list of users from the WebSphere user repository.](#)
- [BPCUI0326E Failed to retrieve the list of users from user repository due to an invalid search string.](#)
- [BPCUI0327E Failed to get the roles associated with the current user.](#)
- [BPCUI0328I A task is saved.](#)
- [BPCUI0329I A task was successfully deleted.](#)
- [BPCUI0330E The user user is not authorized to access the product.](#)
- [BPCUI0331I A task is cancelled for resource resourceName.](#)
- [BPCUI0332E An unexpected error occurred. The task for schedule schedule name could not be paused or resumed.](#)
- [BPCUI0333E An unexpected error occurred. The task for schedule schedule name could not be be paused.](#)
- [BPCUI0334E An unexpected error occurred. The task for schedule schedule name could not be resumed.](#)
- [BPCUI0335E The volumes cannot be converted or moved because the target pools do not have sufficient available space.](#)
- [BPCUI0336I The ability to provision with block storage devices is only available with the advanced license.](#)
- [BPCUI0338E Insufficient user privileges to service the REST request.](#)
- [BPCUI0339E An unexpected error occurred while authorizing the REST request.](#)
- [BPCUI0340I A task was successfully renamed.](#)
- [BPCUI0341E The task could not be renamed.](#)
- [BPCUI0342E The task could not be renamed because the specified name already exists.](#)
- [BPCUI0343I Performance monitoring is unavailable for resource resource name because the resource was not probed.](#)
- [BPCUI0344W The following service classes allow provisioning only from the capacity pool capacity_pool: service classes. If you delete this capacity pool, the service classes will allow provisioning from any available storage.](#)
- [BPCUI0346I The Storage Resource agent that is deployed on the server cannot be uninstalled.](#)
- [BPCUI0347I All servers were removed except for the product server. Entries for the product server resources might still be displayed in the GUI until all the associated removals are complete.](#)
- [BPCUI0348W You cannot provision volumes because at least one of the selected hosts was not found in the database. Ensure that all hosts that are selected for provisioning are being monitored.](#)
- [BPCUI0349W You cannot provision volumes because not all of the selected hosts appear to have Fibre Channel connectivity.](#)
- [BPCUI0350W You cannot provision volumes because the hypervisors that host the virtual machines use different operating systems.](#)
- [BPCUI0351W You cannot provision volumes because there is no Fibre Channel host port information for at least one hypervisor.](#)
- [BPCUI0352W You cannot provision volumes because not all of the hypervisors that host the virtual machines appear to have Fibre Channel connectivity.](#)
- [BPCUI0355W You cannot provision volumes because no block-storage service class exists.](#)
- [BPCUI0356W You cannot provision shares because no file-storage service class exists.](#)
- [BPCUI0357W You cannot provision volumes because you do not have permission to provision by using any block-storage service class.](#)
- [BPCUI0358W You cannot provision shares because you do not have permission to provision by using any file-storage service class.](#)
- [BPCUI0359E The credentials for the servers were not updated.](#)
- [BPCUI0360W The credentials for successfulUpdates of attemptedUpdates of the selected servers were updated.](#)

- [BPCUI0361W](#) The credentials for the selected server was updated, however warnings did occur.
- [BPCUI0362W](#) The credentials for successfulUpdates selected servers were updated, however warnings did occur.
- [BPCUI0363E](#) Cannot connect to the SNMP data source IP Address.
- [BPCUI0364I](#) The performance monitor schedule was updated for deviceName.
- [BPCUI0366W](#) The server serverName was not updated because it does not support the action.
- [BPCUI0367W](#) You cannot provision volumes to virtual machines with NPIV ports and virtual machines without NPIV ports at the same time. To provision volumes to virtual machines, ensure that you select either only virtual machines with NPIV ports or only virtual machines without NPIV ports.
- [BPCUI0368W](#) You cannot provision volumes because none of the selected hosts appear to have Fibre Channel connectivity and the automatic zoning option is enabled. Disable the automatic zoning option in your zoning policy.
- [BPCUI0369W](#) You cannot provision volumes because none of the hypervisors that manage the selected virtual machines appear to have Fibre Channel connectivity and the automatic zoning option is enabled. Disable the automatic zoning option in your zoning policy.
- [BPCUI0370E](#) The display name displayName is already assigned to resource resource Name.
- [BPCUI0372I](#) The selected hosts do not appear to have Fibre Channel connectivity. In the resulting provisioning task, ensure that the recommended storage system is connected to the hosts before you run the task. Also, be aware that all fabric-related options will be ignored.
- [BPCUI0373I](#) Volumes are assigned to the hypervisors that host virtual machines. Volumes are not assigned directly to virtual machines that do not have NPIV ports. None of the hypervisors that manage the virtual machines appear to have Fibre Channel connectivity. In the resulting provisioning task, ensure that the recommended storage system is connected to the hypervisors before you run the task. Also, be aware that all fabric-related options will be ignored.
- [BPCUI0374E](#) Schedule is not enabled for the resource resource.
- [BPCUI0375E](#) Performance data is not available.
- [BPCUI0376E](#) Invalid number of days to keep configuration history. The number should be between minimum value and maximum value.
- [BPCUI0377E](#) Invalid number of days to keep data for removed resources. The number should be between minimum value and maximum value.
- [BPCUI0378E](#) Invalid number of days to keep sample performance data. The number should be between minimum value and maximum value.
- [BPCUI0379E](#) Invalid number of days to keep hourly performance data. The number should be between minimum value and maximum value.
- [BPCUI0380E](#) Invalid number of days to keep daily performance data. The number should be between minimum value and maximum value.
- [BPCUI0381E](#) Failed to update the performance data retention settings.
- [BPCUI0382E](#) Performance monitoring is unavailable for resource resource name.
- [BPCUI0383E](#) Failed to update the history retention settings.
- [BPCUI0384E](#) Failed to retrieve the history retention settings.
- [BPCUI0385E](#) Invalid number of runs to keep log files for each schedule. The number should be between minimum value and maximum value.
- [BPCUI0386E](#) A job cannot be run for resource resourceName because there is a job already running for the resource. Wait for the job to finish and try again.
- [BPCUI0387I](#) The selected resources support different performance monitor intervals. If you select multiple resources, intervals that are common to all resources are displayed in the interval list.
- [BPCUI0388E](#) The probe schedule cannot be created for resource {0} because not all the information was provided. If you are configuring a probe for a resource for the first time, you must enter values for the probe status, time, and frequency fields.
- [BPCUI0389E](#) The performance monitor schedule cannot be created because not all the information was provided. If you are configuring a performance monitor for a resource for the first time, you must enter values for the performance monitor status and interval fields.
- [BPCUI0390I](#) The service logs were successfully created.
- [BPCUI0391I](#) The connection test to data source data source was successful. A probe is running. The health status is unknown until the probe is finished.
- [BPCUI0392I](#) The connection test to the data source data source was successful.
- [BPCUI0393E](#) The user user_name does not have sufficient privileges to deploy the vSphere Web Client extension.
- [BPCUI0394E](#) The user user_name does not have permission to log in to the vCenter Server system.
- [BPCUI0395E](#) This version of the vCenter Server server_name does not support the deployment of the vSphere Web Client extension for the product.
- [BPCUI0396E](#) The user user_ID does not have the required role. The role associated with this user must be Administrator, Monitor, or External Application.
- [BPCUI0397E](#) The vCenter Server user name or password is invalid.
- [BPCUI0398E](#) The user name or password is invalid.
- [BPCUI0399I](#) The server was started.
- [BPCUI0400E](#) Failed to retrieve the system management information from the Data server.
- [BPCUI0402E](#) Failed to retrieve the server status of the Data server.
- [BPCUI0403E](#) The SMI-S provider service is not available.
- [BPCUI0404E](#) An error occurred while updating the trace log configuration file. The original file file was deleted and could not be restored. A backup of this file may be available at backup file.

- [BPCUI0405E Failed to set the trace settings from the Data server.](#)
- [BPCUI0406E Cannot start the server. The start script reported the following error: error](#)
- [BPCUI0407E Cannot start the server. Unable to locate the start script path to script.](#)
- [BPCUI0408E Cannot start the server. Unable to execute the start script path to script.](#)
- [BPCUI0409W The server is taking a long time to start. If the server status continues to show an error status after a reasonable interval, try to start the server again.](#)
- [BPCUI0410E Cannot stop the server. The stop script reported the following error: error](#)
- [BPCUI0411W The server is taking a long time to stop. If the server status continues to show that it is still running try to stop the server again after a reasonable interval.](#)
- [BPCUI0412E Cannot stop the server. Unable to locate the stop script path to script.](#)
- [BPCUI0413E Cannot stop the server. Unable to execute the stop script path to script.](#)
- [BPCUI0414W It is taking a long time for the services to start. If the server status continues to show an error status after a reasonable interval, try to start the services again. If the problem persists then restart the server.](#)
- [BPCUI0415E Failed to start the service service name.](#)
- [BPCUI0416I The server was stopped.](#)
- [BPCUI0417I The services of the server were started.](#)
- [BPCUI0418E The action cannot be completed because the data source that is managing this resource cannot be reached.](#)
- [BPCUI0419E A Storage Resource agent is already deployed for this server and has a status of Pending deployment or Failed deployment. Use the Servers page to resolve the deployment errors or modify the deployment schedule.](#)
- [BPCUI0420E A file access error occurred when the system attempted to back up or modify the tracing configuration file configuration file.](#)
- [BPCUI0421E There is a log collection operation already running. A new one cannot be submitted until the current one completes.](#)
- [BPCUI0422E Cannot start the log collecting job. Unable to locate the required script path to script.](#)
- [BPCUI0423E Cannot start the log collecting job. Unable to run the log collection script path to script.](#)
- [BPCUI0424E Storage cannot be provisioned from capacity_pool capacity_pool using service class service class for the following reason:](#)
- [BPCUI0425W The task task name cannot be scheduled because it is already running.](#)
- [BPCUI0426E Storage cannot be provisioned by using service class service class for the following reason:](#)
- [BPCUI0427W The selected group action is complete for all tasks, but warnings were reported.](#)
- [BPCUI0428I The selected group action is complete for all tasks. Some informational messages were returned.](#)
- [BPCUI0429E The validation process cannot contact the server. The server might be down or unreachable due to network problems.](#)
- [BPCUI0430I Some tasks were not deleted because they were already run.](#)
- [BPCUI0431E Failed to retrieve the list of managed devices.](#)
- [BPCUI0432E Failed to retrieve the performance monitoring granularity from the Device server. Check the connection to the Device server and retry the operation.](#)
- [BPCUI0433E OS type osType specified on line line of file file is not valid.](#)
- [BPCUI0434E Data source data_source Key could not be found.](#)
- [BPCUI0435E Required host name or IP address and OS type were not specified on line line of file file.](#)
- [BPCUI0436E The alert notification settings cannot be displayed.](#)
- [BPCUI0437E The alert notification settings cannot be saved.](#)
- [BPCUI0438E File file does not exist or is empty.](#)
- [BPCUI0439E The file file could not be uploaded.](#)
- [BPCUI0440E The text location specified on line line of file file has invalid character\(s\): characters](#)
- [BPCUI0441E The alert definitions cannot be displayed.](#)
- [BPCUI0442E The alert definitions cannot be saved.](#)
- [BPCUI0443E Select at least one managed server that is deployed for which alert notification settings need to be displayed.](#)
- [BPCUI0444E Select at least one managed server that is deployed for which alert definitions need to be displayed.](#)
- [BPCUI0445W The discovery job completed with errors. Some available devices were not discovered.](#)
- [BPCUI0446E Unable to test the connection to the device because the request was not processed by the data collector.](#)
- [BPCUI0447E Select at least one managed storage subsystem for which alert notification settings need to be displayed.](#)
- [BPCUI0448E Select at least one managed storage subsystem for which alert definitions need to be displayed.](#)
- [BPCUI0449E The user does not have the required authority to complete the task or command.](#)
- [BPCUI0451E One or more applications from provided list: names do not exist.](#)
- [BPCUI0452E entity name is not supporting data collection actions.](#)
- [BPCUI0453E One or more departments from provided list: names do not exist.](#)
- [BPCUI0455I No performance data is available for the selected resources.](#)
- [BPCUI0456E You cannot complete the action because the service is temporarily unavailable.](#)
- [BPCUI0457W The applications listOfApplications cannot be deleted because they contain subcomponents subcomponent, which cannot be moved up a level in the applications hierarchy due to name conflicts with existing applications in that higher level.](#)
- [BPCUI0458W The departments listOfDepartments cannot be deleted because they contain subdepartments or applications subdepartment, which cannot be moved up a level in the departments hierarchy due to name conflicts with departments in that higher level.](#)

- [BPCUI0459W The selected subcomponents cannot be removed from the application because they cannot be moved up a level in the application hierarchy due to name conflicts with the existing applications or subcomponents at the higher level.](#)
- [BPCUI0460W The selected applications or subdepartments cannot be removed from the department because they cannot be moved up a level in the department hierarchy due to name conflicts with the existing applications or subdepartments at the higher level.](#)
- [BPCUI0461W There are no task details to display. The analysis-execution task could not be run.](#)
- [BPCUI0462E Failed to add the device because the data collector is not responding.](#)
- [BPCUI0463E The discovery failed because the data collector is not responding.](#)
- [BPCUI0464E The connection test failed because the data collector is not responding.](#)
- [BPCUI0465E The requested action failed because the data collector is not responding.](#)
- [BPCUI0466I The servers were created.](#)
- [BPCUI0467W successCount of totalCount servers were created.](#)
- [BPCUI0468E The creation of the servers failed.](#)
- [BPCUI0469E Schedule job does not exist for entity name.](#)
- [BPCUI0470E Invalid file file size of size GB. Maximum allowed file size is max size GB.](#)
- [BPCUI0471E Failed to set the trace settings from the Alert server.](#)
- [BPCUI0472E Failed to retrieve the system management information from the Alert server.](#)
- [BPCUI0474E Failed to retrieve the server status of the Alert server.](#)
- [BPCUI0475I The volumes have been excluded from the reclamation analysis.](#)
- [BPCUI0476I The volumes will be included in future analyses to reclaim storage.](#)
- [BPCUI0477E An unexpected error occurred when modifying the optimization characteristics of the volumes.](#)
- [BPCUI0478E The scheduled agent upgrade time is in the past.](#)
- [BPCUI0479E The object storage credentials are incorrect. Enter the correct credentials. Alternatively, clear the object credentials check box and do not specify the authentication credentials for object storage now. You can use the Modify Connection action to add the object storage later.](#)
- [BPCUI0480E An object storage request failed on the GPFS cluster.](#)
- [BPCUI0481W No resources were removed.](#)
- [BPCUI0482E No resources were updated.](#)
- [BPCUI0483E The connection information cannot be updated because it points to another device.](#)
- [BPCUI0484I The connection information for device name was updated.](#)
- [BPCUI0485E The connection information cannot be updated.](#)
- [BPCUI0486E Cannot query the object service for information about accounts and containers as the specified user does not have admin privileges.](#)
- [BPCUI0487I The connection information of the selected device was successfully updated. Other devices were detected as being managed by the same data source. Would you like to update the connection information of all of them?](#)
- [BPCUI0488I The connection information of all devices connecting through this data source was updated.](#)
- [BPCUI0489W Some of the devices connecting through this data source failed to be updated.](#)
- [BPCUI0490I The vCenter vCenter Server was removed.](#)
- [BPCUI0491E The vCenter vCenter Server was not found in the database.](#)
- [BPCUI0492E The selected vCenter Servers were not found in the database.](#)
- [BPCUI0493I The vCenter vCenter Server and all number of monitored hypervisors hypervisors monitored by it were successfully removed.](#)
- [BPCUI0494I The number of vCenters selected vCenter Servers and all number of monitored hypervisors hypervisors monitored by them were successfully removed.](#)
- [BPCUI0495W Only number of removed vCenters of number of selected vCenters of the selected vCenter Servers and number of removed monitored hypervisors of number of monitored hypervisors of the hypervisors monitored by them were successfully removed.](#)
- [BPCUI0496I The following fabrics were detected as being managed by the same data source: comma separated fabrics list. This action applies to all fabrics that are managed by the current data source. Would you like to update the connection information of all of them?](#)
- [BPCUI0497E The following fabrics cannot be monitored through the SMI agent: comma separated fabrics list. The data source connection information will not be updated.](#)
- [BPCUI0498E The fabric cannot be monitored through the SMI agent.](#)
- [BPCUI0499I Other switches were detected as being managed by the same data source. This action applies to all switches that are managed by the current data source. Would you like to update the connection information of all of them?](#)
- [BPCUI0500E One or more switches cannot be monitored through the SMI agent. The data source connection information will not be updated.](#)
- [BPCUI0501E The information cannot be displayed. Log out of the GUI, log in, and try the action again.](#)
- [BPCUI0502E The device is already managed by this data source. The data source connection information will not be updated.](#)
- [BPCUI0503I The connection information of the selected switches was updated.](#)
- [BPCUI0504I The detected versions of the resources discovered on the data source data_Source_Address are unsupported.](#)
- [BPCUI0505E The resource does not have a connection configured.](#)
- [BPCUI0506E Cannot connect to the Alert server.](#)
- [BPCUI0507E The version of the tpc_server IBM Spectrum Control Server is not supported.](#)
- [BPCUI0508E Cannot connect to the rollup server rollup_server on port host_port.](#)
- [BPCUI0509E Cannot authenticate with the rollup server using the provided credentials.](#)

- [BPCUI0510E You entered an invalid time range. The start date and time must be before the end date and time.](#)
- [BPCUI0511E The following alert name\(s\) are not unique: names.](#)
- [BPCUI0512E Custom alerts already exist for other resources with the following alert name\(s\): names.](#)
- [BPCUI0513E Unable to connect from rollup server rollup_server to the repository database.](#)
- [BPCUI0514E The specified subordinate server subordinate_server is the master server.](#)
- [BPCUI0515E The duration of the automated probe run window must be at least minimum_hours hours.](#)
- [BPCUI0516W The selected subgroups cannot be removed from the general group because they cannot be moved up a level in the groups hierarchy due to name conflicts with the general groups at the higher level.](#)
- [BPCUI0519E Authorization has failed because the private key is not valid for the user name that you have specified.](#)
- [BPCUI0520E The IP address ip_address for the FlashSystem storage system is not the management IP address.](#)
- [BPCUI0521E The configuration for the report can't be saved.](#)
- [BPCUI0522E Failed to delete a report configuration.](#)
- [BPCUI0523E Alerts cannot be defined for this storage system.](#)
- [BPCUI0524E The changes to the report configuration can't be saved.](#)
- [BPCUI0525E The configuration for the report can't be saved because the report title isn't unique.](#)
- [BPCUI0527E The action cannot be completed because of an invalid request.](#)
- [BPCUI0528E The action cannot be completed because of an invalid file upload request.](#)
- [BPCUI0526I The connection test to data source data_source was successful. A probe is running.](#)
- [BPCUI0529I The data source data_Source is already being managed as a data source for monitoring. No new resources were detected.](#)
- [BPCUI0530I The data source data_Source is already being managed as a data source for monitoring. The following new resources were detected:](#)
- [BPCUI0531E The action cannot be completed because LDAP registry file failed to upload.](#)
- [BPCUI0532E The action failed because of a missing resource.](#)
- [BPCUI0533E The LDAP configuration test failed.](#)
- [BPCUI0534E There was an error executing the collect log process. If this problem persists, you can try collecting and uploading the service logs manually. Learn More.](#)
- [BPCUI0535E An FTP connection can not be established. If your organization requires the use of a proxy server, consult the following documentation: Troubleshooting FTP Transfers.](#)
- [BPCUI0536E The support data collection failed due to an invalid PMR number format.](#)
- [BPCUI0537E The support package could not be created because file system permissions prevent the creation of temporary files.](#)
- [BPCUI0538E The support data collection completed creating a support package, but the package could not be uploaded to IBM.](#)
- [BPCUI0539E The support data collection failed with an internal error.](#)
- [BPCUI0540E The support data collection failed due to an invalid email address format.](#)
- [BPCUI0541E The specified SMI agent was not found. Make sure that the protocol, SMI agent host name or IP address, and port are specified correctly and that the SMI agent is properly configured at that location.](#)
- [BPCUI0542E A connection was not established. Make sure that the protocol, SMI agent host name or IP address, and port are specified correctly.](#)
- [BPCUI0543E The authentication to the SMI agent failed.](#)
- [BPCUI0544E There is a pending delete in process for this SMI agent.](#)
- [BPCUI0545E The SMI agent service is not available.](#)
- [BPCUI0546E The action cannot be completed because the LDAP registry file could not be updated.](#)
- [BPCUI0547E Connection failed. The server might be down or unreachable due to network problems.](#)
- [BPCUI0548E The add SSL certificate action failed.](#)
- [BPCUI0549E The add SSL certificate action failed because of a wrong password.](#)
- [BPCUI0550E The specified storage resource is not valid for the REST API service request.](#)
- [BPCUI0551E The file cannnot be used because it is not a valid SSL certificate. Select a valid certificate file and try again.](#)
- [BPCUI0554E The SSL certificate download process failed.](#)
- [BPCUI0555E The test connection to the LDAP server failed. Verify that your XML file contains the correct syntax and values and that the LDAP server is running.](#)
- [BPCUI0556E An unexpected error occurred creating or updating a support ticket.](#)
- [BPCUI0557E An invalid request was made when creating or updating a support ticket.](#)
- [BPCUI0558E This tier name is already in use. Enter a different name.](#)
- [BPCUI0559E The custom dashboard was removed by another user. Cancel the action and refresh the page manually.](#)
- [BPCUI0600W Can't save the scheduling information for the report because the Data server is offline.](#)
- [BPCUI0601I The resource does not have a connection configured. To add a connection to the resource, click Add Switch or Add Fabric.](#)
- [BPCUI0602E The osAuthentication script does not start. The script reported the following error: script_error.](#)
- [BPCUI0603E The connection test to data source data_source was not successful.](#)
- [BPCUI0604E Can't stop data collection for entity_name.](#)
- [BPCUI0605E Can't restart data collection for entity_name.](#)
- [BPCUI0606E The action cannot be completed because there was a failure to create or write into the pending configuration file.](#)
- [BPCUI0607E The action cannot be completed because there was a failure to read the pending LDAP registry file.](#)
- [BPCUI0608E The action cannot be completed because there was a failure to get the list of LDAP groups.](#)

- [BPCUI0609E The Local OS authentication configuration test failed.](#)
-

BPCUI0000E The action can't be completed because the following error occurred: *Error message text.*

Explanation

The specified error occurred while processing a request.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)
-

BPCUI0001E An action could not be completed and the following error message was generated:
TPCRemoteException message

Explanation

The action could not be completed because of an error related to the Device server component.

Action

Try the following actions:

- Check the status of the Device server on the Home > System Management page.
 - Check for error messages in the log file of the Device server.
 - Verify that the database repository is up and running.
 - Try the action again.
-

BPCUI0002E Failed to retrieve the requested data because the service is unavailable.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will resume as soon as possible.

Action

This problem might occur when the service is interrupted. IBM Marketplace is investigating the problem and service will resume as soon as possible.

BPCUI0003E The NAPI with the IP address *Napi IP* was not added because of an Internal Error

Explanation

Action

BPCUI0004E The SSH private key for the NAPI *Napi IP* could not be uploaded

Explanation

Action

BPCUI0005E The action cannot be completed because the following internal error has occurred: *message*.

Explanation

An error occurred while processing a user request.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)

BPCUI0007E The discovery job failed to complete.

Explanation

No storage resources were detected because the discovery job did not complete.

Action

Check the Device server log files for error messages that might help determine why the discovery job failed. For the location of the log files, go to IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93/> and view the Reference section.

BPCUI0009E The SSH key could not be loaded for the following reason: *IOException message*

Explanation

Upload of the file failed. Please retry the upload.

BPCUI0010E The host name or IP address that you entered is a *resource_type*, but you selected to add a different type of storage system.

Explanation

The model of the storage system that you add must match the type of storage system that you selected to add.

BPCUI0011E The Device Server did not discover any device

Explanation

The Device Server did not discover any device

BPCUI0012E Cannot connect to the device with the address *Ip Address*.

Explanation

The storage device with this IP address cannot be reached.

Action

Ensure that the IP address of the storage device is correct and that the device is running properly. If the problem continues, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)

BPCUI0019E No data is available for this selection.

Explanation

No data is available for this selection.

BPCUI0025E Probe job *job Id* failed.

Explanation

The probe job failed. The log will provide detailed information.

Action

BPCUI0029E Invalid parameter *param* passed.

Explanation

An invalid parameter was passed.

Action

BPCUI0030I This task was already executed.

Explanation

You are attempting to execute, schedule, or delete a task that was already executed. The task was possibly executed by another user.

Action

No action is required.

BPCUI0032E An unexpected response was received from the server.

Explanation

To find the cause of the issue, further investigation is required.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)

BPCUI0034E Invalid number of runs to keep for each schedule. The number should be between *param1* and *param2*.

Explanation

The entered number of runs to keep is not in the valid range. Please enter a valid number.

Action

BPCUI0035E Invalid number of days' worth of log-files to keep. The number should be between *param1* and *param2*.

Explanation

The entered number of days' worth of log-files to keep is not in the valid range. Please enter a valid number.

Action

BPCUI0036E The schedule id *scheduleID* associated with this job is no longer valid. It might have been deleted. Refresh the view and try again.

Explanation

The requested schedule does not exist in the database. It was either deleted in the meantime or the provided schedule id is not valid

Action

BPCUI0037E The replication server is not installed or is unavailable.

Explanation

The replication server cannot be reached. This condition might occur if the server is not installed or is unavailable.

Action

Verify that the replication server is installed and the local area network is available. If the server is installed, ensure that it is running and then try to add the resource again. If the server is not installed, run the product's installation program to install it and then try to add the resource again.

BPCUI0038E Invalid number of days to retain alerts. The number should be between *param1* and *param2*.

Explanation

The entered number day to retain alerts is not in the valid range. Please enter a valid number.

Action

BPCUI0039E A Storage Resource agent cannot be found.

Explanation

This problem might occur if a Storage Resource agent was not installed locally or was disabled.

Action

Verify that a Storage Resource agent is installed locally and is enabled. To determine if an agent is enabled on a server, go to the Servers page in the product, locate the server, and check the value in the Agent State column.

BPCUI0040E Parsing results from a call to the Data server failed with the following error message: param1.

Explanation

An issue was encountered while trying to parse results that were returned from a call to the Data server. This could be due to corrupted data sent from the data server, or to network problems, or other causes.

Action

Verify that the Data server is running properly and that the network is not experiencing difficulties.

BPCUI0042E Communication with the Data Server failed with the following error: param1

Explanation

Unable to contact the data server.

Action

Use the above error message to identify the cause of the problem. Verify that the data server, service, and port are all running properly and that database repository and the network are working properly.

BPCUI0043E Cannot connect to the Data server.

Explanation

The user interface cannot communicate with the Data server. This error might occur if the Data server is down, the Data server is in maintenance mode while updating agents or the local area network between the user interface and the Data Server is unavailable.

Action

Verify that the Data Server is up and running. Ensure that the Data server is not in maintenance mode and that the local area network is available. If the problem persists, check the Data server log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

If not already done, set the maximum level of tracing for the Data server to aid in resolution of the problem.

BPCUI0044E The entity was not found in the database.

Explanation

This error might occur if the entity was already deleted.

Action

BPCUI0045E Host name length exceeds the 255 character limit

Explanation

The host name must be less than or equal to 255 characters

Action

BPCUI0046E Report '*configurationId*' not found

Explanation

Post installation script may have failed.

Action

BPCUI0047E Parameter '*parameterName*' is not defined in report *configurationId*'

Explanation

Parameter name could be incorrect or the parameter is not defined in report.

Action

BPCUI0048E No property is defined for report *configurationId*'

Explanation

Parameter name could be incorrect or the parameter is not defined in report.

Action

BPCUI0049E No such property *propertyName* for report *configurationId*'

Explanation

Parameter name could be incorrect or the parameter is not defined in report.

Action

BPCUI0050E *variableName* can not be overridden

Explanation

Value for reportOutputFormat can be modified.

Action

BPCUI0051E *variableName* not valid report output format.

Explanation

PDF,XML,CSV,HTML,SINGLEXLS,SPREADSHEETML,XLWA are valid report output format.

Action

BPCUI0052E *variableName* not reachable

Explanation

TCR URL may not be reachable.

Action

BPCUI0053E Cannot authenticate with the provided user credentials.

Explanation

The user name or password that was entered for the device is not correct.

Action

Make sure that the user name and password are correct for the device that is being added. Reenter the user name or password and click Add again. If you are adding a Storwize V7000 Unified storage system, specify the IP address of the block component, not the filer component.

BPCUI0054E The host name or IP address {0} is not valid.

Explanation

The IP address or host name that was entered for the device is not valid.

Action

Make sure that the IP address and host name are valid for the device that is being added. Reenter the IP address or host name and click Add again.

BPCUI0055E Cannot connect to the storage system.

Explanation

This problem might be caused by the following conditions:

- For DS8000 storage systems, this problem might occur because the DS8000 ESSNI server is not available or is not allowing connections.
- For all storage systems, this problem might be caused by the values for connection protocols. IBM Spectrum Control uses different connection protocols to connect to resources. The default values of the connection protocols were changed for different releases of the products, which might cause connection failures.

Action

To resolve the problem, try the following actions:

-Verify that the ESSNI server is up and running. Use a tool such as ping to verify that the ESSNI server can be reached from the system where the data collector is installed. If the server can be reached and the problem persists, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

-Verify that the ESSNI server firmware is current.

Related reference

- [Products and services page](#)
- [Adding DS8000 storage systems that use SSLv3 and MD5 signed certificates](#)

BPCUI0056E Cannot connect to the storage system or cluster.

Explanation

The device that is being added might not be up and running. Also, the IP address, host name, or user credentials that was entered for the storage system or cluster might not be valid.

Action

Verify that the device is up and running. Also, make sure that the IP address, host name, and user credentials are correct for the device that is being added. Reenter the values and click Add again.

BPCUI0058I No supported resources were discovered on the data source *data_Source_Address*.

Explanation

The resources that were discovered on the specified data source are not supported.

Action

For a list of data sources that you can use with the product, go to the support matrix at <http://www.ibm.com/support/docview.wss?uid=swg21386446>.

BPCUI0060I File *param* was successfully uploaded to the Data Server.

Explanation

The file the user selected was successfully uploaded to the Data Server.

Action

The file should be placed on the Data Server and ready to be used by the deployment job.

BPCUI0061E Upload file type *param* is not supported.

Explanation

The upload file type is not supported.

Action

Check the upload file type and provide a correct file type.

BPCUI0062E The requested action failed with the following error message: *error message*

Explanation

The requested action did not complete, and the specified error message was returned.

Action

BPCUI0063E Cannot find jobs for scheduleId *param* and deviceId *param*. No logs are displayed.

Explanation

Jobs related to the schedule and device are not available.

Action

Verify that the schedule was run for the device.

BPCUI0064E A log file cannot be displayed for the job.

Explanation

The selected job does not have an associated job log file.

Action

Verify that the database repository is up and the related database service is active. Ensure that all required product servers are running and that the local area network is available. To check the status of the servers, go to the Home > System Management page.

You can also check the log files of the servers for error messages that might help determine the problem.

For information about how to determine if the database repository is active, if the product servers are running, and the location of log files, go to the IBM Knowledge Center and check the Administering section. You can access the IBM Knowledge Center for the product at <http://www.ibm.com/support/knowledgecenter/SS5R93>.

BPCUI0065E The job log file cannot be accessed. The log file may have been manually removed or may have been deleted because it was older than *retain_days* days or it exceeded the maximum number of *no_of_lofs* runs.

Explanation

The job log file cannot be accessed. The log file may have been manually removed or may have been deleted because it was older than the specified number of days or it exceeded the maximum number of runs.

Action

Verify that the log file exists in the specified location.

BPCUI0067E The schedule for collecting status and asset data cannot be created.

Explanation

If you can't schedule a probe to collect data about a resource, it might mean that the product servers are down or the local area network is not available.

Action

Ensure that all required product servers are running and that you have a network connection to the system on which they are located. To check the status of the servers, go to the Home > System Management page.

BPCUI0068E A proposed schedule for collecting status and asset data cannot be created.

Explanation

No further explanation required.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)

BPCUI0069E The proposed schedule for collecting status and asset data cannot be deleted.

Explanation

No further explanation required.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)

BPCUI0071E The task `task_name` could not be completed.

Explanation

An error prevented the task from completing. For further details, consult the system log file.

Action

Check the trace.log file in the logs directory for entries mentioning the failed task. If the problem persists, contact IBM Software Support.

BPCUI0072E Cannot connect to the Device server. Verify that the database service and Device server are running, and that the Device server is accessible.

Explanation

The Device server is unavailable. This error might occur if the Device server is down or the local area network is unavailable.

Action

Verify that the database service and Device server are up and running. Ensure that you have a network connection to the server on which the Device server is located. Try the action again.

BPCUI0073E Can't make a connection to the storage_resource storage resource.

Explanation

The connection to the resource with the host name or IP address that was specified was unsuccessful.

Action

Complete the following tasks:

- Check that the correct host name or IP address of the storage resource was entered.
- Check whether you have a network connection to the storage resource that was specified.

If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)

BPCUI0074E The wizard could not set an attribute for the storage resource.

Explanation

The wizard could not set a user-defined attribute for the storage resource because an error occurred on the Device server. Examples of user-defined attributes include the location and display name of the storage resource.

Action

Ensure that the Device server is running and that the local area network is available. If the problem persists, check the Device server log files for error messages that might help determine the problem. See the product information center to view the locations of the log file.

BPCUI0075E The certificate wasn't saved on the server.

Explanation

Certificates are saved to a repository called a truststore. The certificate for this device could not be saved to the truststore.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

BPCUI0076W The initial job to collect status and asset data did not start.

Explanation

The wizard cannot start a job for collecting status and asset data from the storage resource.

Action

Ensure that the Device server is running and that the local area network is available. If the first scheduled job to collect status and asset data also does not start, check the Device server log files and Data server log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

Related reference

- [Products and services page](#)

BPCUI0077E A failure occurred loading the certificate.

Explanation

Loading of a certificate to the truststore failed for an unknown reason.

Action

Contact IBM

Related reference

- [Getting help for IBM Storage Insights](#)

BPCUI0078I The certificate was loaded successfully.

Explanation

The user has successfully loaded a certificate into the server's truststore.

Action

No action is required.

BPCUI0079E The SSL certificate is not in the expected format.

Explanation

Loading of a certificate to the truststore failed because the certificate was not in the x.509 format.

Action

Ensure that the certificate being loaded is in the X.509 format.

BPCUI0084W The wizard could not retrieve the default interval information for performance monitoring.

Explanation

The wizard could not retrieve the default interval information for the device from the Device server. The interval value represents the number of minutes over which performance data is averaged.

Action

Ensure that the Device server is running and that the local area network is available. Check the Device server log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

BPCUI0085E The user name or password for the hypervisor or vCenter hypervisor or vCenter Server is invalid.

Explanation

The user name or password is not valid for the specified hypervisor or vCenter Server.

Action

To resolve the problem, try the following actions:

- Ensure that you specified the correct host name, user name, and password for the hypervisor or vCenter Server.
- Verify that the local area network is available and that you can connect to the hypervisor or vCenter Server.
- Ensure that the Device server is running.
- Check the Device server log files for error messages that might help to determine the problem. For the location of these log files, search the IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93/>.

BPCUI0086E The SSL certificate is invalid for the hypervisor or vCenter hypervisor or vCenter Server, or the firewall is blocking access to it.

Explanation

The product cannot communicate with the hypervisor or vCenter Server.

Action

To resolve the problem, try the following actions:

- Ensure that the SSL certificate file is valid for the hypervisor or vCenter Server.
- Verify that the local area network is available and that you can connect to the hypervisor or vCenter Server.
- Ensure that any required firewall authorization was granted.
- Ensure that the Device server is running.
- Check the Device server log files for error messages that might help to determine the problem.

If you need more information, go to the IBM Knowledge Center and check the "Administering" section. You can access the IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93/welcome>.

BPCUI0087E The version of the hypervisor or vCenter hypervisor or vCenter Server is not supported.

Explanation

You can manage only the supported versions of hypervisors and vCenter Servers.

Action

Check the product support site at www.ibm.com/support/docview.wss?uid=swg27039840 for a list of hypervisor and vCenter Server versions that are supported.

BPCUI0088E The host name, protocol, or port for the hypervisor or vCenter hypervisor or vCenter Server is invalid, or the hypervisor or vCenter Server is unreachable.

Explanation

The specified host name, protocol, or port number is invalid and cannot be used to communicate with the hypervisor or vCenter Server, or the hypervisor or vCenter Server is unreachable.

Action

To resolve the problem, try the following actions:

- Ensure that you specified the correct host name, protocol, and port number for the hypervisor or vCenter Server.
 - Verify that the local area network is available and that you can connect to the hypervisor or vCenter Server.
 - Ensure that the Device server is running.
 - Check the Device server log files for error messages that might help to determine the problem. For the location of these log files, search the IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93/>.
-

BPCUI0089W Cannot retrieve a valid set of data collection intervals for performance monitoring.

Explanation

Monitored devices have a specific set of intervals that determine how often their performance data can be collected. For this device, the interval information could not be retrieved from the Device server.

Action

Ensure that the Device server is running and that the local area network is available. Check the Device server log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

BPCUI0090I All alerts were removed.

Explanation

This message is for informational purposes only

Action

No further action is required

BPCUI0091W *error_count* of *total_count* alerts were not removed.

Explanation

>Not all the acknowledged alerts were removed in the alert log..

Action

>Ensure that the local area network is available. Verify that the Device server and Data server are running, and that the database is operational. Check the product log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

BPCUI0093I No data path is available for *deviceNameVariable*.

Explanation

The selected device either does not have a data path or the devices for the data path are not known to the system.

Action

There is no action if the device does not have a data path. If the device is part of a data path, ensure the other devices are added to the system and probed.

BPCUI0094E Authorization failed due to an internal error.

Explanation

The authorization infrastructure was not initialized successfully.

Action

Contact IBM support.

BPCUI0097E Authorization failed due to an invalid request context.

Explanation

The authorization infrastructure was not initialized successfully.

Action

Contact IBM support.

BPCUI0098E The current user is not authorized to perform the requested function.

Explanation

The role assigned to the current user does not have sufficient privileges to perform the requested function.

Action

Request additional privileges from the storage administrator.

BPCUI0099E Information about the storage resource is not available.

Explanation

The storage resource that you want to monitor is offline or can't be accessed. The problem might occur for one or more of the following reasons:

- Your network might be down or experiencing connection issues.
- The data collector is down or can't communicate with IBM Storage Insights or the resource that you're adding.
- The storage resource that you want to monitor is offline or can't be accessed.
- A browser bookmark was used to access a storage resource that is no longer monitored.

Action

Try one or more of the following actions to try to resolve the problem:

- Verify that your network is up and running.
- Verify that your data collectors are online and can connect to IBM Storage Insights and the resource that you're adding.
- Check the probe logs for the data collector for connection errors.
- Remove the bookmark for the storage resource from the web browser.
- Add the storage resource for monitoring again.

If the problem persists, contact IBM Support.

Related reference

- ➔ [Adding storage systems](#)

- [IBM Support Portal](#)
-

BPCUI0100I *success_count* alerts were marked as acknowledged.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0101I The alert was marked as acknowledged.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0102E None of the alerts were marked as acknowledged.

Explanation

None of the alerts in the alert log were marked as acknowledged.

Action

Verify that there are unacknowledged alerts in the list. Ensure that the local area network is available, and that the Device server and Data server are running, and that the database is operational. Check the product log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

BPCUI0104I *success_count* alerts were marked as unacknowledged.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0105I The alert was marked as unacknowledged.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0108I All informational alerts were marked as acknowledged.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0110W Some informational alerts were not marked as acknowledged.

Explanation

Not all of the informational alerts were marked as acknowledged in the alert log.

Action

Ensure that the local area network is available. Verify that the Device server and Data server are running, and that the database is operational. Check the product log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

BPCUI0111I All alerts were marked as acknowledged.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0112I success_count alerts were removed.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0113I The alert was removed.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0114I All acknowledged alerts were removed.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BPCUI0116W Some acknowledged alerts were not removed.

Explanation

Not all of the acknowledged alerts were removed from the alert log.

Action

Ensure that the local area network is available. Verify that the Device server and Data server are running, and that the database is operational. Check the product log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

BPCUI0120W Some acknowledged alerts were not marked as unacknowledged.

Explanation

Not all the acknowledged alerts were changed to unacknowledged in the alert log.

Action

Ensure that the local area network is available. Verify that the Device server and Data server are running, and that the database is operational. Check the product log files for error messages that might help determine the problem. See the product information center to view the locations of these log files.

BPCUI0121E Unable to communicate with the product server. Make sure that the server is running properly.

Explanation

The most recent request that was sent to the server did not complete. This problem might occur if communication with the server cannot be established, or if the local area network is unavailable.

Action

To resolve this problem, verify that the local area network is available.

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)
-

BPCUI0122E No job log file was created for this job run.

Explanation

The server did not create a job log for the job run.

Action

Ensure that all required product servers and services are running and that you have a network connection to the system on which they are located. To check the status of the servers, go to the Home > System Management page.

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)
-

BPCUI0123E The action cannot be completed.

Explanation

An error occurred when the server tried to process a request. This message might occur when a request is not handled correctly by the internal framework.

Action

Ensure that all required product servers and services are running and that you have a network connection to the system on which they are located. To check the status of the servers, go to the Home > System Management page.

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)
-

BPCUI0124E An unexpected error occurred during the execution of the action.

Explanation

While executing the action, an unexpected error occurred.

Action

Contact IBM Support.

BPCUI0125E The alert is not available.

Explanation

The alert cannot be displayed on the page. This problem might occur if a bookmark or URL was used to access the alert, but that alert has been removed.

Action

Remove the bookmark for the storage resource from the web browser.

BPCUI0126E The status of the Performance Monitors could not be retrieved.

Explanation

The status of the Performance Monitors could not be retrieved from the Device Server.

Action

Verify that the Device Server is running properly and that the network is not experiencing difficulties.

BPCUI0127E The currently installed version of the product does not have the required product license for the function that you requested.

Explanation

You need a different product license to perform the function that you requested.

Action

Go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)
-

BPCUI0128E An undefined capacity chart metric was requested.

Explanation

While viewing a capacity bar chart, an unknown metric was requested. This error should never be seen by the user.

Action

Customer should not see this error. Contact IBM Support.

BPCUI0129I Alerts that were migrated from a previous version of the product are not shown on this page.

Explanation

Alerts are generated when certain conditions are detected on monitored resources. The version of the product that detected an alert determines where information about the alert is displayed. Alerts that were generated in recent versions of the product are displayed on the Alerts page and also on the detail pages of their associated resource. Alerts that were generated in older versions of the product, also called migrated alerts, are only displayed on the Alerts page.

Action

If you migrated alerts from a previous version, go the Alerts page to view the full list of all historical alerts for the resource that is being displayed. To access the Alerts page, click the link in the message or select Alerts from the menu.

This warning message is shown only if one or more migrated alerts still exist in the database. When all migrated alerts are either manually deleted or become old enough to be deleted automatically, this warning is no longer displayed. Alternatively, you can suppress the warning message by clicking Don't show this again in the warning message window.

BPCUI0130E The alerts cannot be acknowledged because they were deleted.

Explanation

None of the alerts were marked as acknowledged in the alert log because these no longer exist in the database.

Action

No further action is required.

BPCUI0131E The alerts cannot be unacknowledged because they were deleted.

Explanation

None of the alerts were marked as unacknowledged in the alert log because these no longer exist in the database.

Action

No further action is required.

BPCUI0132W *success_count* alerts were marked as acknowledged. *unsuccess_count* alerts cannot be marked as acknowledged because they were deleted.

Explanation

Not all of the alerts were marked as acknowledged in the alert log because these no longer exist in the database.

Action

No further action is required.

BPCUI0133W *success_count* alerts were marked as unacknowledged. *unsuccess_count* alerts cannot be marked as unacknowledged because they were deleted.

Explanation

Not all of the alerts were marked as unacknowledged in the alert log because these no longer exist in the database.

Action

No further action is required.

BPCUI0134E The alert cannot be acknowledged because it was deleted.

Explanation

The alert was not marked as acknowledged in the alert log because this no longer exist in the database.

Action

No further action is required.

BPCUI0135E The alert cannot be unacknowledged because it was deleted.

Explanation

The alert was not marked as unacknowledged in the alert log because this no longer exist in the database.

Action

No further action is required.

BPCUI0136E The device was not removed because the action is not supported for devices of type *devType*.

Explanation

An internal operating error occurred. Check the logs for an indication of an error or exception and contact IBM customer support.

Action

Check the logs for an indication of an error or exception and contact IBM customer support.

BPCUI0137E Input text provided has invalid character(s) : *characters*. Input text: *text*

Explanation

Action

Please do not use the characters which are not allowed in the input.

BPCUI0141E Host name or IP address *hostname* specified on line *line* of file *file* is not valid.

Explanation

The specified host name or IP address in the file is not valid.

Action

Enter a valid host name or IP address. Host names must be less than 255 characters in length, contain letters 'a' through 'z' or digits '0' through '9'. Hyphens are allowed as long as it is not the leading or trailing character in the host name.

BPCUI0143E Host port WWPN *wwpn* specified on line *line* of file *file* is not valid.

Explanation

The specified WWPN in the file is not valid.

Action

Enter a valid host port WWPN. WWPNs must be 16 hexadecimal characters in length with no other characters.

BPCUI0144E Duplicate server name specified on lines *line1* and *line2* of file *file*.

Explanation

The file contains duplicate entries for the same server.

Action

Ensure the file contains one entry per server to create.

BPCUI0145E Could not parse file *file*.

Explanation

The attempt to parse the file failed.

Action

Verify the correct file was specified or the file is in the correct format.

BPCUI0146E Could not parse file *file*. Invalid entry on line *line*.

Explanation

The attempt to parse the file failed.

Action

Verify the correct file was specified or the file is in the correct format.

BPCUI0148I Successfully deleted server *server_name*.

Explanation

The server was successfully deleted.

Action

No action is required.

BPCUI0149I Successfully modified ports of server *server_name*.

Explanation

The ports of the server were successfully modified.

Action

No action is required..

BPCUI0150I The server was created.

Explanation

The server was created.

Action

The server was created.

BPCUI0151E The host name or IP address is associated with another resource.

Explanation

The same host name or IP address cannot be used to connect to different resources.

Action

Enter a host name or IP address that is not associated with a resource that was already added for monitoring.

BPCUI0152I The data source *data_Source_Address* was successfully added as a data source for monitoring. The following new resources were detected:

Explanation

You cannot configure resources that are already being monitored. Only resources that are newly discovered or are not included in a data collection schedule can be added for monitoring.

Action

No action is required.

BPCUI0155W You cannot provision volumes because there is no Fibre Channel host port information for at least one server.

Explanation

To provision a volume to a server by using the Provision Storage wizard, the server must have at least one Fibre Channel host port. If you are provisioning to a single server, the server does not have a Fibre Channel host port. If you are provisioning to multiple servers, at least one of the servers does not have a Fibre Channel host port.

Action

To request volumes by using the Provision Storage wizard, ensure that all the selected servers have Fibre Channel host ports.

BPCUI0156W You cannot provision volumes to servers that use different operating systems.

Explanation

To provision a volume to multiple servers by using the Provision Storage wizard, the servers must all be running the same operating system type.

Action

To provision volumes to multiple servers, make sure that you select servers that all run the same operating system type. The OS Type column on the Servers page displays the operation system type.

BPCUI0157W You cannot provision volumes to servers and virtual machines at the same time. To provision volumes, ensure that you select either only servers or only virtual machines.

Explanation

By using the Provision Storage wizard, you can provision volumes to multiple servers or to multiple virtual machines. You cannot, however, provision to a combination of servers and virtual machines.

Action

When you open the Provision Storage wizard from the Servers page, make sure that you select only servers or only virtual machines. The Virtual Machines column on the Servers page indicates whether the server is a virtual machine.

BPCUI0158I Volumes are assigned to the hypervisors that host virtual machines. Volumes are not assigned directly to virtual machines.

Explanation

When you provision volumes for one or more virtual machines that do not have NPIV ports, the volumes are assigned to the hypervisors that host the virtual machines.

Action

To assign volumes to virtual machines, wait until the provisioning operation completes. Then, use the hypervisor manager to assign the hypervisor disks to the virtual machines.

BPCUI0159W You cannot provision volumes because at least one of the hypervisors that host the virtual machines is not being monitored. Ensure that all the hypervisors that are hosting the virtual machines that were selected for provisioning were probed.

Explanation

When you provision volumes for one or more virtual machines that do not have NPIV ports, the volumes are assigned to the hypervisors that host the virtual machines. If you are requesting storage for a single virtual machine, that hypervisor that hosts the virtual machine is not being monitored. If you are requesting storage for multiple virtual machines, one or more of the hypervisors that are hosting the virtual machines are not being monitored.

Action

When you request volumes for virtual machines that do not have NPIV ports, make sure all of the hypervisors that host the virtual machines were probed.

BPCUI0160E Duplicate port WWPN *wwpn* specified on lines *line1* and *line2* of file *file*.

Explanation

The file contains duplicate entries for the same server port.

Action

Ensure the file contains ports that are not assigned to more than one server.

BPCUI0162W File *file* does not contain any servers to create.

Explanation

The specified file does not contain any servers to create.

Action

Specify a file which includes entries for servers to create.

BPCUI0166W Optimization cannot be done in place to the subsystem since storage subsystem param1 and/or its pools belong to more than one capacity pool. Following are capacity pools the subsystem is associated with: param2

Explanation

Optimization cannot be done in place to the subsystem since storage system and/or storage pools from the system belong to more than one capacity pools.

Action

Specify a target capacity pool for optimization or if you want to use in place optimization, refer to the documentation for proper configuration.

BPCUI0167W Optimization cannot be done in place to the subsystem since storage subsystem param1 and/or its pools are not part of any capacity pool.

Explanation

Optimization cannot be done in place to the subsystem since storage system and/or storage pools from the system do not belong to any capacity pool.

Action

Specify a target capacity pool for optimization or if you want to use in place optimization, refer to the documentation for proper configuration.

BPCUI0168W Optimization cannot be done in place to the server param1 since storage subsystems or storage pools associated with luns assigned to the server belong to more than one capacity pool. Following are associated capacity pools: param2

Explanation

Optimization cannot be done in place to the server since storage systems and/or storage pools associated with luns assigned to the server belong to more than one capacity pools.

Action

Specify a target capacity pool for optimization or if you want to use in place optimization, refer to the documentation for proper configuration.

BPCUI0169W Optimization cannot be done in place to the server param1 since storage subsystems or storage pools associated with luns assigned to the server are not part of any capacity pool.

Explanation

Optimization cannot be done in place to the server since storage system and/or storage pools associated with luns assigned to the server do not belong to any capacity pool.

Action

Specify a target capacity pool for optimization or if you want to use in place optimization, refer to the documentation for proper configuration.

BPCUI0170W Optimization cannot be done in place to the storage entity param1 since storage subsystems or storage pools associated with it belong to more than one capacity pool. Following are associated capacity pools: param2

Explanation

Optimization cannot be done in place to the entity since storage systems and/or storage pools associated belong to more than one capacity pools.

Action

Specify a target capacity pool for optimization or if you want to use in place optimization, refer to the documentation for proper configuration.

BPCUI0171W Optimization cannot be done in place to the storage entity param1 since storage subsystems or storage pools associated with it are not part of any capacity pool.

Explanation

Optimization cannot be done in place to the entity since storage system and/or storage pools associated with it do not belong to any capacity pool.

Action

Specify a target capacity pool for optimization or if you want to use in place optimization, refer to the documentation for proper configuration.

BPCUI0172E The operation timed out while waiting for a response from the server.

Explanation

The server did not respond to a request from the GUI. This message is displayed if the server does not respond within the length of time defined for the timeout value.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibm.com/serviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

BPCUI0173E File *file* does not exist or is empty.

Explanation

The file does not exist in the specified location or is empty.

Action

Either create the file or select a new one with servers to create.

BPCUI0174E The device does not support the credential mechanism used.

Explanation

The device does not support the credential mechanism used.

Action

Choose another credential mechanism.

BPCUI0175E A required parameter is missing.

Explanation

The highlighted field is missing a required value. As a result, a required parameter in the server request was missing or empty.

Action

Enter a valid value in the highlighted field.

BPCUI0176E The highlighted field contains an invalid value.

Explanation

The highlighted field contains an invalid value. As a result, a parameter in the server request contained an invalid value.

Action

Enter a valid value in the highlighted field.

BPCUI0177E The highlighted field contains a value that is outside of the allowed range. The value must be between *minVal* and *maxVal*.

Explanation

The highlighted field contains a value that is outside of the allowed range. As a result, a parameter in the server request is outside of the allowed range.

Action

In the highlighted field, enter a value that is within the allowed range.

BPCUI0178E A service class with the same name and type already exists.

Explanation

The specified service class name is not unique. A service class with the same name and type already exists in the database and cannot be duplicated.

Action

Enter a different name for the service class you are creating.

BPCUI0179I The service class was created.

Explanation

This message is for informational purposes only.

Action

No action is required.

BPCUI0180I Based on the known configuration of storage system host connections, fabric zone aliases, and HBA ports, additional ports may have been added to the selection below.

Explanation

Based on the input host name or WWPN, additional ports were found in the storage system host connection configuration, fabric zone alias configuration, or HBA port configuration.

Action

Remove unwanted WWPNs by clicking the remove icon. Add additional WWPNs by typing them in then clicking the Add button.

BPCUI0181I You selected to add a *expectedDevice* resource, but a *foundDevice* resource was detected and will be added.

Explanation

One or more resources that are managed by the data source are of a different type than expected. However, the resource will still be added for monitoring if you enter its information. For example, if you select to add a SAN Volume Controller, but the discovered resource is a Storwize V7000, this message is displayed. In this case, the Storwize V7000 storage system will be added.

Action

To add the resource that was discovered, continue to enter its information. To add the intended resource, click Add Storage System again and enter the correct IP address for the resource.

BPCUI0182I The data source *data_Source_Address* was added as a data source for monitoring. No new resources were detected.

Explanation

Only resources that are newly discovered or are not included in a data collection schedule can be added for monitoring.

Action

Enter the IP address or host for a different data source or resource to continue.

If you want to modify resources that are already monitored, go to the list page for the resource. For example, to modify a storage system, in the navigation pane select Storage Resources > Storage Systems. Then, right-click the resource and select View Properties. In the properties notebook, modify the values for the resource.

BPCUI0183E The text in the highlighted field exceeds the *maxLength* character limit.

Explanation

The text in the highlighted field is too long.

Action

Enter text in the highlighted field that does not exceed the character limit.

BPCUI0185W Unable to lookup the IP Address for Host Name *hostName*. Enter the IP Address manually.

Explanation

Unable to lookup the IP Address for the given host name.

Action

Manually enter the IP Address.

BPCUI0189I Configuration of SRA deployment and probe schedules were done successfully.

Explanation

Configuration of deployment probe schedules were done successfully.

Action

None.

BPCUI0190W Configuration of SRA finished with some warnings or errors. Check the detail messages.

Explanation

Configuration user trying to make finish with warnings or errors..

Action

Check the accompanying message to take further actions.

BPCUI0191E An internal error occurred while testing connection to *param1*.

Explanation

This type of error is usually caused by unexpected run time condition like when Data/Device Server is down or communication to the servers are interrupted unexpectedly.

Action

Please check the log file for the errors. Correct them and retry the operation.

BPCUI0192E The supplied service class type is invalid.

Explanation

An Invalid service class type was passed to the server.

Action

Contact IBM Software support.

BPCUI0193E The specified SMI-S provider was not found. Make sure that the protocol, SMI-S provider host name or IP address, and port are specified correctly and that the SMI-S provider is properly configured at that location.

Explanation

The SMI-S provider specified was not found.

BPCUI0194E An unknown error has occurred. Please review all values entered.

Explanation

An unknown error has occurred.

BPCUI0195E The Interop Namespace is not correct. Please correct this entry.

Explanation

The Interop Namespace is not correct.

BPCUI0196E A timeout occurred while processing the request. Please retry request.

Explanation

The request could not be processed in the time allowed.

BPCUI0197E A connection was not established. Make sure that the protocol, SMI-S provider host name or IP address, and port are specified correctly.

Explanation

The attempt to establish a connection failed.

BPCUI0198E The authentication to the SMI-S provider failed.

Explanation

The credentials that you supplied for the connection are incorrect.

BPCUI0199E An SSLHandshakeException or SSLProtocolException has occurred. This exception might be due to an invalid SLP registration, e.g. 'http' instead of 'https'.

Explanation

An SSLHandshakeException or SSLProtocolException has occurred.

BPCUI0201E There is a pending delete in process for this SMI-S provider.

Explanation

The specified SMI-S provider is currently being deleted.

BPCUI0202I Success

Explanation

The operation was successful.

BPCUI0203E The selected resources were not removed.

Explanation

None of the resources were removed.

Action

Review the listed of detailed messages for further information.

BPCUI0204W successfulDeletes of attemptedDeletes of the selected resources were removed.

Explanation

Removing the resources were partially successful, but some warnings occurred.

Action

Review the listed of detailed messages for further information.

BPCUI0205W successfulDeletes selected resources were removed, however warnings did occur.

Explanation

The resources were removed however some warnings did occur.

Action

Review the listed of detailed messages for further information.

BPCUI0209E A database operation cannot be completed.

Explanation

This problem might occur when the service is interrupted. IBM marketplace is investigating the problem and service will resume as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)

BPCUI0210I Device *param1* supports performance monitoring.

Explanation

Performance monitoring is supported on this device.

Action

BPCUI0211E No performance data is available for a resource.

Explanation

A resource is not being managed by the storage management service, so no performance data is available for that resource.

Action

To monitor the storage resource, go to the Storage Systems page in the GUI and select Add Storage System. See the online help for information about how to add a storage resource for monitoring.

BPCUI0212E There is no Secure Shell running at this host/IP.

Explanation

SSH is not running on this host/IP.

Action

Enable SSH on this host/IP and make sure it is running

BPCUI0213E Unsupported Secure Shell protocol was used.

Explanation

Action

BPCUI0214E Invalid public key location for subsystem *param1*.

Explanation

Action

BPCUI0215E Invalid public key format for subsystem *param1*.

Explanation

Action

BPCUI0216E Passphrase was incorrect for subsystem *param1*.

Explanation

Action

BPCUI0217E Unable to transfer the key(s) to the server *param1*.

Explanation

Action

BPCUI0218E The specified private key file format is not supported. Please convert it to Open SSH (.pem) key file format for subsystem *param1*.

Explanation

Action

BPCUI0219E The specified key file or key file name is already linked to another user.

Explanation

Action

BPCUI0220E The IP address that was entered was the address of the management console for the storage system. You must enter the valid IP address of the block component of the storage system.

Explanation

Action

Enter the IP address of the block component. Try to add the storage system again.

BPCUI0221E The IP address you entered is the address of another device's management console.

Explanation

Action

BPCUI0222E The IP address you entered points to a device of another type.

Explanation

This error might occur in situations such as the following:

- You are trying to add a storage system of a certain type, but you enter the IP address for a different type of storage system
- You are trying to add a storage system, but you enter the IP address of a switch
- You are trying to add a storage system, for example IBM Spectrum Scale, but the storage system software is not installed on the device

Action

To resolve the problem, try the following actions:

- Ensure that the host name or IP address is valid for the device type that you are adding
- Ensure that the device is operational
- Try to add the device again

BPCUI0223E Passphrase is required. Specify one for subsystem *param1*.

Explanation

The passphrase for the truststore is missing.

Action

Provide the missing passphrase

BPCUI0224E Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: http://www.ibm.com/support/docview.wss?uid=swg21976237

Explanation

This communication problem might be caused by an error with the SSL certificate on the resource.

Action

To learn about how to troubleshoot the problem, go to <http://www.ibm.com/support/docview.wss?uid=swg21976237>.

BPCUI0225I The agent log files for *server_Name* have been collected and copied to *log_Location*.

Explanation

The server successfully collected the Storage Resource agent log files and saved them to the specified location.

BPCUI0226I Discovery of *data_source* is taking longer than expected. Click Close to run the discovery in the background.

Explanation

The process for discovering the resources that are managed by the data source is taking longer than expected. This delay might occur because the network connection is slow, the data source is running slowly, or the data source manages many resources.

Action

To close the window but continue the discovery process in the background, click Close. Try to add the resource again when the discovery is complete.

BPCUI0227E Thin provisioning must be enabled when compression is enabled.

Explanation

The service class cannot be created because compression is enabled but thin provisioning is disabled. It is not possible to create a compressed volume that is not also thin provisioned.

Action

Enable thin provisioning when compression is enabled.

BPCUI0229I 1 resource was added to name.

Explanation

The indicated number of resources are now members of the Capacity Pool.

Action

None.

BPCUI0231I count resources were added to name.

Explanation

The indicated number of resources are now members of the Capacity Pool.

Action

None.

BPCUI0233E The specified host name is already associated with an existing server.

Explanation

You cannot add a server with same host name as a server that is already being monitored.

Action

Enter a host name for a server that is not already being monitored.

BPCUI0234E The specified IP address is already associated with an existing server.

Explanation

You cannot add a server with same IP address as a server that is already being monitored.

Action

Enter an IP address for a server that is not already being monitored.

BPCUI0235E The specified host name and IP address are already associated with an existing server.**Explanation**

You cannot add a server with same IP address and host name as a server that is already being monitored.

Action

Enter a host name and IP address for a server that is not already being monitored.

BPCUI0236E The disabling of the agents failed.**Explanation**

None of the selected agents were disabled due to errors.

Action

Review the individual detailed error messages.

BPCUI0237E Errors occurred when attempting to disable some of the agents.**Explanation**

Disabling some of the agents was successful, however errors did occur on others.

Action

Review the individual detailed error messages.

BPCUI0238W Warnings occurred when attempting to disable *warningCount* of the agents.**Explanation**

The agents were successfully disabled, but warnings did occur

Action

Review the individual detailed warning messages.

BPCUI0239I *attemptedCount* of the *selectedCount* selected agents were disabled.

Explanation

All agents that could be disabled did so successfully.

Action

No action.

BPCUI0240E The agents were not enabled.

Explanation

None of the selected agents were enabled due to errors.

Action

Review the individual detailed error messages.

BPCUI0241E Errors occurred when attempting to enable some of the agents.

Explanation

Enabling some of the agents was successful, however errors did occur on others.

Action

Review the individual detailed error messages.

BPCUI0242W Warnings occurred when attempting to enable warningCount of the agents.

Explanation

The agents were successfully enabled, but warnings did occur.

Action

Review the individual detailed warning messages.

BPCUI0243I attemptedCount of the selectedCount selected agents were enabled.

Explanation

All agents that could be enabled did so successfully.

Action

No action.

BPCUI0244I The credentials of an agent were updated.

Explanation

The agent credentials were successfully updated

Action

No action required.

BPCUI0245I The credentials of *updateCount* agents were updated.

Explanation

The agent credentials were successfully updated

Action

No action required.

BPCUI0246E Cannot authenticate to the file module with the provided user credentials.

Explanation

The user name or password that was entered for the file module is not correct.

Action

Make sure that the user name and password are correct for the file module that is being added. Reenter the user name or password and click Add again.

BPCUI0247E Unknown file module key user.

Explanation

The key user that was entered for the file module was not found.

Action

Make sure that the key user is correct for the file module that is being added. Reenter the key user and click Add again.

BPCUI0248E The SSH key could not be loaded for the following reason: *IOException message***Explanation**

Upload of the file failed. Please retry the upload.

BPCUI0249E Passphrase is incorrect.**Explanation**

Action

BPCUI0250E Passphrase is required.**Explanation**

The passphrase for the truststore is missing.

Action

Provide the missing passphrase

BPCUI0251E Cannot connect to the storage system or cluster.**Explanation**

The device that is being added might not be up and running. Also, the IP address, host name, or user credentials that was entered for the storage system or cluster might not be valid.

Action

Verify that the device is up and running. Also, make sure that the IP address, host name, and user credentials are correct for the device that is being added. Reenter the values and click Add again.

BPCUI0252E The host name or IP address {0} is not valid.**Explanation**

The IP address or host name that was entered for the device is not valid.

Action

Make sure that the IP address and host name are valid for the device that is being added. Reenter the IP address or host name and click Add.

BPCUI0253E Cannot connect to the data source for the resource with the address *ip_address*.

Explanation

The data source for the storage resource cannot be contacted.

BPCUI0254E Invalid private key location.

Explanation

BPCUI0255W The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?

Explanation

You are attempting to add one or more resources to a capacity pool, but the resources are already assigned to another capacity pool. If you continue, the resources will be reassigned to the capacity pool you specified.

Action

BPCUI0256W The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?

Explanation

When a storage system is added to a capacity pool, all of its internal resources (storage pools, NSDs, and file systems) are indirectly assigned to that capacity pool. You are attempting to add one or more resources to a capacity pool, but the resources are already indirectly assigned to another capacity pool at the storage system level. If you continue, the resources will be reassigned to the capacity pool you specified. In addition, the storage system will no longer be assigned to its capacity pool. The storage system resources that are not being reassigned will instead be directly assigned to the storage system's original capacity pool.

BPCUI0257W The following resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?

Explanation

You are attempting to add one or more resources to a capacity pool, but the resources are already assigned to another capacity pool. Some of the resources are directly assigned to a capacity pool, and some are indirectly assigned to a capacity pool at the storage system level. If you continue, the resources will be reassigned to the capacity pool you specified.

BPCUI0258W The following internal resources of a storage system you are attempting to add are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?

Explanation

When a storage system is added to a capacity pool, all of its internal resources (storage pools, NSDs, and file systems) are indirectly assigned to that capacity pool. You are attempting to add one or more storage systems to a capacity pool, but one or more of the storage-system internal resources are already assigned to another capacity pool. If you continue, the resources will be reassigned at the storage system level to the capacity pool you specified.

BPCUI0259W The following storage systems and storage-system internal resources are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?

Explanation

You are attempting to add storage systems to a capacity pool, but one or more of the storage systems and one or more storage-system internal resources (storage pools, NSDs, and file systems) are already assigned to another capacity pool. If you continue, the resources will be reassigned to the capacity pool you specified. At least one of the storage systems you are attempting to add is already assigned to another capacity pool. If you continue, the storage system will be reassigned to the capacity pool you specified. When a storage system is added to a capacity pool, all of its internal resources (storage pools, NSDs, and file systems) are indirectly assigned to that capacity pool. At least one of the storage systems you are attempting to add has one or more internal resources that are already assigned to another capacity pool. If you continue, the resources will be reassigned at the storage system level to the capacity pool you specified.

BPCUI0260E The specified private key file format for the file module is not supported. Please convert it to Open SSH (.pem) key file.

Explanation

Action

BPCUI0261E The service class was not found in the database.

Explanation

This error might occur if the service class was already deleted.

Action

BPCUI0262E The capacity pool was not found in the database.

Explanation

This error might occur if the capacity pool was already deleted.

Action

BPCUI0263E The scheduling of the agent upgrade jobs failed.

Explanation

None of the selected agents were scheduled for upgrade due to errors.

Action

Review the individual detailed error messages.

BPCUI0264E Errors occurred when attempting to schedule the upgrade jobs of some of the agents.

Explanation

Upgrade scheduling of some of the agents was successful, however errors did occur while scheduling some of the upgrades.

Action

Review the individual detailed error messages.

BPCUI0265W Warnings occurred when scheduling the upgrade of *warningCount* of the agents.

Explanation

The agents were successfully scheduled for upgrade, but warnings did occur.

Action

Review the individual detailed warning messages.

BPCUI0266I attemptedCount of the selected agents were scheduled for upgrade.

Explanation

All agents that could be upgraded were successfully scheduled for upgrade.

Action

No action.

BPCUI0267I The upgrade agent job was successfully scheduled for *hostName*.

Explanation

Action

No admin response required.

BPCUI0268W Deleting a capacity pool does not affect any volumes or shares that were provisioned from the capacity pool. However, the volumes or shares are no longer associated with the capacity pool. Associations with the following volumes or shares will be removed:

Explanation

This message is for informational purposes only

Action

No action is required.

BPCUI0269W The following volumes are associated with the service class *scName*. When the volumes were created, they satisfied the requirements of the service class. If you modify the service class, the volumes are still associated with the service class, but might not satisfy the new requirements of the service class. Depending on your changes to the service class, users might incorrectly assume that the volumes have properties that they do not possess.

Explanation

BPCUI0270W The following shares are associated with the service class *scName*. When the shares were created, they satisfied the requirements of the service class. If you modify the service class, the shares are still associated with the service class, but might not satisfy the new requirements of the service class. Depending on your changes to the service class, users might incorrectly assume that the shares have properties that they do not possess.

Explanation

BPCUI0271W The following volumes are associated with the service class *scName*. If you delete the service class, the volumes are no longer associated with any service class.

Explanation

BPCUI0272W The following shares are associated with the service class *scName*. If you delete the service class, the shares are no longer associated with any service class.

Explanation

BPCUI0273E The action does not support the specified type of device.

Explanation

An internal operating error occurred. Check the logs for an indication of an error or exception and contact IBM customer support.

BPCUI0274I The connection test to resource *data_Source_Name* was successful.

Explanation

The connection between the server and the target resource was successfully tested.

Action

No action is required.

BPCUI0275I To collect data about zoning or complete zoning actions during provisioning, you must deploy Storage Resource agents to one or more servers that are on the fabric.

Explanation

A Storage Resource agent is required to collect data and complete zoning actions for a fabric.

Action

To deploy Storage Resource agents to a server, go to the Servers > Servers page, click Add Server, and select Deploy an agent for full server monitoring.

BPCUI0276I Agent *agentName* was disabled.

Explanation

The named agent was disabled.

Action

No action.

BPCUI0277I Agent *agentName* was enabled.

Explanation

The named agent was enabled.

Action

No action.

BPCUI0278I The credentials for *agentName* were updated.

Explanation

The credentials of the named device were successfully updated.

Action

No action.

BPCUI0279I There is no job defined for the device Name. Please create a job first before running it again.

Explanation

Corresponding job definition for the device cannot be found. Please create a new job definition and try running the job again.

Action

Create a job definition first and attempt the action again.

BPCUI0280I No switches are managed by the data_Source_Address data source.

Explanation

The specified data source is not managing any switches. No switch can be detected during the discovery process.

Action

Ensure that information about the data source was entered correctly and that the data source is managing switches. Add the data source again.

BPCUI0282I The resources that are managed by data_Source_Address are already known. One or more resources were added.

Explanation

Any resources that are already known are not added again for monitoring. However, one or more new resources were added. The new resources might collect additional information about the managed resources or might collect redundant information about the managed resources.

Action

No further action is required.

BPCUI0284I No fabrics are managed by the data_Source_Address data source.

Explanation

The specified data source is not managing any fabrics. No fabric can be detected during the discovery process.

Action

Ensure that information about the data source was entered correctly and that the data source is managing fabrics. Add the data source again.

BPCUI0286I The fabrics that are managed by data_Source_Address are already being monitored.

Explanation

You cannot add fabrics that were previously added and configured for monitoring.

Action

To modify a fabric that is being monitored, go to the list page for the fabric. For example, in the navigation pane, select Network Resources > Fabrics. Then, right-click the fabric and select View Properties. In the properties notebook, modify the values for the fabric.

BPCUI0289W The following network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these NSDs to a different capacity pool?

Explanation

When a file system is added to a capacity pool, all of the NSDs on which the file system resides are indirectly assigned to that capacity pool. You are attempting to add one or more file systems to a capacity pool, but one or more of the related NSDs are already assigned to another capacity pool. If you continue, the NSDs will be reassigned at the file system level to the capacity pool you specified.

BPCUI0290W The following file systems and network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these resources to a different capacity pool?

Explanation

At least one of the file systems you are attempting to add is already assigned to another capacity pool. If you continue, the file system will be reassigned to the capacity pool you specified.

When a file system is added to a capacity pool, all of the NSDs on which the file system resides are indirectly assigned to that capacity pool. At least one of the file systems you are attempting to add has one or more related NSDs that are already assigned to another capacity pool. If you continue, the resources will be reassigned at the file system level to the capacity pool you specified.

BPCUI0291W The following network shared disks (NSDs) are already assigned to a capacity pool. Are you sure you want to move these NSDs to a different capacity pool?

Explanation

When a storage system is added to a capacity pool, all free NSDs in the storage system are indirectly assigned to that capacity pool. When a file system is added to a capacity pool, all of the NSDs on which the file system resides are indirectly assigned to that capacity pool. You are attempting to add one or more NSDs to a capacity pool, but they are already indirectly assigned to another capacity pool at the storage system level or the file system level. If you continue, the NSDs will be reassigned to the capacity pool you specified. In addition, the storage system or file system will no longer be assigned to its capacity pool. The NSDs that are not being reassigned will instead be directly assigned to the storage system's or file system's original capacity pool.

BPCUI0292E The host name or IP address *ip_address_or_hostname* cannot be reached.

Explanation

This problem might occur if the local area network is down, the resource cannot be reached by a ping (ICMP) command, or a firewall is preventing communication between the server and the resource.

Action

To resolve this problem, try the following actions:

- Verify that the IP address or host name of the resource is valid.
- Verify that the local area network is available.
- Ensure that a firewall is not preventing network access.

Try to add the storage resource again by going to the Storage Systems page in the GUI and selecting Add Storage System.

BPCUI0293IA A probe is started for *deviceName*.

Explanation

A data collection job is started to gather probe data for the resource.

BPCUI0294IA A performance monitor is started for *deviceName*.

Explanation

A data collection job is started to gather performance data for the resource.

BPCUI0295I The performance monitor is stopped for *deviceName*.

Explanation

The performance monitor is stopped for the resource

BPCUI0297W One resource was added to *capacity_pool_name*. One resource could not be added because it could not be found.

Explanation

One or more resources could not be added to the selected capacity pool because they are no longer in the database.

Action

No action is required.

BPCUI0298W *count* resources were added to *capacity_pool_name*. One resource could not be added because it could not be found.

Explanation

One or more resources could not be added to the selected capacity pool because they are no longer in the database.

Action

No action is required.

BPCUI0299W One resource was added to *capacity_pool_name*. *count_Not_Found* resources could not be added because they could not be found.

Explanation

One or more resources could not be added to the selected capacity pool because they are no longer in the database.

Action

No action is required.

BPCUI0300W *count* resources were added to *capacity_pool_name*. *count_Not_Found* resources could not be added because they could not be found.

Explanation

One or more resources could not be added to the selected capacity pool because they are no longer in the database.

Action

No action is required.

BPCUI0301E Failed to assign the role name role.

Explanation

An internal error occurred when trying to assign a role to a list of groups.

BPCUI0302E Failed to retrieve the existing role assignments.

Explanation

An internal error occurred when trying retrieve the existing group to role assignments.

BPCUI0303E Failed to remove all role assignments from the specified groups.

Explanation

An internal error occurred when remove all role assignments from the specified groups.

BPCUI0304W An error occurred when saving the user-defined properties of the resourcesType.

Explanation

The user-defined properties for one or more resources cannot be saved because of an error on the server. Examples of user-defined properties include the location and display name of the resource. After the resource is added, you can set these properties either on the resource details page or in the properties notebook for the resource.

Action

To set user-defined properties for a resource, go to the resource list page, right-click the resource, and select View Properties. On the properties notebook, click Edit to change the properties and click Save.

For example, to specify the name of a switch, select Network Resources > Switches from the navigation pane. On the Switches page, right-click the switch and select View Properties. On the properties notebook for the switch, click Edit and enter 64 characters or less in the Name field. Click Save.

You can also specify these properties on the details page for a resource. To access the details page, select Network Resources > Switches from the navigation pane, right-click a resource, and select View Details.

BPCUI0305E A capacity pool with the same name already exists.

Explanation

The specified capacity pool name is not unique. A capacity pool with the same name already exists and cannot be duplicated.

Action

Enter a different name for the capacity pool you want to create.

BPCUI0306W The selected resource was removed, however warnings did occur.

Explanation

The resource was removed however some warnings did occur.

Action

Review the list of detailed messages for further information.

BPCUI0307E The schedule could not be deleted.

Explanation

The schedule could not be deleted.

Action

Check log file for error messages that might help determine the problem.

BPCUI0308I The resource does not have a connection configured. To add a connection to the resource, click Add Storage System.

Explanation

The data source for the resource might have been removed. You must add a connection to the resource again.

Action

Use the Add dialog for the resource to add the connection again.

BPCUI0309IA A probe schedule is defined for deviceName.

Explanation

A probe schedule is defined for the device.

BPCUI0310I A performance monitor schedule is defined for *deviceName*.

Explanation

A performance monitor schedule is defined for the device.

BPCUI0311I Probe and performance monitor schedules are defined for *deviceName*.

Explanation

Probe and performance monitor schedules are defined for the device.

BPCUI0312I SNMP Discovery of switches is taking longer than expected. Click Close to run the discovery in the background.

Explanation

The process for discovering switches via SNMP is taking longer than expected. This delay might occur because the network connection is slow, the data source is running slowly, or the data source is managing many resources.

Action

To close the window but continue the discovery process in the background, click Close. Try to add the resource again when the discovery is complete.

BPCUI0313I An upgrade is started for server *deviceName*.

Explanation

An upgrade job was started for a server.

BPCUI0314E Failed to retrieve the list of user groups from the WebSphere user repository.

Explanation

An internal error occurred when attempting to retrieve a list of groups from the WebSphere user repository.

BPCUI0315E Failed to retrieve the list of user groups from user repository due to an invalid search string.

Explanation

The search string specified by the user is invalid preventing the query from being submitted to WebSphere.

Action

Specify a valid search string.

BPCUI0316W Failed to update the role cache maintained by the Device server.

Explanation

The role cache maintained by the Device server was not updated.

Action

Restart the Device server.

BPCUI0317E Access can not be removed, because at least one Administrator user must remain in the system.

Explanation

Access can not be removed, because at least one Administrator user must remain in the system.

Action

First add another group having Administrator role and then retry the action.

BPCUI0318E The group mapping can not be modified, because at least one Administrator user must remain in the system.

Explanation

The group mapping can not be modified, because at least one Administrator user must remain in the system.

Action

First add another group having Administrator role and then retry the action.

BPCUI0319IA A task is started for resource resourceName.

Explanation

A task is started for the specified resource.

BPCUI0320I Probe and performance monitor schedules are defined for *deviceName*. A performance monitor is scheduled to collect performance data after the probe is done.

Explanation

Probe and performance monitor schedules are defined for the device. Performance monitor is disabled and will start after the probe is done.

BPCUI0321I A task is paused for resource *resourceName*.

Explanation

A task is paused for the specified resource.

BPCUI0322E A task could not be paused for resource *resourceName*.

Explanation

A task could not be paused for the specified resource.

BPCUI0323I A task is resumed for resource *resourceName*.

Explanation

A task is resumed for the specified resource.

BPCUI0324E A task could not be resumed for resource *resourceName*.

Explanation

A task could not be resumed for the specified resource.

BPCUI0325E Failed to retrieve the list of users from the WebSphere user repository.

Explanation

An internal error occurred when attempting to retrieve a list of users from the WebSphere user repository.

BPCUI0326E Failed to retrieve the list of users from user repository due to an invalid search string.**Explanation**

The search string specified by the user is invalid preventing the query from being submitted to WebSphere.

Action

Specify a valid search string.

BPCUI0327E Failed to get the roles associated with the current user.**Explanation**

An internal error occurred when attempting to retrieve the roles associated with the current user.

BPCUI0328IA task is saved.**Explanation**

A task is saved.

BPCUI0329IA task was successfully deleted.**Explanation**

The task was successfully deleted.

Action

No action is required.

BPCUI0330E The user *user* is not authorized to access the product.**Explanation**

The IBM ID that was used to log into Storage Insights is not authorized to access the service. This error might also occur when the subscription to Storage Insights lapses.

Action

If you have a valid subscription, contact your Storage Insights administrator to get access. If you don't have a valid subscription, renew it and then try again.

BPCUI0331E A task is cancelled for resource *resourceName*.

Explanation

A task is cancelled for the specified resource.

BPCUI0332E An unexpected error occurred. The task for schedule *schedule name* could not be paused or resumed.

Explanation

The task type associated with the schedule is not valid.

Action

Refresh the page to check whether the task was completed. If the problem persists, use the Service tool to collect trace data and send it to IBM Software Support.

BPCUI0333E An unexpected error occurred. The task for schedule *schedule name* could not be paused.

Explanation

The task was not running or the task was completed before the task was paused.

Action

Refresh the page to check whether the task was completed. If the problem persists, use the Service tool to collect trace data and send it to IBM Software Support.

BPCUI0334E An unexpected error occurred. The task for schedule *schedule name* could not be resumed.

Explanation

The task was not paused or the task was completed.

Action

Refresh the page to check whether the task was completed. If the problem persists, use the Service tool to collect trace data and send it to IBM Software Support.

BPCUI0335E The volumes cannot be converted or moved because the target pools do not have sufficient

available space.

Explanation

The target pools do not have sufficient available space to complete the operation.

Action

Select target pools with sufficient available space to complete the operation.

BPCUI0336I The ability to provision with block storage devices is only available with the advanced license.

Explanation

The product is installed with the basic license and the functional is unavailable to enable this feature the advance license must be installed.

BPCUI0338E Insufficient user privileges to service the REST request.

Explanation

A request to the REST interface was made by a user who did not have sufficient role privileges.

BPCUI0339E An unexpected error occurred while authorizing the REST request.

Explanation

An internal operating error occurred. Check the logs for an indication of an error or exception and contact IBM customer support.

BPCUI0340IA A task was successfully renamed.

Explanation

The task was successfully renamed.

Action

No action is required.

BPCUI0341E The task could not be renamed.

Explanation

The task could not be renamed because the new name already exists.

Action

Enter a different name for the task. Ensure that you have the proper authorization to rename a task.

BPCUI0342E The task could not be renamed because the specified name already exists.

Explanation

The task name that you entered already exists.

Action

Enter a unique name for the task.

BPCUI0343I Performance monitoring is unavailable for resource *resource name* because the resource was not probed.

Explanation

To effectively monitor the performance of a resource, a probe must collect asset and configuration information about that resource.

Action

Schedule a probe to collect information about the resource. After the probe completes, run the performance monitor again.

BPCUI0344W The following service classes allow provisioning only from the capacity pool capacity pool: *service classes*. If you delete this capacity pool, the service classes will allow provisioning from any available storage.

Explanation

The capacity pool is the only capacity pool that is associated with one or more service classes. Currently, storage requests that require any of these service classes can be satisfied only by resources in the capacity pool. By removing the capacity pool, you remove this restriction from the service classes.

Action

Identify the reason why each service class specifies the capacity pool restriction. Determine whether removing the restriction is acceptable.

BPCUI0346I The Storage Resource agent that is deployed on the server cannot be uninstalled.

Explanation

The Storage Resource agent cannot be uninstalled.

Action

Ensure that all required servers are running, and that the local area network is available. Verify that you have a network connection to the server that the agent is located on. Wait a few minutes and try again. If none of these actions help resolve the problem, contact IBM Software Support.

BPCUI0347I All servers were removed except for the product server. Entries for the product server resources might still be displayed in the GUI until all the associated removals are complete.

Explanation

You have attempted to remove a number of servers including the Storage Resource agent that is installed on the product server. The agent on the product server cannot be removed.

Action

No further action is required.

BPCUI0348W You cannot provision volumes because at least one of the selected hosts was not found in the database. Ensure that all hosts that are selected for provisioning are being monitored.

Explanation

To request volumes for a server or hypervisor, the server or hypervisor must be added to the database.

Action

Make sure that the server or hypervisor is known. If it is not, add the server or hypervisor using the Add dialog for that type of resource.

BPCUI0349W You cannot provision volumes because not all of the selected hosts appear to have Fibre Channel connectivity.

Explanation

Typically, you cannot request volumes for servers or hypervisors that do not have fabric connectivity. However, if all of the selected hosts have Fibre Channel Port WWPNs and none appear to have fabric connectivity, it is possible that the fabrics were not probed. In this case, you can use the Provision Storage function to request volumes even though the hosts appear to have no fabric connectivity. However, if only some, but not all, of the selected servers or hypervisors appear to have Fibre Channel connectivity, provisioning volumes is not supported.

Action

To request volumes for servers or hypervisors, ensure that either all or none of the selected servers or hypervisors appear to have Fibre Channel connectivity to a managed fabric.

BPCUI0350W You cannot provision volumes because the hypervisors that host the virtual machines use different operating systems.

Explanation

When you provision volumes for one or more virtual machines, the volumes are assigned to the hypervisors that host the virtual machines. To provision a volume to multiple virtual machines, the hypervisors that host the virtual machines must all be running the same operating system type.

Action

To provision volumes to multiple virtual machines, make sure the hypervisors that host the virtual machines all run the same operating system type. The OS Type column on the Hypervisors page displays the operating system type.

BPCUI0351W You cannot provision volumes because there is no Fibre Channel host port information for at least one hypervisor.

Explanation

When you provision volumes for one or more virtual machines that do not have NPIV ports, the volumes are assigned to the hypervisors that host the virtual machines. If you are provisioning to a single virtual machine, the hypervisor that is managing the virtual machine does not have a Fibre Channel host port. If you are provisioning to multiple virtual machines, at least one of the hypervisors that is managing the virtual machines does not have a Fibre Channel host port.

Action

To provision volumes to virtual machines that do not have NPIV ports, ensure that all the hypervisors that are managing the selected virtual machines have Fibre Channel host ports.

BPCUI0352W You cannot provision volumes because not all of the hypervisors that host the virtual machines appear to have Fibre Channel connectivity.

Explanation

When you provision volumes for one or more virtual machines that do not have NPIV ports, the volumes are assigned to the hypervisors that host the virtual machines. Typically, you cannot provision volumes for hypervisors that do not have fabric connectivity. However, if all of the hypervisors that host the virtual machines have Fibre Channel Port WWPNs and none appear to have fabric connectivity, it is possible

that the fabrics were not probed. In this case, you can use the Provision Storage function to provision volumes even though the hypervisors appear to have no fabric connectivity. However, if only some, but not all, of the hypervisors that host the virtual machines appear to have Fibre Channel connectivity, provisioning volumes is not supported.

Action

To provision volumes to virtual machines that do not have NPIV ports, ensure that either all or none the hypervisors that are managing the selected virtual machines appear to have Fibre Channel connectivity to a managed fabric.

BPCUI0355W You cannot provision volumes because no block-storage service class exists.

Explanation

When you request volumes by using the Provision Storage wizard, you specify your storage requirements by selecting a block-storage service class. There are currently no block-storage service classes, so you cannot provision volumes.

Action

BPCUI0356W You cannot provision shares because no file-storage service class exists.

Explanation

When you request network-attached storage (NAS) shares by using the Provision Storage wizard, you specify your storage requirements by selecting a file-storage service class. There are currently no file-storage service classes, so you cannot provision shares.

Action

BPCUI0357W You cannot provision volumes because you do not have permission to provision by using any block-storage service class.

Explanation

When you request volumes by using the Provision Storage wizard, you specify your storage requirements by selecting a block-storage service class. If you do not have Administrator privileges, you must have permission to provision by using at least one block-storage service class. You do not have permission to provision by using any block-storage service class, so you cannot provision volumes.

Action

BPCUI0358W You cannot provision shares because you do not have permission to provision by using any file-storage service class.

Explanation

When you request network-attached storage (NAS) shares by using the Provision Storage wizard, you specify your storage requirements by selecting a file-storage service class. If you do not have Administrator privileges, you must have permission to provision by using at least one file-storage service class. You do not have permission to provision by using any file-storage service class, so you cannot provision shares.

Action

BPCUI0359E The credentials for the servers were not updated.

Explanation

None of the credentials for the selected servers were updated.

Action

Review the listed of detailed messages for further information.

BPCUI0360W The credentials for *successfulUpdates* of *attemptedUpdates* of the selected servers were updated.

Explanation

Updating the credentials of the servers was partially successful, but some errors occurred.

Action

Review the listed of detailed messages for further information.

BPCUI0361W The credentials for the selected server was updated, however warnings did occur.

Explanation

The credentials for the selected server was updated, however warnings did occur.

Action

Review the list of detailed messages for further information.

BPCUI0362W The credentials for *successfulUpdates* selected servers were updated, however warnings did occur.

Explanation

The credentials were updated however some warnings did occur.

Action

Review the listed of detailed messages for further information.

BPCUI0363E Cannot connect to the SNMP data source *IP_Address*.

Explanation

A test connection cannot be established to the data source at the specified IP address. This error might occur if the data source is not available or the SNMP community was not entered correctly. The SNMP community name is shared by one or more SNMP hosts and is used to authenticate messages that are received by those hosts..

BPCUI0364I The performance monitor schedule was updated for *deviceName*.

Explanation

A performance monitor schedule was updated for the device.

Action

No further action is required.

BPCUI0366W The server *serverName* was not updated because it does not support the action.

Explanation

The server was not updated because it is an agentless server or it is a server with an agent whose present configuration cannot support the action. Examples of such server actions would be attempting to update the server's credentials when the server is a RXA agent or stopping a server that is already stopped.

BPCUI0367W You cannot provision volumes to virtual machines with NPIV ports and virtual machines without NPIV ports at the same time. To provision volumes to virtual machines, ensure that you select either only virtual machines with NPIV ports or only virtual machines without NPIV ports.

Explanation

By using the Provision Storage wizard, you can provision volumes to multiple virtual machines. You cannot, however, provision to a combination of virtual machines with NPIV ports and virtual machines without NPIV ports. This restriction exists because volumes are assigned directly to a virtual machine only if the virtual machine has an NPIV port. Otherwise, the volume is assigned to the hypervisor that hosts the virtual machine. You cannot provision volumes to servers (including virtual machines) and hypervisors at the same time.

Action

When you open the Provision Storage wizard from the Servers page, make sure that you select only virtual machines with NPIV ports or only virtual machines without NPIV ports.

BPCUI0368W You cannot provision volumes because none of the selected hosts appear to have Fibre Channel connectivity and the automatic zoning option is enabled. Disable the automatic zoning option in your zoning policy.

Explanation

Typically, you cannot request volumes for servers or hypervisors that do not have fabric connectivity. However, because all of the selected hosts have Fibre Channel Port WWPNs and none appear to have fabric connectivity, it is possible that the fabrics were not probed. For this reason, you can use the Provision Storage dialog to request volumes even though the hosts appear to have no fabric connectivity. However, automatic zoning must first be disabled.

Action

Either probe the fabrics or modify the zoning policy to disable automatic zoning. To modify the zoning policy, go to Advanced Analytics - Provisioning - Set Zoning Policy.

BPCUI0369W You cannot provision volumes because none of the hypervisors that manage the selected virtual machines appear to have Fibre Channel connectivity and the automatic zoning option is enabled. Disable the automatic zoning option in your zoning policy.

Explanation

Typically, you cannot request volumes for servers or hypervisors that do not have fabric connectivity. However, because all of the hypervisors that are managing the selected virtual machines have Fibre Channel port WWPNs and none appear to have fabric connectivity, it is possible that the fabrics were not probed. For this reason, you can use the Provision Storage dialog to request volumes even though the hosts appear to have no fabric connectivity. However, you must disable automatic zoning.

Action

Either probe the fabrics or modify the zoning policy to disable automatic zoning. To modify the zoning policy, click Advanced Analytics - Provisioning - Set Zoning Policy.

BPCUI0370E The display name *displayName* is already assigned to resource *resource Name*.

Explanation

The display name of a resource must be unique.

Action

Enter a unique display name for the resource.

BPCUI0372I The selected hosts do not appear to have Fibre Channel connectivity. In the resulting provisioning task, ensure that the recommended storage system is connected to the hosts before you run the task. Also, be aware that all fabric-related options will be ignored.

Explanation

Typically, you cannot request volumes for servers or hypervisors that do not have fabric connectivity. However, because all of the selected hosts have Fibre Channel Port WWPNs and none appear to have fabric connectivity, it is possible that the fabrics were not probed. For this reason, you can use the Provision Storage dialog to request volumes even though the hosts do not appear to have fabric connectivity. However, all of the fabric-related options, such as number of paths, redundant fabrics, and automatic zoning, will be ignored.

Action

If a provisioning task cannot be created, ensure that the hosts are connected to the recommended storage system before you run the task. You must manually configure the fabric. Alternatively, make sure the hosts have fabric connectivity and probe the fabrics.

BPCUI373I Volumes are assigned to the hypervisors that host virtual machines. Volumes are not assigned directly to virtual machines that do not have NPIV ports. None of the hypervisors that manage the virtual machines appear to have Fibre Channel connectivity. In the resulting provisioning task, ensure that the recommended storage system is connected to the hypervisors before you run the task. Also, be aware that all fabric-related options will be ignored.

Explanation

Typically, you cannot request volumes for servers or hypervisors that do not have fabric connectivity. However, because all of the hypervisors that are managing the selected virtual machines have Fibre Channel port WWPNs and none appear to have fabric connectivity, it is possible that the fabrics were not probed. For this reason, you can use the Provision Storage wizard to request volumes even though the hypervisors appear to have no fabric connectivity. However, all of the fabric-related options (number of paths, redundant fabrics, and automatic zoning) will be ignored.

Action

If a provisioning task cannot be created, ensure that the hypervisors are connected to the recommended storage systems before you run the task. You must manually configure the fabric. Alternatively, make sure that the hypervisors have fabric connectivity and probe the fabrics. To assign volumes to virtual machines, wait until the provisioning operation completes. Then, use the hypervisor manager to assign the hypervisor disks to the virtual machines.

BPCUI0374E Schedule is not enabled for the resource resource.

Explanation

Schedule is not enabled. Cannot be started.

Action

In order to be started the job should be enabled first.

BPCUI0375E Performance data is not available.

Explanation

The service for collecting performance data is not available.

Action

Wait for the next collection of performance data. If the performance data is still not being collected, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)

BPCUI0376E Invalid number of days to keep configuration history. The number should be between *minimum value* and *maximum value*.

Explanation

The input values were not in a valid range.

Action

Retry again with input values within the valid range.

BPCUI0377E Invalid number of days to keep data for removed resources. The number should be between *minimum value* and *maximum value*.

Explanation

The input values were not in a valid range.

Action

Retry again with input values within the valid range.

BPCUI0378E Invalid number of days to keep sample performance data. The number should be between *minimum value* and *maximum value*.

Explanation

The input values were not in a valid range.

Action

Retry again with input values within the valid range.

BPCUI0379E Invalid number of days to keep hourly performance data. The number should be between *minimum value* and *maximum value*.

Explanation

The input values were not in a valid range.

Action

Retry again with input values within the valid range.

BPCUI0380E Invalid number of days to keep daily performance data. The number should be between *minimum value* and *maximum value*.

Explanation

The input values were not in a valid range.

Action

Retry again with input values within the valid range.

BPCUI0381E Failed to update the performance data retention settings.

Explanation

The performance data retention settings on the History Retention page could not be saved.

Action

To resolve the issue, try the following actions:

- Verify that the local area network is available.
 - Check the status of the Device server on the Home > System Management page.
 - Restart the Device server on the Home > System Management page.
 - Verify that that the database repository is up and running.
 - Try to save the performance data retention settings again.
-

BPCUI0382E Performance monitoring is unavailable for resource *resource name*.

Explanation

Performance monitoring is not supported for the device.

Action

Performance monitoring is not supported for the device.

BPCUI0383E Failed to update the history retention settings.

Explanation

The history retention settings on the History Retention page could not be saved.

Action

To resolve the issue, try the following actions:

- Verify that the local area network is available.
 - Check the status of the Device server on the Home > System Management page.
 - Restart the Device server on the Home > System Management page.
 - Verify that that the database repository is up and running.
 - Try to save the history retention settings again.
-

BPCUI0384E Failed to retrieve the history retention settings.

Explanation

The most recent history retention settings could not be displayed on the History Retention page.

Action

To resolve the issue, try the following actions:

- Verify that the local area network is available.
- Check the status of the Device server on the Home > System Management page.
- Restart the Device server on the Home > System Management page.
- Verify that the database repository is up and running.
- Reload the History Retention page.

BPCUI0385E Invalid number of runs to keep log files for each schedule. The number should be between *minimum value* and *maximum value*.

Explanation

The input values were not in a valid range.

Action

Retry again with input values within the valid range.

BPCUI0386E A job cannot be run for resource *resourceName* because there is a job already running for the resource. Wait for the job to finish and try again.

Explanation

A new job cannot be run for a schedule definition if a previous job from that schedule definition did not finish running. Only one running job per schedule at a time is permitted.

Action

BPCUI0387I The selected resources support different performance monitor intervals. If you select multiple resources, intervals that are common to all resources are displayed in the interval list.

Explanation

The selected resources do not support the same set of performance monitor intervals. For example, you select two storage systems. Storage_System_a supports performance monitor intervals of 5 minutes, 10 minutes, and 15 minutes. Storage_System_b supports intervals of 10 minutes, 15 minutes, and 20 minutes. The interval list displays intervals of 10 minutes and 15 minutes.

Action

To configure a performance monitor with an interval that is not in the interval list, you can schedule the performance monitor for a single resource or a group of resources of the same type.

BPCUI0388E The probe schedule cannot be created for resource {0} because not all the information was provided. If you are configuring a probe for a resource for the first time, you must enter values for the probe status, time, and frequency fields.

Explanation

You attempted to create a probe schedule but not all the information was provided. If you are configuring a probe for a resource for the first time, you must enter values for the probe status, time, and frequency fields.

Action

When you create a probe schedule, enter all the information that is required. If you are modifying probe schedules for multiple resources at the same time, do not include resources that are not configured for probe data collection.

BPCUI0389E The performance monitor schedule cannot be created because not all the information was provided. If you are configuring a performance monitor for a resource for the first time, you must enter values for the performance monitor status and interval fields.

Explanation

You attempted to create a performance monitor but not all the information was provided. If you are configuring a performance monitor for a resource for the first time, you must enter values for the performance monitor status and interval fields.

Action

When you create a performance monitor schedule, enter all the information that is required. If you are modifying performance monitors schedules for multiple resources at the same time, do not include resources that are not configured for performance monitor data collection.

BPCUI0390I The service logs were successfully created.

Explanation

The service logs zip file were successfully created on the server.

Action

The user can either download the logs by clicking the link on the message or they can download later from the System Management Overview page.

BPCUI0391I The connection test to data source data source was successful. A probe is running. The health

status is unknown until the probe is finished.

Explanation

The previous state of the monitored device was either unreachable or unknown. The health status of the device is unknown until the currently running probe updates the status.

Action

No action is required.

BPCUI0392I The connection test to the data source *data source* was successful.

Explanation

The connection test was successful. However, to view the most recent information about the resource, you must run a probe.

Action

To collect the most recent information about a resource, including its status, right-click it on the resource list page and select Data Collection > Start Probe.

BPCUI0393E The user *user_name* does not have sufficient privileges to deploy the vSphere Web Client extension.

Explanation

The user must have Administrator privileges to deploy the vSphere Web Client extension.

Action

Specify a vSphere user name with Administrator privileges.

BPCUI0394E The user *user_name* does not have permission to log in to the vCenter Server system.

Explanation

The user does not have permission to log in to the vCenter Server system.

Action

Specify a user with permission to log in to the vCenter Server system.

BPCUI0395E This version of the vCenter Server `server_name` does not support the deployment of the vSphere Web Client extension for the product.

Explanation

This version of vCenter Server does not support the deployment of the vSphere Web Client extension.

Action

Deploy the required vSphere Web Client extension on vCenter Server version 5.1 or later.

BPCUI0396E The user `user_ID` does not have the required role. The role associated with this user must be Administrator, Monitor, or External Application.

Explanation

To access the vSphere Web Client extension and VASA functionality, the user ID must have one of the following roles: Administrator, Monitor, or External Application.

Action

Specify a user ID with one of the required roles.

BPCUI0397E The vCenter Server user name or password is invalid.

Explanation

The user name or password is not valid.

Action

Ensure that you enter the correct user name and password.

BPCUI0398E The user name or password is invalid.

Explanation

The user name or password is not valid.

Action

Ensure that you enter the correct user name and password.

BPCUI0399I The server was started.

Explanation

This message is for informational purposes only.

Action

No action is required.

BPCUI0400E Failed to retrieve the system management information from the Data server.

Explanation

An error occurred when attempting to retrieve the system management information from the Data server.

Action

Verify that the Data server is running.

BPCUI0402E Failed to retrieve the server status of the Data server.

Explanation

An error occurred when attempting to retrieve the server status of the Data server.

Action

Verify that the Data server is running.

BPCUI0403E The SMI-S provider service is not available.

Explanation

The service that is accessed by the SMI-S provider is not available.

Action

Make sure that the service accessed by the SMI-S provider is started and operational.

BPCUI0404E An error occurred while updating the trace log configuration file. The original file *file* was deleted and could not be restored. A backup of this file may be available at *backup file*.

Explanation

An error occurred during the process of updating the Performance Management trace log configuration file. The original file was deleted and needs to be restored. This will not impact the current operation of the Performance Manager but the file is needed prior to restarting the Device server.

Action

Restore the backup of the Performance Management configuration file, if possible. Otherwise contact IBM support.

BPCUI0405E Failed to set the trace settings from the Data server.

Explanation

An error occurred when attempting to save the trace settings from the Data server.

Action

Verify that the Data server is running.

BPCUI0406E Cannot start the server. The start script reported the following error: error

Explanation

An error occurred when executing the start script for the server.

Action

Retry the operation or manually start the server.

BPCUI0407E Cannot start the server. Unable to locate the start script path to script.

Explanation

The script required to start the server could not be found on the local filesystem.

Action

Verify that the script exists at the specified location.

BPCUI0408E Cannot start the server. Unable to execute the start script path to script.

Explanation

The script required to start the server could not be executed.

Action

Verify that the script is configured with the required file permissions so that it can be run by the product.

BPCUI0409W The server is taking a long time to start. If the server status continues to show an error status after a reasonable interval, try to start the server again.

Explanation

The server is in the process of starting but it is taking a long time.

Action

To resolve this issue, try the following actions:

1. Wait for the Alert server to start. If the Alert server does not start after a reasonable amount of time, try restarting the server.
2. Make sure the database is running properly.
3. Make sure the network is functioning properly.
4. Make sure the server or file system has not run out of disk space.
5. In some rare cases, the following directories or files might be missing or corrupt:
 - (installation_directory)/alert/conf directory
 - (installation_directory)/wlp/usr/servers/alertServerjvm.optionsIf this is the case, restore these directories and files from the installation image.

BPCUI0410E Cannot stop the server. The stop script reported the following error: error

Explanation

An error occurred when executing the stop script for the server.

Action

Retry the operation or manually stop the server.

BPCUI0411W The server is taking a long time to stop. If the server status continues to show that it is still running try to stop the server again after a reasonable interval.

Explanation

The server is in the process of stopping but it is taking a long time to stop.

Action

BPCUI0412E Cannot stop the server. Unable to locate the stop script path to script.**Explanation**

The script required to stop the server could not be found on the local filesystem.

Action

Verify that the script exists at the specified location.

BPCUI0413E Cannot stop the server. Unable to execute the stop script path to script.**Explanation**

The script required to stop the server could not be executed.

Action

Verify that the script is configured with the required file permissions so that it can be run by the product.

BPCUI0414W It is taking a long time for the services to start. If the server status continues to show an error status after a reasonable interval, try to start the services again. If the problem persists then restart the server.**Explanation**

The request to start the services has been issued but it is taking a long time for them to start.

Action

BPCUI0415E Failed to start the service *service name*.**Explanation**

An error occurred when attempting to start the specified service of the Data server.

Action

Retry to start the service. If the error continues to occur try restarting the Data server.

BPCUI0416I The server was stopped.

Explanation

This message is for informational purposes only.

Action

No action is required.

BPCUI0417I The services of the server were started.

Explanation

The user initiated the starting of internal server services that were not running

Action

The services have been started, no further action is required.

BPCUI0418E The action cannot be completed because the data source that is managing this resource cannot be reached.

Explanation

A test connection cannot be established to the data source that is managing this resource.

Action

Ensure that the data source is available. Ensure that the network is available and that you have a network connection to the data source. Verify that a firewall is not preventing network access to the data source. Try the action again. If the problem persists, try adding the data source again.

BPCUI0419E A Storage Resource agent is already deployed for this server and has a status of Pending deployment or Failed deployment. Use the Servers page to resolve the deployment errors or modify the deployment schedule.

Explanation

The Storage Resource agent is already added. Use the Servers page to check the status of the agent deployment.

Action

On the Servers page, if the server has a status of Pending deployment, you can cancel the deployment or modify the deployment schedule. If the server has a status of Failed deployment, you can cancel the deployment or resolve the errors that caused the deployment to fail and then deploy the agent again.

BPCUI0420E A file access error occurred when the system attempted to back up or modify the tracing configuration file *configuration file*.

Explanation

The action to change tracing levels first backs up, and then modifies, the tracing configuration file. The error occurred during that process.

Action

Review the trace file for the exception details. Look at the directories and file information to determine why the exception occurred.

BPCUI0421E There is a log collection operation already running. A new one cannot be submitted until the current one completes.

Explanation

Only one log collection operation can run on the server at a time. There is already one running.

Action

BPCUI0422E Cannot start the log collecting job. Unable to locate the required script path to script.

Explanation

The script that is required to collect the logs was not found on the local file system.

Action

Verify that the script exists at the specified location.

BPCUI0423E Cannot start the log collecting job. Unable to run the log collection script *path_to_script*.

Explanation

The script that collects the product logs could not be run.

Action

Verify that the script is configured with the correct permissions to allow it to be run from the web server.

BPCUI0424E Storage cannot be provisioned from capacity pool *capacity pool* using service class *service class* for the following reason:

Explanation

An error occurred during the execution of the provisioning plan for the specified service class and capacity pool.

Action

Verify that the capacity pool for the service class still meets the requirements for the requested storage to be provisioned.

BPCUI0425W The task *task name* cannot be scheduled because it is already running.

Explanation

This task cannot be scheduled to run later because it is already running. It cannot be run again.

Action

No action is required.

BPCUI0426E Storage cannot be provisioned by using service class *service class* for the following reason:

Explanation

A provisioning task cannot be created. The requested capacity cannot be found for the selected service class.

Action

Verify that there is free space in storage resources that meet the requirements of the selected service class.

BPCUI0427W The selected group action is complete for all tasks, but warnings were reported.

Explanation

The action to execute, schedule, or delete tasks is complete. However, the action resulted in at least one warning for one or more of the tasks.

Action

The warnings are listed following this message. Refer to the warning messages.

BPCUI0428I The selected group action is complete for all tasks. Some informational messages were returned.

Explanation

The action to execute, schedule, or delete tasks was successful. No warnings or errors were reported. At least one informational message was returned for one or more of the tasks.

Action

No action is required.

BPCUI0429E The validation process cannot contact the server. The server might be down or unreachable due to network problems.

Explanation

The server cannot be added because the validation process cannot contact the server.

Action

Use the ping command to verify that you have a network connection to the server. Try to add the server again.

BPCUI0430I Some tasks were not deleted because they were already run.

Explanation

When you complete the steps of the Provision Storage wizard, provisioning tasks are created. If you return to the Provision Storage wizard without executing, scheduling, or deleting the provisioning tasks, the tasks are deleted. Not all the tasks were deleted, however, because some were already executed.

Action

No action is required.

BPCUI0431E Failed to retrieve the list of managed devices.

Explanation

An unexpected error occurred trying to retrieve the list of managed devices from the database.

Action

Check the connection to the database and retry the operation.

BPCUI0432E Failed to retrieve the performance monitoring granularity from the Device server. Check the connection to the Device server and retry the operation.

Explanation

An unexpected error occurred trying to retrieve the performance monitoring granularity from the Device server.

Action

Check the connection to the Device server and retry the operation.

BPCUI0433E OS type *osType* specified on line *line* of file *file* is not valid.

Explanation

The specified OS type in the file is not valid.

Action

Enter a valid OS type. Valid OS types are "Windows", "Linux", "AIX", "Solaris", or "HP-UX".

BPCUI0434E Data source *data_Source_Key* could not be found.

Explanation

The data source could not be found in the database.

Action

Ensure that the database is running properly. Ensure that the Data server and Device server are up and running. Verify that the local area network is available and a firewall is not preventing network access to product services and agents. Try the action again.

If the problem persists, check the log files for error messages that might help determine the problem. For information about the location of log files and how to start the Data server, Device server, and Db2 database repository, see the IBM Knowledge Center.

If the problem continues, contact IBM Software Support.

BPCUI0435E Required host name or IP address and OS type were not specified on line *line* of file *file*.

Explanation

Deploying a server from a file requires a minimum host name or IP address and OS type.

Action

Ensure the file contains the required host name or IP address and OS type.

BPCUI0436E The alert notification settings cannot be displayed.

Explanation

Information about the alert notification settings for the resource cannot be retrieved from the product database.

Action

Ensure that the product database, Data server, and Device server are up and running. Verify that the local area network is available. Try to view the alert notification settings again.

BPCUI0437E The alert notification settings cannot be saved.

Explanation

Information about the alert notification settings for the resource cannot be saved to the product database.

Action

Check the log files for the Data server and the GUI to determine where the problem might have occurred. The log files are located in the following default locations:

- Data server: (Windows) TPC_installation_directory\data\log, (Linux or AIX) TPC_installation_directory/data/log
- GUI: (Windows) TPC_INSTALL_DIR\web\log, (Linux or AIX) TPC_INSTALL_DIR/web/log

Ensure that the product database, Data server, and Device server are up and running. Verify that the local area network is available. Try to save the alert notification settings again.

BPCUI0438E File *file* does not exist or is empty.

Explanation

The script file that you want to upload must exist in the specified location and contain the commands that you want to run when an alert is detected.

Action

Ensure that the script file exists in the specified location. If it does not exist, create the file or specify a different location. If the file exists but is empty, edit the file to include the script commands that you want to run when an alert is detected.

BPCUI0439E The file *file* could not be uploaded.

Explanation

An error occurred while uploading the script

Action

Check the log files for the GUI to determine where the problem might have occurred. The log files are located in the following default locations:

- GUI: (Windows) TPC_INSTALL_DIR\web\log, (Linux or AIX) TPC_INSTALL_DIR/web/log

BPCUI0440E The text location specified on line *line* of file *file* has invalid character(s) : *characters*

Explanation

The specified location or custom tag in the file contains invalid characters.

Action

Enter a valid location or custom tag that must contain only letters, numbers, spaces and common characters.

BPCUI0441E The alert definitions cannot be displayed.

Explanation

Information about the alert definitions for the resource cannot be retrieved from the product database.

Action

Ensure that the product database, Data server, and Device server are up and running. Verify that the local area network is available. Try to view the alert definitions again.

BPCUI0442E The alert definitions cannot be saved.

Explanation

Information about the alert definitions for the resource cannot be saved to the product database.

Action

Check the log files for the Data server and the GUI to determine where the problem might have occurred. The log files are located in the following default locations:

- Data server: (Windows) TPC_installation_directory\data\log, (Linux or AIX) TPC_installation_directory/data/log
- GUI: (Windows) TPC_INSTALL_DIR\web\log, (Linux or AIX) TPC_INSTALL_DIR/web/log

Ensure that the product database, Data server, and Device server are up and running. Verify that the local area network is available. Try to save the alert definitions again.

BPCUI0443E Select at least one managed server that is deployed for which alert notification settings need to

be displayed.

Explanation

Alert notification settings can be displayed only for managed servers that are deployed.

Action

Select at least one managed server that is deployed and try to view the alert notification settings again.

BPCUI0444E Select at least one managed server that is deployed for which alert definitions need to be displayed.

Explanation

Alert definitions can be displayed only for managed servers that are deployed.

Action

Select at least one managed server that is deployed and try to view the alert definitions again.

BPCUI0445W The discovery job completed with errors. Some available devices were not discovered.

Explanation

The discovery job was able to discover some devices, but encountered problems discovering other available devices.

Action

Check the logs for an explanation of errors. Correct the errors and run the discovery again, or continue configuring the devices that were discovered.

BPCUI0446E Unable to test the connection to the device because the request was not processed by the data collector.

Explanation

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server.

BPCUI0447E Select at least one managed storage subsystem for which alert notification settings need to be displayed.**Explanation**

Alert notification settings can be displayed only for managed storage subsystems.

Action

Select at least one managed storage subsystem and try to view the alert notification settings again.

BPCUI0448E Select at least one managed storage subsystem for which alert definitions need to be displayed.**Explanation**

Alert definitions can be displayed only for managed storage subsystems.

Action

Select at least one managed server that is deployed and try to view the alert definitions again.

BPCUI0449E The user does not have the required authority to complete the task or command.**Explanation**

The level of authority that is required for the task or command depends on the type of resource that the user is managing. This error can occur in the following situations:

- For IBM SONAS resources, if the user is an rssh restricted account and can issue only a restricted set of commands on the resource.
- For IBM Spectrum Scale, if the user that is used to log on to the cluster node does not have privileges to monitor the GPFS cluster. The user must have root privileges on the cluster node or have privileges to run a set of specified administration commands using the sudo command. For information about monitoring IBM Spectrum Scale without requiring root privileges, go to the IBM Knowledge Center at http://www.ibm.com/support/knowledgecenter/search/tpch_t_configuring_sudo_access?scope=SSQRB8.

Action

Ensure that the user has the required permissions to complete the task.

BPCUI0451E One or more applications from provided list: names do not exist.**Explanation**

An application with the specified name was not found.

Action

Verify that the required application name exists. If it does not, specify a different application.

BPCUI0452E *entity name* is not supporting data collection actions.

Explanation

The specified entity does not support data collection actions.

Action

The specified entity does not support data collection actions.

BPCUI0453E One or more departments from provided list: *names* do not exist.

Explanation

A department with the specified name was not found.

Action

Verify that the required department name exists. If it does not, specify a different department.

BPCUI0455I No performance data is available for the selected resources.

Explanation

Performance data must be collected about a resource before you can view its performance. Use performance monitors to collect performance data about a resource.

Action

To collect performance data about a resource immediately, go to the Storage Systems page or Switches page, right-click the storage system or switch, and select Data Collection > Start Performance Monitor. To schedule performance monitors to run at set times, select Data Collection > Schedule.

BPCUI0456E You cannot complete the action because the service is temporarily unavailable.

Explanation

IBM Marketplace is investigating the issue and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)

BPCUI0457W The applications *listOfApplications* cannot be deleted because they contain subcomponents *subcomponent*, which cannot be moved up a level in the applications hierarchy due to name conflicts with existing applications in that higher level.

Explanation

When you delete an application, the subcomponents that belong to that application are not automatically deleted unless you specify the Remove subcomponents option. They are moved to the next higher level in the application hierarchy. If those subcomponents have the same name as an application in the higher level, they cannot be moved up, and the parent application of those subcomponents cannot be deleted.

Action

Either rename the specified subcomponents and then delete the applications, or specify the Remove subcomponents option when you delete these applications.

BPCUI0458W The departments *listOfDepartments* cannot be deleted because they contain subdepartments or applications *subdepartment*, which cannot be moved up a level in the departments hierarchy due to name conflicts with departments in that higher level.

Explanation

When you delete a department, the subdepartments and applications that belong to that department are not automatically deleted unless you specify the Remove subdepartments and applications option. They are moved to the next higher level in the department hierarchy. If those subdepartments and applications have the same name as a department or an application in the higher level, they cannot be moved up, and the parent department of those subdepartments and applications cannot be deleted.

Action

Either rename the specified subdepartments or applications and then delete the department, or specify the Remove subdepartments and applications option when you delete these departments.

BPCUI0459W The selected subcomponents cannot be removed from the application because they cannot be

BPCUI0460W Failed to add the device because the data collector is not responding. The device was moved up a level in the application hierarchy due to name conflicts with the existing applications or subcomponents at the higher level.

Explanation

When you remove a subcomponent from an application, the subcomponent is moved up to the same level as the parent application. If the subcomponent has the same name as an existing application or subcomponent at that higher level, it cannot be moved up and the subcomponent is not removed from the application.

Action

Rename the specified subcomponents and try to remove them from the application again.

BPCUI0460W The selected applications or subdepartments cannot be removed from the department because they cannot be moved up a level in the department hierarchy due to name conflicts with the existing applications or subdepartments at the higher level.

Explanation

When you remove an application or subdepartment from a department, the application or subcomponent is moved up to the same level as the parent department. If the application or subdepartment has the same name as an existing application or subdepartment at the higher level, it cannot be moved up. The application or subdepartment is not removed from the department.

Action

Rename the specified applications or subdepartments and try to remove them from the department again.

BPCUI0461W There are no task details to display. The analysis-execution task could not be run.

Explanation

The execution task was created when the Device server was not available. The task is not valid.

Action

Ensure that the Device server is running, and then create and run a new task.

BPCUI0462E Failed to add the device because the data collector is not responding.

Explanation

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server.

BPCUI0463E The discovery failed because the data collector is not responding.

Explanation

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server.

BPCUI0464E The connection test failed because the data collector is not responding.

Explanation

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server.

BPCUI0465E The requested action failed because the data collector is not responding.

Explanation

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server.

BPCUI0466I The servers were created.

Explanation

Action

The action completed successfully, no further action necessary

BPCUI0467W *successCount* of *totalCount* servers were created.

Explanation

Action

Not all of the servers were created, review the detailed error messages for more information.

BPCUI0468E The creation of the servers failed.

Explanation

Action

None of the servers were created, review the detailed error messages for more information.

BPCUI0469E Schedule job does not exist for entity name.

Explanation

Schedule job should be created first in order to be started.

Action

Schedule job should be created first in order to be started.

BPCUI0470E Invalid file file size of size GB. Maximum allowed file size is max size GB.

Explanation

Maximum allowed files size exceeded.

Action

Verify the size of the input file.

BPCUI0471E Failed to set the trace settings from the Alert server.

Explanation

An error occurred when attempting to save the trace settings from the Alert server.

Action

Verify that the Alert server is running.

BPCUI0472E Failed to retrieve the system management information from the Alert server.

Explanation

An error occurred when attempting to retrieve the system management information from the Alert server.

Action

Verify that the Alert server is running.

BPCUI0474E Failed to retrieve the server status of the Alert server.

Explanation

An error occurred when attempting to retrieve the server status of the Alert server.

Action

Verify that the Alert server is running.

BPCUI0475I The volumes have been excluded from the reclamation analysis.

Explanation

The removed volumes will now be in the excluded list and will not be considered in future runs of the reclamation analysis.

Action

The action completed successfully, no further action necessary.

BPCUI0476I The volumes will be included in future analyses to reclaim storage.

Explanation

On completion of the next reclamation analysis the volumes may appear in the table of recommended reclamation volumes and reclamation summary charts

Action

The action completed successfully, no further action necessary.

BPCUI0477E An unexpected error occurred when modifying the optimization characteristics of the volumes.

Explanation

To find the cause of the issue, further investigation is required.

Action

few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

- [Products and services page](#)

BPCUI0478E The scheduled agent upgrade time is in the past.

Explanation

The upgrade was scheduled to occur at a time in the past.

Action

Schedule another date and time to upgrade the agent.

BPCUI0479E The object storage credentials are incorrect. Enter the correct credentials. Alternatively, clear the object credentials check box and do not specify the authentication credentials for object storage now. You can use the Modify Connection action to add the object storage later.

Explanation

The GPFS cluster is configured for object storage, but the specified user credentials are invalid.

Action

Enter the correct object storage credentials and try the operation again.

Alternatively, clear the object credentials check box and do not specify the authentication credentials for object storage now. You can use the Modify Connection action on the Object Storage Systems page to add the object storage later.

BPCUI0480E An object storage request failed on the GPFS cluster.

Explanation

The IBM Spectrum Control server cannot connect to the object storage on the GPFS cluster. This error might occur because the object service is disabled or stopped.

Action

Verify that the object service is configured correctly and is enabled and started. For more information about configuring the object service for IBM Spectrum Scale, go to the IBM Knowledge Center (<http://www.ibm.com/support/knowledgecenter>).

Try the operation again. If the problem persists, contact IBM Software Support.

BPCUI0481W No resources were removed.

Explanation

None of the selected resources were removed, either the resource was already removed or could not be found.

Action

Wait a few minutes, if the resource is still present contact IBM Support.

BPCUI0482E No resources were updated.

Explanation

None of the selected resources were updated because the resource could not be found.

Action

Contact IBM Support.

BPCUI0483E The connection information cannot be updated because it points to another device.

Explanation

The serial number of the device that is managed by this data source doesn't match the serial number of the existing device.

Action

Enter the host name or the IP address of the existing device.

BPCUI0484I The connection information for device name was updated.

Explanation

You successfully updated the connection information of the named device.

Action

No action is required.

BPCUI0485E The connection information cannot be updated.

Explanation

The connection information cannot be updated because the serial number of the resource cannot be retrieved. This problem might occur if the resource is unavailable or the connection to the resource was lost.

Action

Try the following actions:

- Verify that the resource is available.
- Ensure that a connection to the resource is active.
- Verify the available local disk space.
- Check the log files for error messages to determine the cause. For information about the location of log files, see the IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93/>.

BPCUI0486E Cannot query the object service for information about accounts and containers as the specified user does not have admin privileges.

Explanation

To query account and container information from the object service, the user must be assigned the admin role in Keystone, the OpenStack identity service. To monitor all accounts and containers, the user must also be assigned the role that is defined in the reseller_admin_role configuration option in the Swift proxy server. The default value for the reseller_admin_role option is ResellerAdmin.

Action

Check the credentials for the user. In Keystone, the OpenStack identity service, ensure that the user is assigned the required role and has the authority to retrieve object storage account and container information. Try the operation again.

BPCUI0487I The connection information of the selected device was successfully updated. Other devices were detected as being managed by the same data source.

Would you like to update the connection information of all of them?

Explanation

Other devices were found in Spectrum Control as being managed by the same data source.

Action

Select "Yes" to update the connection information of all detected devices, or "No" to close the dialog.

BPCUI0488I The connection information of all devices connecting through this data source was updated.

Explanation

You successfully updated the connection information of all devices connecting through this data source.

Action

No action is required.

BPCUI0489W Some of the devices connecting through this data source failed to be updated.

Explanation

One or more devices connecting through this data source was not updated.

Action

See below the reason of failure for each device.

BPCUI0490I The vCenter vCenter Server was removed.

Explanation

The removal of the specified vCenter Server succeeded.

Action

No action is required.

BPCUI0491E The vCenter vCenter Server was not found in the database.

Explanation

The specified vCenter Server was not found in the database. Maybe it was removed.

Action

Wait a few minutes, then verify that the vCenter Server is not listed in the "vCenters" tab of the "Hypervisors" page.

BPCUI0492E The selected vCenter Servers were not found in the database.

Explanation

None of the selected vCenter Servers was found in the database. Maybe they were removed.

Action

Wait a few minutes, then verify that the vCenter Servers are not listed in the "vCenters" tab of the "Hypervisors" page.

BPCUI0493I The vCenter vCenter Server and all number of monitored hypervisors hypervisors monitored by it were successfully removed.

Explanation

The selected vCenter Server and the hypervisors that it monitors were successfully removed.

Action

No action is required.

BPCUI0494I The number of vCenters selected vCenter Servers and all number of monitored hypervisors hypervisors monitored by them were successfully removed.

Explanation

The selected vCenter Servers and the hypervisors that they monitor were successfully removed.

Action

No action is required.

BPCUI0495W Only number of removed vCenters of number of selected vCenters of the selected vCenter Servers

and number of removed monitored hypervisors of number of monitored hypervisors of the hypervisors monitored by them were successfully removed.

Explanation

The selected vCenter Servers and the hypervisors that they monitor were partially removed, but some errors occurred.

Action

Review the list of detailed messages for further information.

BPCUI0496I The following fabrics were detected as being managed by the same data source: *comma separated fabrics list*. This action applies to all fabrics that are managed by the current data source. Would you like to update the connection information of all of them?

Explanation

Other monitored fabrics are being managed by the same data source. When you change the connection information for one fabric, the change will apply to all of the fabrics.

Action

Select Yes to update the connection information of all monitored fabrics, or No to close the window without updating connection information.

BPCUI0497E The following fabrics cannot be monitored through the SMI agent: *comma separated fabrics list*. The data source connection information will not be updated.

Explanation

This message applies to all fabrics that are managed by the SMI agent and occurs when one or more switches in the fabrics cannot be reached through the SMI agent.

Action

To resolve the problem, try the following actions:

- Ensure that all of the switches in the fabrics can be reached by the SMI agent.
- Use a different SMI agent to connect to a fabric. To connect a fabric to a different SMI agent, go to Network > Fabrics, click Add Fabric, and select Other. Specify information about the SMI agent, including host name or IP address, to complete the add action.

BPCUI0498E The fabric cannot be monitored through the SMI agent.

Explanation

At least one switch in this fabric cannot be monitored through the SMI agent.

Action

Ensure that all of the switches in the fabric can be reached by the SMI agent.

BPCUI0499I Other switches were detected as being managed by the same data source. This action applies to all switches that are managed by the current data source. Would you like to update the connection information of all of them?

Explanation

Other monitored switches are being managed by the same data source. When you change the connection information for one switch, the change will apply to all of the switches.

Action

Select Yes to update the connection information of all monitored switches, or No to close the window without updating connection information.

BPCUI0500E One or more switches cannot be monitored through the SMI agent. The data source connection information will not be updated.

Explanation

This message applies to all switches that are managed by the SMI agent and occurs when at least one switch cannot be reached through the SMI agent.

Action

Ensure that all of the switches can be reached by the SMI agent.

BPCUI0501E The information cannot be displayed. Log out of the GUI, log in, and try the action again.

Explanation

An error occurred when the server tried to process a request. This message might occur when a request is not handled correctly by the internal Web server, the Web server is down, or the related data collection job failed.

Action

To resolve the problem, try the following actions:

- Ensure that the Web server (and all required product servers) are running and that you have a network connection to the system on which they are located. To check the status of the servers, go to the Home > System Management page. If the status of any server is not Running, click Component Servers for more details.
- Ensure that the related data collection jobs are running and completing successfully. To check the data collection jobs for a specific resource, go to the resource page (for example, Storage > Block Storage Systems) and check the Probe Status and Performance Monitor status columns.
- Log out of the GUI, log in, and try the action again.
- Restart the browser, log in to the GUI, and try the action again.

If the problem persists, contact IBM support. For information about how to contact IBM support, go to <http://www.ibm.com/support/knowledgecenter/SS5R93> and navigate to Troubleshooting and problem determination > Contacting IBM Software Support.

BPCUI0502E The device is already managed by this data source. The data source connection information will not be updated.

Explanation

The device is already being managed by the data source.

Action

No action is required.

BPCUI0503I The connection information of the selected switches was updated.

Explanation

The selected switches have been updated with new connection information.

Action

No action is required.

BPCUI0504I The detected versions of the resources discovered on the data source `data_Source_Address` are unsupported.

Explanation

This resource is of an unsupported version.

Action

For a list of supported versions of this product, go to the support matrix at <http://www.ibm.com/support/docview.wss?uid=swg21386446>.

BPCUI0505E The resource does not have a connection configured.

Explanation

The data source for the resource might have been removed. You must add a connection to the resource again.

Action

To add the connection to the resource again, go to the resource list page for this resource type and click the Add button.

BPCUI0506E Cannot connect to the Alert server.

Explanation

The Alert server is unavailable. This error might occur if the Alert server is down or the local area network is unavailable.

Action

Verify that the database service and Alert server are up and running. Ensure that you have a network connection to the server on which the Alert server is located. Try the action again.

To check the status of IBM Spectrum Control servers and services, go to Home - System Management. For additional status details, click Component Servers or Database in the left navigation pane.

BPCUI0507E The version of the *tpc_server* IBM Spectrum Control Server is not supported.

Explanation

You can manage only the supported versions of IBM Spectrum Control.

Action

Check the product support site for a list of IBM Spectrum Control Server versions that are supported.

BPCUI0508E Cannot connect to the rollup server *rollup_server* on port *host_port*.

Explanation

The rollup server cannot be contacted on the specified port.

Action

To resolve the issue, try the following actions:

- Ensure that you enter the correct host address and port.
- Verify that the local area network is available and a firewall is not preventing network access to product services.
- Check the status of the rollup server.
- Ensure that the Device server is running properly.
- Ensure that the database is running properly.
- Verify that the database repository is available.
- Verify that the related database service is active.
- Check for error messages in the server log files.

BPCUI0509E Cannot authenticate with the rollup server using the provided credentials.

Explanation

The user name or password that was entered for the rollup server is not correct.

Action

Make sure that the user name and password are correct for the device that is being added. Reenter the user name or password and click Add.

BPCUI0510E You entered an invalid time range. The start date and time must be before the end date and time.

Explanation

The start date and time of the time range that you specify must be earlier than the end date and time.

Action

Enter a valid time range, and try the operation again.

BPCUI0511E The following alert name(s) are not unique: *names*.

Explanation

The names of custom alerts must be unique across all resources.

Action

Specify unique names for your custom alerts and try again.

BPCUI0512E Custom alerts already exist for other resources with the following alert name(s) : *names*.

Explanation

The names of custom alerts must be unique across all resources.

Action

Specify unique names for your custom alerts and try again.

BPCUI0513E Unable to connect from rollup server *rollup_server* to the repository database.

Explanation

This error typically indicates that the repository database has been shut down. The rollup server must connect to the repository database in order to add or modify subordinate servers.

Action

Please ensure that specified repository RDBMS is up and running.

BPCUI0514E The specified subordinate server *subordinate_server* is the master server.

Explanation

This problem might occur when the host name or IP address of the master server was entered instead of the subordinate server.

Action

Enter the correct host name or IP address for the subordinate server that you want to add and try again.

BPCUI0515E The duration of the automated probe run window must be at least *minimum_hours* hours.

Explanation

The automated probe window cannot be less than the value that is specified in the message.

Action

Enter the start time and end time so that the duration of the window is at least the amount of time that is specified in the message.

BPCUI0516W The selected subgroups cannot be removed from the general group because they cannot be moved up a level in the groups hierarchy due to name conflicts with the general groups at the higher level.

Explanation

When you remove a subgroup from its parent general group, the subgroup is moved up to the same level in the hierarchy as the parent group. If the subgroup has the same name as an existing general group at the higher level, the subgroup cannot be moved up. The subgroup is not removed from the general group.

Action

Rename the subgroup and try the action again.

BPCUI0519E Authorization has failed because the private key is not valid for the user name that you have specified.

Explanation

The private key and user name that you have provided do not match what has been defined on the cluster.

Action

Ensure that the private key is valid for the specified user name, and log in again.

BPCUI0520E The IP address *ip_address* for the FlashSystem storage system is not the management IP address.

Explanation

The IP address for the FlashSystem storage system that you added is not the management IP address. If you do not use the management IP address, the storage system might be managed incorrectly.

Action

Add the FlashSystem storage system again using the management IP address.

BPCUI0521E The configuration for the report can't be saved.

Explanation

The save operation wasn't completed.

Action

Go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support and then choose an option.

Related reference

- [Products and services page](#)
-

BPCUI0522E Failed to delete a report configuration.

Explanation

An attempt to delete a report configuration failed.

Action

Verify that the database service is up and running.

BPCUI0523E Alerts cannot be defined for this storage system.

Explanation

This error might occur when a storage system is not fully supported for monitoring and data for generating alerts is not being collected.

Action

To verify if the storage system is supported for monitoring, check the support matrix at <https://www.ibm.com/support/pages/node/6249369>.

BPCUI0524E The changes to the report configuration can't be saved.

Explanation

The configuration for the report can't be updated because it couldn't be retrieved from the database.

Action

A new report must be created and configured.

BPCUI0525E The configuration for the report can't be saved because the report title isn't unique.

Explanation

The title of the report must be unique.

Action

Enter a unique title for the report.

BPCUI0527E The action cannot be completed because of an invalid request.

Explanation

The issue should not be seen in the field.

Action

If the problem persists, contact IBM Software Support.

BPCUI0528E The action cannot be completed because of an invalid file upload request.

Explanation

The issue should not be seen in the field.

Action

If the problem persists, contact IBM Software Support.

BPCUI0526I The connection test to data source *data source* was successful. A probe is running.

Explanation

The previous state of the monitored device was either unreachable or unknown.

Action

No action is required.

BPCUI0529I The data source *data_Source_Address* is already being managed as a data source for monitoring. No new resources were detected.

Explanation

Only resources that are newly discovered or are not included in a data collection schedule can be added for monitoring.

Action

Enter the IP address or host for a different data source or resource to continue.

If you want to modify resources that are already monitored, go to the list page for the resource. For example, to modify a storage system, in the navigation pane select Storage Resources > Storage Systems. Then, right-click the resource and select View Properties. In the properties notebook, modify the values for the resource.

BPCUI0530I The data source *data_Source_Address* is already being managed as a data source for monitoring. The following new resources were detected:

Explanation

You cannot configure resources that are already being monitored. Only resources that are newly discovered or are not included in a data collection schedule can be added for monitoring.

Action

No action is required.

BPCUI0531E The action cannot be completed because LDAP registry file failed to upload.

Explanation

The LDAP registry file failed to upload.

Action

No action is required.

BPCUI0532E The action failed because of a missing resource.

Explanation

An error occurred while processing a user request.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)

BPCUI0533E The LDAP configuration test failed.

Explanation

An error occurred while testing the LDAP configuration.

Action

Ensure that the user ID and password you are using is correct.

BPCUI0534E There was an error executing the collect log process. If this problem persists, you can try collecting and uploading the service logs manually. Learn More.

Explanation

There was a problem while executing the collect log process.

Either the process could not be started, or it has failed unexpectedly.

Action

Collect logs manually: Collecting Service Logs.

After the log package has been created, manually upload the service logs.

BPCUI0535E An FTP connection can not be established. If your organization requires the use of a proxy server, consult the following documentation: Troubleshooting FTP Transfers.

Explanation

A proxy configuration file ibmsdduu.config has been created, but the content is not valid.

Action

Please check and fix the configuration file, and try again.

BPCUI0536E The support data collection failed due to an invalid PMR number format.

Explanation

The used PMR number was not in format nnnnn,nnn,nnn.

Action

Please check the PMR number and try again.

BPCUI0537E The support package could not be created because file system permissions prevent the creation

of temporary files.

Explanation

The collection of the support information failed because of problems reading/writing to the file system.

Action

Please check the file system and try again.

BPCUI0538E The support data collection completed creating a support package, but the package could not be uploaded to IBM.

Explanation

The upload of the support package via FTP failed. This might be caused by firewalls preventing the Spectrum Control server to access the internet.

Action

Please do a manual upload of the created service package.

To enable the automatic upload of the support packages in the future, you might have to configure Spectrum Control to use a proxy server. Please see the documentation for details.

BPCUI0539E The support data collection failed with an internal error

Explanation

The creation of the support data package failed due to an internal error.

Action

Try again or try using the CLI command to collect the service information. Please see the documentation for details.

BPCUI0540E The support data collection failed due to an invalid email address format.

Explanation

The used email address was not according to the syntax rules of RFC 822.

Action

Please check the email address and try again.

BPCUI0541E The specified SMI agent was not found. Make sure that the protocol, SMI agent host name or IP address, and port are specified correctly and that the SMI agent is properly configured at that location.

Explanation

The SMI agent specified was not found.

BPCUI0542E A connection was not established. Make sure that the protocol, SMI agent host name or IP address, and port are specified correctly.

Explanation

The attempt to establish a connection failed.

BPCUI0543E The authentication to the SMI agent failed.

Explanation

The credentials that you supplied for the connection are incorrect.

BPCUI0544E There is a pending delete in process for this SMI agent.

Explanation

The specified SMI agent is currently being deleted.

BPCUI0545E The SMI agent service is not available.

Explanation

The service accessed by the SMI agent is not available.

Action

Make sure that the service accessed by the SMI agent is started and operational.

BPCUI0546E The action cannot be completed because the LDAP registry file could not be updated.

Explanation

The ldapregistry.properties file failed to update.

Action

Check the file ldapregistry.properties file for possible conditions that caused the error. For example, the LDAP registry file is locked or is being used by an application. Correct the error condition and perform the action again.

BPCUI0547E Connection failed. The server might be down or unreachable due to network problems.

Explanation

The test to connect to the server failed.

Action

Test the connection again when the network connection to the server is restored.

BPCUI0548E The add SSL certificate action failed.

Explanation

The script that was used to add the SSL certificate to the webServer keystore file failed.

Action

Verify that you have the correct SSL certificate and try to add the SSL certificate again.

BPCUI0549E The add SSL certificate action failed because of a wrong password.

Explanation

A wrong password was used in the script to add the SSL certificate to the webServer keystore file.

Action

Verify that you have the correct password for the webServer keystore file and try to add the SSL certificate again.

BPCUI0550E The specified storage resource is not valid for the REST API service request.

Explanation

The service request does not support the specified storage resource. For example, you cannot specify a virtual server if you use the Consumption REST API.

Action

Enter a storage resource that is valid for the service request.

BPCUI0551E The file cannot be used because it is not a valid SSL certificate. Select a valid certificate file and try again.

Explanation

The file must be a valid SSL certificate to configure LDAP authentication

Action

Select a valid SSL certificate file and try again.

BPCUI0554E The SSL certificate download process failed.

Explanation

The process for downloading the SSL certificate from the LDAP server failed.

Action

Try downloading the SSL certificate again. If the problem persists, contact your LDAP administrator.

BPCUI0555E The test connection to the LDAP server failed. Verify that your XML file contains the correct syntax and values and that the LDAP server is running.

Explanation

The test connection to the LDAP server failed.

Action

Verify the settings in the configuration file and test your connection again.

BPCUI0556E An unexpected error occurred creating or updating a support ticket.

Explanation

While executing the action, an error occurred when reading the request data.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

BPCUI0557E An invalid request was made when creating or updating a support ticket.

Explanation

While executing the action, an error occurred when reading the request data.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

BPCUI0558E This tier name is already in use. Enter a different name.

Explanation

Tier names must be unique so that each tier can be identified.

Action

Enter a unique name for each tier.

BPCUI0559E The custom dashboard was removed by another user. Cancel the action and refresh the page manually.

Explanation

Before the page could be refreshed, the custom dashboard was removed by another user.

Action

Cancel the action or close the dialog, and then refresh the page manually.

BPCUI0600W Can't save the scheduling information for the report because the Data server is offline.

Explanation

The report was saved with the configuration changes that were made, but without the scheduling information.

Complete these actions:

1. From the Home menu, click System Management.

2. In the Components section, click Component Servers.
3. Click Start Server next to the Data server.

When the Data server starts, complete these actions:

1. From the Reports menu, click Reports.
2. In the Custom Report section, click the report, and then click Edit.
3. Click Next, configure the schedule, and save your changes.

Action

Wait a few minutes and then complete these actions:

BPCUI0601I The resource does not have a connection configured. To add a connection to the resource, click Add Switch or Add Fabric.

Explanation

The data source for the resource might have been removed. You must add a connection to the resource again.

Action

Use the Add dialog for the resource to add the connection again.

BPCUI0602E The osAuthentication script does not start. The script reported the following error: *script_error*.

Explanation

Action

Fix the reason for failure and try the script again.

BPCUI0603E The connection test to data source *data source* was not successful.

Explanation

The connection to the data source (SMI-S provider) was established but the resource was not found. This problem might occur if the resource was removed and is no longer managed by the SMI-S provider.

Action

In your storage environment, assign the resource to be managed by the SMI-S provider. In IBM Spectrum Control, test the connection again.

BPCUI0604E Can't stop data collection for *entity name*.

Explanation

An error was encountered when stopping the data collection.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

BPCUI0605E Can't restart data collection for entity name .

Explanation

An error was encountered when restarting the data collection.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

BPCUI0606E The action cannot be completed because there was a failure to create or write into the pending configuration file .

Explanation

An unknown error occurred when trying to create or write the .PendingConfiguration file.

Action

Check that files can be created on the filesystem.

BPCUI0607E The action cannot be completed because there was a failure to read the pending LDAP registry file .

Explanation

An unknown error occurred when trying to read from the ldapregistry.pending file.

Action

Check that the ldapregistry.pending file exists and is readable.

BPCUI0608E The action cannot be completed because there was a failure to get the list of LDAP groups .

Explanation

There was a failure to get LDAP groups. Verify the settings in the uploaded LDAP registry file.

Action

Check the settings in the uploaded LDAP registry file.

BPCUI0609E The Local OS authentication configuration test failed.

Explanation

An error occurred while testing the Local OS authentication configuration.

Action

Ensure that the user ID and password are correct, and the user is member of the group selected.

BTADS/BTAFM/BTAVM/HWN - Job logging messages

- [BTADS0000I Starting Discover Process value , with Device Server RUN ID value , and Job ID value .](#)
- [BTADS0001I Discover Process with Device Server run ID value and job ID value is complete.](#)
- [BTADS0002I Starting Child Discover Process value with Job ID= value .](#)
- [BTADS0003I The Child Discover Process with Job ID value has completed with Status= value and Return Code= value .](#)
- [BTADS0004W The child discovery request with job ID job_id completed with status status_number and return code value .](#)
- [BTADS0005E The child discovery request with job ID job_id completed with status status_number and return code value .](#)
- [BTADS0010I Invoking outband scanner value on agent value .](#)
- [BTADS0011I Outband scanner value on agent value completed successfully.](#)
- [BTADS0012E Outband Scanner value on agent value failed with return code value .](#)
- [BTADS0019E An outband scanner failed to capture the scan data.](#)
- [BTADS0020I Processing value data from agent value .](#)
- [BTADS0021W Warning encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value .](#)
- [BTADS0022E Exception encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value .](#)
- [BTADS0023E Fatal error encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value .](#)
- [BTADS0024E Error encountered processing scanner value data from agent value . value .](#)
- [BTADS0025I Running job to discover SMI-S providers through Service Location Protocol: RUN ID= value , Job ID= value .](#)
- [BTADS0026I Service Location Protocol has found value SMI-S providers.](#)
- [BTADS0027E Error encountered by a Service Location Protocol job: RUN ID= value , and Job ID= value . value .](#)
- [BTADS0028W The Device Server Job with RUN ID=: value , Job ID= value , Discover Request= value has been cancelled since it is long running.](#)
- [BTADS0029I Scanner value data from agent value has not changed since last scan.](#)
- [BTADS0030I Invoking inband Scanner value on agent value .](#)
- [BTADS0031I Inband Scanner value on Agent value completed successfully.](#)
- [BTADS0032E Inband Scanner value failed on agent value with Return Code value .](#)
- [BTADS0033E Error invoking value on host value .](#)
- [BTADS0034E Fatal error encountered while persisting the data for job: RUN ID= value , and Job ID= value . value .](#)
- [BTADS0035E The execution of the job failed with: value .](#)
- [BTADS0036I Found SNMP Target at value .](#)
- [BTADS0037E Found SNMP Target at value but it is not persisted in the database. Will NOT perform discovery of information using the address.](#)
- [BTADS0038I Starting scan of SNMP agents from value to value .](#)
- [BTADS0039I Starting probe of detected agents.](#)
- [BTADS0040I Processing of Scanner value data from Agent value completed successfully.](#)
- [BTADS0041I Discover Process with Device Server RUN ID value and Job ID value completed successfully.](#)
- [BTADS0042E Discover Process with Device Server RUN ID value and Job ID value failed with return code value .](#)
- [BTADS0043I Invoking value scanner value on target value .](#)

- [BTADS0044I](#) value scanner value on target value completed successfully.
- [BTADS0045E](#) value Scanner value on target value failed with return code value .
- [BTADS0046I](#) Processing value data from agent value .
- [BTADS0047W](#) The value parser encountered a warning while parsing XML for job with RUN ID= value , and Job ID value . The return code from the parser job is value .
- [BTADS0048E](#) The value parser encountered an exception while parsing XML from job with RUN ID= value , and Job ID= value .The return code from the parser is value .
- [BTADS0049E](#) The value parser for Device Server job with RUN ID= value , and Job ID= value failed. The return code from the parser is value .
- [BTADS0050I](#) Service Location Protocol has found SMI-S provider, value , at address value .
- [BTADS0051I](#) Service Location Protocol has found SMI-S provider, value , at address value , which requires security information to be configured.
- [BTADS0052W](#) Warning encountered while parsing value data from agent value. value.
- [BTADS0053E](#) Exception encountered while parsing value data from agent value. value.
- [BTADS0054E](#) Fatal error encountered while parsing value data from agent value. value.
- [BTADS0055E](#) Outband Scanner value on agent value encountered the presence of a McData i10k. These devices do not report correctly via SNMP and can only be used with SMI-S provider.
- [BTADS0056E](#) Errors in Topology XML generator.
- [BTADS0057E](#) Errors occurred while resolving InterconnectElement and Port relationship.
- [BTADS0058E](#) Errors in creating an entity.
- [BTADS0059E](#) The outband agent target address IP address is not a Cisco device or is invalid.
- [BTADS0060E](#) Outband Scanner value is not responding.
- [BTADS0062E](#) Encountered SQL error value while persisting some data.
- [BTADS0063E](#) The execution of the PM BSP invocation failed with: value .
- [BTADS0063W](#) The performance data collection for the current device is not enabled.
- [BTADS0064I](#) Starting scan of Storage Subsystems from value to value .
- [BTADS0065I](#) Outband and inband agents for fabric(s) specified in probe are value
- [BTADS0066I](#) Could not find scanners for agent value
- [BTADS0067I](#) Agent value is configured for no SAN calls and so no scanners will be invoked for this particular agent
- [BTADS0068I](#) Could not retrieve connection information for agent value. Will not be able to invoke scanners for this particular agent
- [BTADS0069I](#) Added inband scanner job with id value discover request value for agent value.
- [BTADS0070I](#) Agent value has not discovered any fabrics and will not be used during the probe.
- [BTADS0071I](#) Invoked inband Scanner value on agent value .
- [BTADS0072I](#) Successfully received response from agent for job value with request id value .
- [BTADS0073E](#) Received error response from agent for job value with request id value. Return code is value.
- [BTADS0074E](#) IP Scan Discovery was canceled due to a hung socket/thread detected. Partial result of the scan will be persisted.
- [BTADS0075E](#) IP Scan Discovery was canceled due to a hung socket/thread detected.
- [BTADS0076I](#) IP Scan Discovery has started for DS, XIV, and IBM SONAS subsystems.
- [BTADS0077I](#) Scanning value out of value IP addresses.
- [BTADS0078I](#) IP Scan Discovery has started for SVC subsystems.
- [BTADS0079I](#) IP Scan Discovery for DS and XIV was done.
- [BTADS0080I](#) IP Scan Discovery for SVC was done
- [BTADS0081I](#) Inband Scanner value for agent address value is not required for probing switches and will not be used.
- [BTADS0082W](#) A first run of a switch probe failed. Additional agents will be used.
- [BTADS0083I](#) The available agents provide a subset of possible features for the probed switch: value
- [BTADS0084I](#) There are no limitations for probing switch value based on the mix of agents that are configured.
- [BTADS0085W](#) A problem was encountered when agent assignments were being determined for the probe. All available agents will be used to collect information about the switch.
- [BTADS0086I](#) The following storage systems were discovered value
- [BTADS0087I](#) IP Scan Discovery did not find any DS8000, SVC, XIV, and IBM SONAS storage systems in the given IP range.
- [BTADS0088I](#) IP Scan Discovery finished.
- [BTADS0089E](#) The Device server is not registered with agent manager. Scanners cannot be used for agent value. value.
- [BTADS0090E](#) There are no agents currently available to probe switch value.
- [BTADS0091I](#) Inband Scanner value for agent address value is currently not running and will not be used.
- [BTADS0092I](#) Inband Scanner value for agent address value is currently disabled from performing fabric functions and will not be used.
- [BTADS0093I](#) Inband Scanner value for agent address value is currently not reachable and will not be used.
- [BTADS0094W](#) The probe for switch value has some limitations.
- [BTADS0095W](#) For switch value some information will not be collected.
- [BTADS0096I](#) The probe limitation can be overcome by configuring an SMI agent to manage fabric value.
- [BTADS0097I](#) The probe limitation can be overcome by configuring SNMP agents to manage switches in fabric value.
- [BTADS0098I](#) The probe limitation can be overcome by configuring a Storage Resource agent to manage fabric value.
- [BTADS0099W](#) The following WWN is not recognized as belonging to a known vendor: value.

- [BTADS0100W](#) Invalid relationships between switches and fabrics were identified. If possible, these relationships will be fixed automatically for the following switches: value.
- [BTADS0101W](#) The discover process that has the Device server run ID value and job ID value completed with one or more warnings.
- [BTADS0102E](#) The probe with the run ID value completed with errors.
- [BTADS0103E](#) No data source is available to probe switch switch_name.
- [BTADS0104E](#) A timeout occurred while processing the request. Try the request again.
- [BTADS0105E](#) A response from the data collector was not received within the specified time.
- [BTADS0106E](#) The requested action on agent agent_name did not complete because the data collector stopped or is not responding. The request failed with error code error_code.
- [BTADS0107W](#) Outband Scanner outband_scanner_name on agent agent_name failed because of another transaction in progress on the switch.
- [BTADS0108E](#) Outband Scanner outband_scanner_name on agent agent_name failed because unexpected data was returned by the switch. Check the trace file for more details.
- [BTADS0109I](#) Outband Scanner outband_scanner_name on agent agent_name did not collect zoning data.
- [BTADS0110I](#) Outband Scanner outband_scanner_name on agent agent_name did not pass write capabilities check.
- [BTADS0111E](#) The probe was unable to collect some details of the switch.
- [BTADS0112E](#) Error encountered while persisting some data. value
- [BTADS0113E](#) Error encountered while processing a probe job. value
- [BTADS0114E](#) The information cannot be saved to the database repository.
- [BTADS0115E](#) The probe failed when collecting information about the resource. The data collector returned the following error status: value.
- [BTAFM0000I](#) Operation op_name processed successfully.
- [BTAFM0100I](#) Initializing Collection.
- [BTAFM0110I](#) Querying the SMI-S provider.
- [BTAFM0113I](#) Collecting for db_table, current_obj of num_objs.
- [BTAFM0114I](#) Probing data for switch switch_name.
- [BTAFM0115I](#) Probing data for port port_name.
- [BTAFM0150I](#) Storing Information.
- [BTAFM0151I](#) The db_table of current_obj num_objs stored.
- [BTAFM0200I](#) Traversing fabric topology.
- [BTAFM0500I](#) The IBM Spectrum Control Device Server service has started successfully.
- [BTAFM0501I](#) The IBM Spectrum Control Device Server service was shut down successfully.
- [BTAFM0502I](#) The IBM Spectrum Control Device Server service provides methods to collect, report and configure the fabric hardware.
- [BTAFM0505I](#) The delete missing function has started.
- [BTAFM0506I](#) The delete missing method was processed in milliseconds milliseconds.
- [BTAFM2000W](#) Operation op_Name partially processed.
- [BTAFM2501W](#) Unable to shut down Device Server Service smoothly.
- [BTAFM4000E](#) Operation op_Name failed.
- [BTAFM4001E](#) An internal error occurred.
- [BTAFM4002E](#) Could not get requested information due to an internal error - errorMessage
- [BTAFM4100E](#) Mandatory parameter parameter_Name is missing.
- [BTAFM4101E](#) Invalid parameter parameter_Name.
- [BTAFM4103E](#) Entity entity_name was not found.
- [BTAFM4104E](#) Attribute attribute_name was not found.
- [BTAFM4105E](#) Computer computer_name was not found.
- [BTAFM4106E](#) Fabric fabric_name was not found.
- [BTAFM4107E](#) Switch switch_name was not found.
- [BTAFM4108E](#) Port port_name was not found.
- [BTAFM4109E](#) Zone set zoneset_name was not found.
- [BTAFM4110E](#) Zone zone_name was not found.
- [BTAFM4111E](#) Zone alias zone_alias_name was not found.
- [BTAFM4112E](#) Zone member zone_member_name was not found.
- [BTAFM4113E](#) Subsystem subsystem_name was not found.
- [BTAFM4114E](#) Host Bus Adapter HBA_name was not found.
- [BTAFM4115E](#) Node node_name was not found.
- [BTAFM4116E](#) Link from port from_port_name to port_to_port_name was not found.
- [BTAFM4117E](#) Hub hub_name was not found.
- [BTAFM4118E](#) Router router_name was not found.
- [BTAFM4119E](#) Bridge bridge_name was not found.
- [BTAFM4120E](#) LUN LUN_name was not found.
- [BTAFM4140E](#) Agent Agent_name was not found.
- [BTAFM4141E](#) Scanner scanner_name on agent agent_name was not found.
- [BTAFM4142W](#) Agent agent_name was ignored because the switch switch_name was probed by agent agent1_name.
- [BTAFM4150E](#) Indexed properties property_name don't match.

- [BTAFM4180E Agent to gather sensor and event data is not available for the switch switch_name.](#)
- [BTAFM4200E Credentials not found.](#)
- [BTAFM4300E The connection to the SMI agent for switch switch_name could not be made.](#)
- [BTAFM4301E The invocation of CIM method method_name failed on SMI-S provider SMI-S provider name. The return code is return_code.](#)
- [BTAFM4302E The invocation of CIM method method_name failed on SMI-S provider SMI-S provider name with the following exception text: exception_text.](#)
- [BTAFM4303E Received unexpected values from SMI-S provider SMI-S provider name.](#)
- [BTAFM4304E SMI agent SMI agent name can not contact switch switch_name.](#)
- [BTAFM4305E The CIM method method_name is not supported on the switch switch_name.](#)
- [BTAFM4306E Could not create connection to SMI-S provider SMI-S provider name . Reason: reason.](#)
- [BTAFM4307E The username user_name or password is wrong on SMI-S provider SMI-S provider name.](#)
- [BTAFM4308I Could not create connection to SMI-S provider SMI-S provider name . Reason: reason. An alternate SMI-S provider will be used.](#)
- [BTAFM4501E No agent is available to configure the zoning on the fabric with ID fabric_name.](#)
- [BTAFM4502E The fabric with ID fabric_name is currently locked by another client of IBM Spectrum Control.](#)
- [BTAFM4503E A token for fabric fabric_name has expired for client client_name.](#)
- [BTAFM4504E The transaction for fabric fabric_name has expired.](#)
- [BTAFM4505E Another transaction is in progress for fabric fabric_name.](#)
- [BTAFM4506E Zone set zoneset_name already exists.](#)
- [BTAFM4507E Zone zone_name already exists.](#)
- [BTAFM4508E Zone alias zone_alias_name already exists.](#)
- [BTAFM4509E Zone member zone_member_name already exists.](#)
- [BTAFM4510E Another job is in progress for fabric fabric_name.](#)
- [BTAFM4550E The Device Server encountered an error accessing the database.](#)
- [BTAFM4600E Unable to start the Device Server service.](#)
- [BTAFM5000E Step failed after collecting Count of collected entities entities for switch switch where entities exist. Continuing with next step.](#)
- [BTAFM5001E No set of fabrics or switches was defined for this probe.](#)
- [BTAFM5002E The SMI agents SMIURL returned an error or can no longer contact the switches.](#)
- [BTAFM5003E Requests to an SMI agent did not correctly collect a set of switches for fabric fabric identity.](#)
- [BTAFM5004E No switch retrieved from the SMI agent for fabric fabric identity.](#)
- [BTAFM5005E No switch found for fabric fabric identity.](#)
- [BTAFM5006E No switch retrieved from database.](#)
- [BTAFM5007E Failed to get CIM entity for fabric fabric_name.](#)
- [BTAFM5008E Failed to get CIM entity for switch switch_name.](#)
- [BTAFM5009E Failed to enumerate CIM entity Entity class name.](#)
- [BTAFM5010E SMI-S provider is not available.](#)
- [BTAFM5011E Failed to get blade for switch Switch name.](#)
- [BTAFM5012E Failed to get physicalpackage for blade with slot number Blade slot name.](#)
- [BTAFM5013E Blade serial number is NULL.](#)
- [BTAFM5014E Step failed after collecting Count of collected entities entities for fabric fabric where entities exist. Continuing with next step.](#)
- [BTAFM5015E Data source could not be retrieved from the IBM Spectrum Control database for fabric fabric where data source exists.](#)
- [BTAFM5016E The selected data source could not be contacted for fabric fabric where data source exists.](#)
- [BTAFM5017E Failed to get fabric for switch Switch name.](#)
- [BTAFM5018E Failed to get CIM entity for port port_name.](#)
- [BTAFM5019E Failed to get switch for port port_name.](#)
- [BTAFM5020E Failed to get blade for port port_name.](#)
- [BTAFM5021E Failed to get CIM entity for blade blade_name.](#)
- [BTAFM5022E Failed to get switch for blade blade_name.](#)
- [BTAFM5023E Failed to discover Fabric and Switch.](#)
- [BTAFM5024E The data source for switch switch_name was not retrieved from the database repository.](#)
- [BTAFM0600I Count of collected entities blades collected for switch switch where entities exist.](#)
- [BTAFM0601I Starting collection of switch blades for switch switch identifier.](#)
- [BTAFM0602I Collection of switch blades completed. Count of collected entities entities collected in total for switch switch identifier.](#)
- [BTAFM0603I Starting collection of switch fcports for switch switch identifier.](#)
- [BTAFM0604I Collection of switch fcports completed. count of collected entities entities collected in total for switch switch identifier.](#)
- [BTAFM0605I Start probing switch entities switches.](#)
- [BTAFM0606I Start topology probing for fabric fabric entity.](#)
- [BTAFM0609I Count of entities fcports collected for switch switch where entities exist.](#)
- [BTAFM0614I The probe task is to probe topology and zone. The probe algorithm is CIM association.](#)
- [BTAFM0616I The probe policy involves discovering segmented or merged fabrics.](#)

- [BTAFM0617I The probe policy doesn't involve discovering segmented or merged fabrics.](#)
- [BTAFM0618I The probe task is to probe topology. The probe algorithm is CIM association.](#)
- [BTAFM0620I Start zone probing for fabric fabric entity.](#)
- [BTAFM0621I Starting collection of zone set for switch switch entity.](#)
- [BTAFM0622I Starting collection of zone for switch switch entity.](#)
- [BTAFM0623I Starting collection of zone alias for switch switch entity.](#)
- [BTAFM0624I Starting collection of zone member from zone alias for switch switch entity.](#)
- [BTAFM0625I Starting collection of zone member and zone alias from zone for switch switch entity.](#)
- [BTAFM0626I Starting collection of zone member from zone for switch switch entity.](#)
- [BTAFM0627I Starting collection of zone set for fabric fabric entity.](#)
- [BTAFM0628I Count of collected entities zone sets collected.](#)
- [BTAFM0629I Collection of zone set completed. Count of collected entities entities collected in total for fabric fabric entity.](#)
- [BTAFM0630I Starting collection of zone for fabric fabric entity.](#)
- [BTAFM0631I Count of collected entities zones collected.](#)
- [BTAFM0632I Collection of zone completed. Count of collected entities entities collected in total for fabric fabric entity.](#)
- [BTAFM0633I Starting collection of zone alias for fabric fabric entity.](#)
- [BTAFM0634I Count of collected entities zone aliases collected.](#)
- [BTAFM0635I Collection of zone alias completed. Count of collected entities entities collected in total for fabric fabric entity.](#)
- [BTAFM0636I Starting collection of zone member from zone alias for fabric fabric entity.](#)
- [BTAFM0637I Starting collection of zone member and zone alias from zone for fabric fabric entity.](#)
- [BTAFM0638I Starting collection of zone member from zone for fabric fabric entity.](#)
- [BTAFM0639I Collection of zone member completed. Count of collected entities entities collected in total for fabric fabric entity.](#)
- [BTAFM0640I Zone probe will discover both active and inactive zone definitions at selected data source datasource name for zone probe.](#)
- [BTAFM0641I Zone probe will discover only active zone sets at data source datasource name for zone probe.](#)
- [BTAFM0654I The port is not switch port.](#)
- [BTAFM0655I The switch profile doesn't support this switch switch_name. No further process to probe this switch.](#)
- [BTAFM0656I Start enumerating entity of association between fabric and zone set at selected data source Url entity.](#)
- [BTAFM0657I Start enumerating entity of association between fabric and zone at selected data source Url entity.](#)
- [BTAFM0658I Start enumerating entity of association between fabric and zone alias at selected data source Url entity.](#)
- [BTAFM0659I Start enumerating entity of association between switch and zone set at selected data source Url entity.](#)
- [BTAFM0660I Start enumerating entity of association between switch and zone at selected data source Url entity.](#)
- [BTAFM0661I Start enumerating entity of association between switch and zone alias at selected data source Url entity.](#)
- [BTAFM0662I Start enumerating associations between virtual fabric and zoning entities at selected data source Url entity.](#)
- [BTAFM0663I Starting collection of switch control processor blades for switch switch identifier.](#)
- [BTAFM0664I Count of collected entities control processor blades collected for switch switch where entities exist.](#)
- [BTAFM0665I Collection of switch control processor blades completed. Count of collected entities entities collected in total for switch switch identifier.](#)
- [BTAFM0666I Checksums for the active and defined Zone Database could not be updated for fabric entity.](#)
- [BTAFM0667E Job id or request id is mising for a SRA job that is been processed.](#)
- [BTAFM0668E Command and/or job timestamp is missing for job id with request id .](#)
- [BTAFM0669I job id with request id was is not found. Device server may have been restarted after job was created.](#)
- [BTAFM0670E could not retrieve output file for job id with request id .](#)
- [BTAFM0671E Another probe of fabric The Name+Nameformat of the fabric is already in progress.](#)
- [BTAFM0672E Device server is not registered with agent manager. Will not be able to invoke scanner on host .](#)
- [BTAFM0673E There are no agents that are currently available to probe fabric .](#)
- [BTAFM0674W No fabric found for event source that is associated with switch with IP address .](#)
- [BTAFM0675E Unable to start parsing of SRA fabric probe data for SRA job id request id file name .](#)
- [BTAFM0676E Error parsing SRA fabric probe data for SRA job id request id file name .](#)
- [BTAFM0677E Unable to connect to SNMP port \(another application may already be connected and forwarding messages\).](#)
- [BTAFM0678I The Name of the switch switch was removed.](#)
- [BTAFM0679I The The Name+Nameformat of the fabric fabric was removed.](#)
- [BTAFM0680E The Name of the switch switch was not removed because it is not missing.](#)
- [BTAFM0681E The The Name+Nameformat of the fabric fabric was not removed because it is not missing.](#)
- [BTAFM0682E An error occurred while checking for access to the database to save new zoning information for fabric to the database.](#)
- [BTAFM0683E Unable to access the database to save zoning information for fabric . Another job is currently saving new zoning information to the database for the same fabric.](#)
- [BTAFM0684I The job is waiting to access the database to save new zoning information for fabric . Another job is currently saving zoning information to the database for the same fabric.](#)
- [BTAFM0685W Host/IP Address is not a switch.](#)
- [BTAFM0686W Switch is not a supported switch.](#)
- [BTAFM0687W The switch does not respond to SNMP queries.](#)
- [BTAFM0688W Cannot communicate with host or IP address .](#)
- [BTAFM0689W No ports were discovered for the switch .](#)

- [BTAFM0690I Collection of data from trunks is completed. Data was collected from count of collected entities trunks.](#)
- [BTAFM0691I Starting collection of data from trunks for switch switch identifier.](#)
- [BTAFM0692I Count of entities trunks collected for switch switch where entities exist.](#)
- [BTAFM0692E A response from the data collector was not received within the specified time.](#)
- [BTAFM0693E A response from the data collector was not received. The request failed with return code return_code](#)
- [BTAFM0694W Zoning data cannot be collected because there is a transaction in progress on the switch key](#)
- [BTAFM0695E The switch key is returning unexpected data.](#)
- [BTAFM0696E Zone set zoneset_name is already active.](#)
- [BTAFM0697E Zone set zoneset_name is already inactive.](#)
- [BTAFM0698E On the switch switch_name VSAN vsan_name was not found.](#)
- [BTAFM0699E The switch key did not return zoning data.](#)
- [BTAFM0700E Duplicate entries for the same switch: switch.](#)
- [BTAFM0701E Current active full zone configuration is not synchronized with the zone configuration on the switch switch_name for VSAN vsan_name.](#)
- [BTAFM0702E You cannot monitor Brocade Access Gateway switches without Network Advisor.](#)
- [BTAFM0703I Waiting for probes of other Access Gateway switches to complete.](#)
- [BTAFM0704W Distributing zone configuration across all the switches for VSAN vsan_name did not succeed on the switch switch_name.](#)
- [BTAFM0705W Zone data collection after zone changes were made failed on the switch switch_name.](#)
- [BTAFM0706E The fabric probe was unable to collect some details of the blades on the switches.](#)
- [BTAFM0707I You cannot use IBM Spectrum Control to make zoning changes for provisioning on switch switch_name.](#)
- [BTAFM0708E The probe was unable to collect some details of the switches.](#)
- [BTAQE1107E InbandScanHandler failed to start InbandScanner scanner name on managed host target.](#)
- [BTAQE1108E InbandScanHandler failed to get callback information for InbandScanner scanner name on managed host target.](#)
- [BTAQE1112E During an outband scan, the scanner scanner name was unable to identify the target host target.](#)
- [BTAQE1113E Unable to invoke an Outband scan scanner name on target target.](#)
- [BTAQE1114E OutbandScannerHandler received invalid callback information for Outband scanner scanner name on target target.](#)
- [BTAQE1115E The outband scanner scanner name did not return the SAN ID on target target.](#)
- [BTAVM0001I The operation Name of the operation processed successfully.](#)
- [BTAVM0002I The Web service call Name of the operation processed successfully.](#)
- [BTAVM0003I Data source Name of the datasource successfully added.](#)
- [BTAVM0004I Data source Name of the datasource successfully deleted.](#)
- [BTAVM0005I Data source Name of the datasource successfully modified.](#)
- [BTAVM0006I Discovery on data source Name of the datasource has started.](#)
- [BTAVM0007I Discovery on data source Name of the datasource completed successfully.](#)
- [BTAVM0008I Probe of hypervisor Name of the Hypervisor has started.](#)
- [BTAVM0009I Probe of hypervisor Name of the Hypervisor completed successfully.](#)
- [BTAVM0010I A connection test to data source Name of the data source has started.](#)
- [BTAVM0011I The Connection test to data source Name of the data source completed successfully.](#)
- [BTAVM0012I Hypervisor Name of the Hypervisor discovered/rediscovered.](#)
- [BTAVM0013I Discovery: Hypervisor Name of the hypervisor will not be discovered as it is managed by another data source.](#)
- [BTAVM0014I Discovery: Hypervisor Name of the hypervisor will not be discovered as it itself is registered as a data source.](#)
- [BTAVM0015I Collection of the physical storage configuration for hypervisor Name of the hypervisor has started.](#)
- [BTAVM0016I Collection of the physical storage configuration for hypervisor Name of the hypervisor completed successfully.](#)
- [BTAVM0017I Collection of the logical storage configuration for hypervisor Name of the hypervisor has started.](#)
- [BTAVM0018I Collection of the logical storage configuration for hypervisor Name of the hypervisor completed successfully.](#)
- [BTAVM0019I Collection of the virtual machines configuration for hypervisor Name of the hypervisor has started.](#)
- [BTAVM0020I Collection of the virtual machines configuration for hypervisor Name of the hypervisor completed successfully.](#)
- [BTAVM0021I The probe of name of the hypervisor found number of physical disks physical disks.](#)
- [BTAVM0022I The probe of name of the hypervisor found number of logical volumes logical volumes.](#)
- [BTAVM0023I The probe of name of the hypervisor found number of virtual machines virtual machines.](#)
- [BTAVM0024I The Name of the hypervisor hypervisor was removed.](#)
- [BTAVM0025I VMWare Cluster Name of the Cluster discovered/rediscovered.](#)
- [BTAVM1301I The probe of name of the hypervisor could collect partial information only for the disk with the device name Device name of the disk.](#)
- [BTAVM1302I LUN correlation is not supported for disk with device name Device name of the disk, vendor: Vendor name, model: model name, for hypervisor hypervisor name.](#)
- [BTAVM1503E An internal error occurred: Text describing the internal error.](#)
- [BTAVM2001E The mandatory parameter Name of the mandatory parameter which is missing is missing.](#)
- [BTAVM2002E Invalid parameter Name of the parameter which was invalid.](#)
- [BTAVM2003E A database error was encountered during database query or insert.](#)
- [BTAVM2004E Cannot connect to the database repository.](#)
- [BTAVM2006E The operation Name of the operation that failed failed for the following reason: Reason of the failure.](#)
- [BTAVM2007E The Web service call Name of the operation failed for the following reason: Reason of the failure.](#)
- [BTAVM2008E The product Name of the unsupported product is not supported.](#)

- [BTAVM2010E The user name or password is invalid for Address of the host](#)
- [BTAVM2011E The operation Name of the timed out operation could not complete within the time limit of Timeout threshold in milliseconds milliseconds.](#)
- [BTAVM2012E An error occurred while trying to establish secure communication over SSL.](#)
- [BTAVM2013E The Add Device wizard could not add the Name of the data source data source.](#)
- [BTAVM2014E The deletion of data source Name of the data source failed.](#)
- [BTAVM2015E The modification of data source Name of the data source failed.](#)
- [BTAVM2016E Discovery on data source Name of the datasource failed.](#)
- [BTAVM2017E Probe of the hypervisor Name of the Hypervisor failed.](#)
- [BTAVM2018E IBM Spectrum Control can't connect to the data source Name of the datasource.](#)
- [BTAVM2201E Probe: An error occurred during the collection of the physical storage configuration.](#)
- [BTAVM2202E Probe: An error occurred during the collection of the logical storage configuration.](#)
- [BTAVM2204E Probe: An error occurred during the collection of the virtual machine configuration.](#)
- [BTAVM2206E Discovery: the hypervisor Name of the hypervisor will not be discovered because its version is not supported.](#)
- [BTAVM2207E Calculation of the summary data for the hypervisor Name of the hypervisor failed.](#)
- [BTAVM2208E Unable to obtain the hypervisor version\(s\) from the datasource Name of the datasource.](#)
- [BTAVM2209E Unable to obtain information about other Virtual Centers managing the hypervisor\(s\) of datasource Name of the datasource.](#)
- [BTAVM2210W Error getting LUN definition data for the disk with the device name Device name of the disk, storage subsystem vendor: Vendor name, model: model name, for hypervisor hypervisor name.](#)
- [BTAVM2211E Probe: Virtualization Manager failed to get the VMWare VI data source for the hypervisor Name of the hypervisor from the database.](#)
- [BTAVM2212E Probe: The hypervisor Name of the hypervisor is not available on the VMWare VI datasource Name of the datasource.](#)
- [BTAVM2213E Data source Name of the datasource is disconnected from Virtual Center.](#)
- [BTAVM2214E The probe job encountered an NFS file system while probing ESX server {0}. IBM Spectrum Control currently does not support probes of ESX servers with NFS file systems. The probe job for this ESX server has been stopped. Probes of other ESX servers that are included in this probe job will continue.](#)
- [BTAVM2215W Unsupported storage subsystem disk with device name Device name of the disk, vendor: Vendor name, model: model name, for hypervisor hypervisor name with hypervisor version less than 3.5.0.](#)
- [BTAVM2216E Unable to get keystore instance.](#)
- [BTAVM2217E Unable to load keystore file.](#)
- [BTAVM2218E Unable to set certificate entry in keystore file.](#)
- [BTAVM2219E Unable to open keystore for writing.](#)
- [BTAVM2220E Unable to close keystore file.](#)
- [BTAVM2221E Unable to acquire lock on keystore file.](#)
- [BTAVM2222E Unable to store certificate in keystore file.](#)
- [BTAVM2223E Unable to release lock on keystore file.](#)
- [BTAVM2224E Unable to decrypt keystore password.](#)
- [BTAVM2225E Unable to open keystore for reading.](#)
- [BTAVM2226E Certificate already exists in keystore.](#)
- [BTAVM2227E host address hypervisor is already being monitored and could not be added.](#)
- [BTAVM2228E Missing host name.](#)
- [BTAVM2229E Missing certificate.](#)
- [BTAVM2230E Cannot create keystore directory.](#)
- [BTAVM2231E Cannot download the certificate from Data Source Name of the data source.](#)
- [BTAVM2232E Cannot connect to the Name of the data source data source.](#)
- [BTAVM2233E Cannot download the certificate from the port.](#)
- [BTAVM2234E The hypervisor name hypervisor was not removed because IBM Spectrum Control is running other actions on the device.](#)
- [BTAVM2235E Unable to obtain the cluster\(s\) from the datasource Name of the datasource.](#)
- [BTAVM2236W Subsequent steps of probe process may not be able to collect data for the hypervisor Name of the hypervisor because the hypervisor is in critical state.](#)
- [BTAVM2237E Datastore Browser Task failed for hypervisor Name of the hypervisor, datastore Name of the datastore with error: Error](#)
- [BTAVM2238E The registration of the vSphere Web Client extension for IBM Spectrum Control has started on Name of the vCenter server.](#)
- [BTAVM2239E The registration of the vSphere Web Client extension for IBM Spectrum Control did not extract the extension package.](#)
- [BTAVM2240E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete while updating the VASA web archive file, vasa.war, with the IBM Spectrum Control server configuration.](#)
- [BTAVM2241E The registration of the vSphere Web Client extension for IBM Spectrum Control completed.](#)
- [BTAVM2242E Unable to register IBM Spectrum Control as an extension on the vCenter server Name of the vCenter server. The validation of input values did not complete.](#)
- [BTAVM2243E Unable to register IBM Spectrum Control as an extension on the vCenter server Name of the vCenter server. Could not authenticate with the vCenter server.](#)

- [BTAVM2244E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete.](#)
- [BTAVM2245E Unable to connect to the vCenter Server Name of the datasource.](#)
- [BTAVM2246E Unable to configure the vCenter Server.](#)
- [BTAVM2247E The registration of the vSphere Web Client extension for IBM Spectrum Control did not delete the temporary directory Name of the directory.](#)
- [BTAVM2248E The registration of IBM Spectrum Control as a VASA provider did not complete.](#)
- [BTAVM2249E Automatic registration of IBM Spectrum Control as a VASA provider is not supported for vCenter Server version 5.0 and earlier.](#)
- [BTAVM2250E IBM Spectrum Control is already registered as a VASA provider for vCenter Server server name. Register IBM Spectrum Control as a VASA provider manually in the vSphere Web Client to update the credentials.](#)
- [BTAVM2251E One or more third-party VASA providers are already registered with the vCenter Server. IBM Spectrum Control VASA provider was not registered. Register IBM Spectrum Control as a VASA provider manually.](#)
- [BTAVM2252E The registration of IBM Spectrum Control as a VASA provider has started on Name of the vCenter server.](#)
- [BTAVM2253E The registration of IBM Spectrum Control as a VASA provider has completed.](#)
- [BTAVM2254E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete. The current session is invalid.](#)
- [BTAVM2255E The registration of IBM Spectrum Control as a VASA provider did not complete. The current session is invalid.](#)
- [BTAVM2256W Could not determine the host for VM with ID: host id and Name: Vendor name. Check if the same mac address is used on other computers.](#)
- [BTAVM2257I Found number of files files on name of datastore of name of the hypervisor.](#)
- [BTAVM2258I The probe of name of the hypervisor found number of controllers controllers.](#)
- [BTAVM2259I Collecting file system details for hypervisor Name of the hypervisor.](#)
- [BTAVM2260I Collecting list of files for hypervisor Name of the hypervisor.](#)
- [BTAVM2261I Collecting logical volumes for hypervisor Name of the hypervisor.](#)
- [BTAVM2262I Collecting disk partition for hypervisor Name of the hypervisor.](#)
- [BTAVM2263I Files details for Name of the datastore being collected by id of the Hypervisor.](#)
- [BTAVM2264I Files details for Name of the datastore were collected by id of the Hypervisor on timestamp.](#)
- [BTAVM2265E Invalid host name or IP address.](#)
- [BTAVM2266E The connection information cannot be updated because it points to another device.](#)
- [BTAVM2268E The connection information cannot be updated because IBM Spectrum Control cannot determine if the hypervisor is managed by the Name of the data source data source.](#)
- [BTAVM2269E The connection information cannot be updated because a data source with this host name or IP address is already present.](#)
- [BTAVM2270E The connection information cannot be updated because it doesn't point to a data source of the same type \(vCenter/ESX\).](#)
- [BTAVM2271W The hypervisor Name of the Hypervisor cannot be discovered because its connection state is "Connection State".](#)
- [BTAVM2272E The user User Name does not have the privilege to browse the datastore Name of the Datastore.](#)
- [HWN020001I Operation Name of the operation processed successfully.](#)
- [HWN020002E Mandatory parameter Name of the mandatory parameter which is missing missing](#)
- [HWN020003E Invalid parameter Name of the parameter which was invalid](#)
- [HWN020101E The external process terminated unexpected.](#)
- [HWN020102W The external process was canceled per users request.](#)
- [HWN020103E The external process exceeded the timeout limit and was canceled.](#)
- [HWN020104E The external process could not be started.](#)
- [HWN020105E The data collector is not responding to the server.](#)
- [HWN020106E An external process was cancelled by the data collector.](#)
- [HWN021503E The action cannot be completed](#)
- [HWN021504E Entity The ID of the entity was not found.](#)
- [HWN021508E Credentials not found](#)
- [HWN021514E The invocation of CIM method Name of method failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method](#)
- [HWN021515E The invocation of CIM method Name of method failed on SMI-S provider Name of SMI-S provider with the following exception text: Exception text](#)
- [HWN021516E The LSS specified LSS name on subsystem Name of subsystem is already at the maximum volume number \(255\). Volume creation can not be done on this LSS, please select a different one.](#)
- [HWN021517E The connection to SMI-S provider for storage system VPD of the storage system could not be made.](#)
- [HWN021520E The attribute Name of the attribute was not found.](#)
- [HWN021522E Host port The WWPN of the host port not assigned to Volume The PK of the volume](#)
- [HWN021524E Indexed Properties Names don't match](#)
- [HWN021529E An SMI-S provider has reported unexpected values: IP and port of SMI-S provider.](#)
- [HWN021530E The Volume - Port mapping can not be created. There are existing mappings that prevent this combination. VolumeCOP: The ID of the volume , Port: The WWPN of the port that should be mapped to the volume](#)
- [HWN021531E SMI-S provider The IP and port of the SMI-S provider can not reach storage system The VPD of the storage system](#)

- [HWN021535E There is not enough space left in the storage pool The primary key of the Pool on storage system The VPD of the storage system to create a volume of The requested volume size bytes.](#)
- [HWN021536E The CIM method The CIM method that is not supported. is not supported on the storage system The VPD of the storage system](#)
- [HWN021537E Could not create connection to SMI-S provider The IP and port for the SMI-S provider..Reason: The exception returned by the SMI-S provider.](#)
- [HWN021538E The username The username that was used to connect to the SMI-S provider. or password is wrong on SMI-S provider The IP and port for the SMI-S provider.](#)
- [HWN021539E The SVC with IP The IP of the SVC, which is managed by SMI-S provider The IP and port for the SMI-S provider. can not be discovered. The status is The status of the SVC..](#)
- [HWN021540E The invocation of CIM method Name of method failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method. Details provided by the SMI-S provider : Description of Returncode](#)
- [HWN021600W Operation Name of the operation. partially processed.](#)
- [HWN021601E The operation\(s\) Operation names failed.](#)
- [HWN021602E It is necessary to specify target ports for storage device VPD of the storage subsystem](#)
- [HWN021603W More storage volumes and ports than specified will loose access](#)
- [HWN021604E WWPNs and storage volumes to be unassigned not completely specified. Assigned WWPNs: All WWPNs that are assigned to the volumes in the host port collection , missing WWPNs: The WWPNs that are assigned but were not specified in the input parameter in the method unassign . Storage volumes to be unassigned not completely specified. Assigned storage volumes: Lists all storage volumes that are really assigned to the WWPNs . }, missing storage volumes: The storage volumes that are really assigned but were not specified in the input parameter in the method unassign](#)
- [HWN021605I More storage volumes and ports than specified will gain access.](#)
- [HWN021606E WWPNs and storage volumes to be assigned not completely specified. Missing WWPNs: The WWPNs that need to be assigned but were not specified in the input parameter . Storage volumes to be assigned not completely specified. Missing storage volumes: The storage volumes that need to be assigned but were not specified in the input parameter.](#)
- [HWN021607E The client type the client type with description the client description is not supported on SMI-S provider the SMI-S provider IP and port for storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in](#)
- [HWN021608E The target port the target port ID does not belong to storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in](#)
- [HWN021609E There is not enough space left in the storage pool The primary key of the Pool on storage system The VPD of the storage system to create The number of volumes to create volumes of The total size needed bytes total.](#)
- [HWN021610E The specified size The size of the volume to create is not supported on pool The storage pool ID Size has to be dividable by Divisor returned by getSupportedSizeRange and in between Minimum returned by getSupportedSizeRange and Maximum returned by getSupportedSizeRange](#)
- [HWN021611E Volume The volume ID has mappings, it can not be deleted.](#)
- [HWN021612E The mapping between volume The volume ID and port The initiator port wwpn exists already](#)
- [HWN021613E The WWPN The WWPN not found can not be found on subsystem The subsystem](#)
- [HWN021614E The WWPNs The WWPNs without mappings have no mappings on storage system The storage system](#)
- [HWN021615E WWPNs WWPNs that can not share mappings can not share mappings on storage system Storage system}. There are existing mappings that prevent this.](#)
- [HWN021616E Volumes VolumeIDs can not share mappings on storage system Storage system }. There are existing mappings that prevent this.](#)
- [HWN021617E The stored data for storage system The storage system is not in sync with the environment. Rerun data collection.](#)
- [HWN021618E Modifying target ports is not supported by subsystem the subsystem .](#)
- [HWN021619E Modifying the target ports for mapping of initiator port initiator port WWPN and volume volume name will also modify the target ports of the following mappings: port - volume list](#)
- [HWN021620I Modifying the target ports for mapping of initiator port initiator port WWPN and volume volume name will modify the target ports of more mappings than specified.](#)
- [HWN021621E It is not supported to modify the target ports of existing mappings and create new mappings in one step. Modify the existing mappings first and then create the new mappings. Existing mappings: port - volume list](#)
- [HWN021622I Started modification of the assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN . Target ports to add: target ports to add Target ports to remove: target ports to remove](#)
- [HWN021623I Finished modification of the assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN . Target ports to add: target ports added Target ports to remove: target ports removed](#)
- [HWN021624E The modification of the assignment of volume VolumeID on subsystem Subsystem to initiator port WWPN failed. Target ports to add: target ports to add Target ports to remove: target ports to remove](#)
- [HWN021650E A timeout occurred while connecting to SMI-S provider SMI-S provider IP and port.](#)
- [HWN021651E Job on SMI-S provider SMI-S provider IP and Port in format IP:Port failed. Job Status: Job status . Error code is Error code , error description: Error description . Check IBM Spectrum Control and SMI-S provider logs.](#)
- [HWN021652E The process has timed out. Check the IBM Spectrum Control log files for more information.](#)
- [HWN021653E The attribute Name of the attribute was not found.](#)
- [HWN021654E Pool ID was not found.](#)
- [HWN021655E Volume ID The ID of the volume was not found.](#)
- [HWN021656E Port ID The ID of the port was not found.](#)

- [HWN021657E Subsystem ID](#) The ID of the subsystem was not found.
- [HWN021658E Managed Disk ID](#) The ID of the MDisk was not found.
- [HWN021659E SMI-S provider](#) The ID of the SMI-S provider was not found
- [HWN021660E IO Group](#) The SVC IO Group was not found.
- [HWN021661E Extent](#) The storage extent external key was not found.
- [HWN021662E Physical volume](#) The physical volume external key was not found.
- [HWN021670E The client type](#) the client type with description the client description is not unique on SMI-S provider the SMI-S provider IP and port } for storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in
- [HWN021671I The storage system](#) The storage system was deleted from the database
- [HWN021672E The storage system name](#) storage system was not removed because other monitoring actions are running on the device.
- [HWN021673E The probe job on SMI-S provider](#) SMI-S provider IP and Port in format IP:Port did not complete within the time limit of Microseconds microseconds. The job is Percent complete percent complete. Check the SMI-S provider log for job status. Job information: JobCOP . Run the probe job again after the current job has completed.
- [HWN021674E Job on SMI-S provider](#) SMI-S provider IP and Port in format IP:Port returned unexpected results. Job information: JobCOP Job status: JobState , status description: JobStatus Check SMI-S provider log. Redo probe if the job completed.
- [HWN021675I Started creation of volume with size](#) Size in pool Pool on subsystem Subsystem
- [HWN021676I Volume creation completed successfully.](#) New volume VolumeID created with size Size in pool Pool on subsystem Subsystem .
- [HWN021677E Volume creation failed.](#) The volume of size Size in pool Pool on subsystem Subsystem could not be created.
- [HWN021678I Started assignment of volume](#) VolumeID on subsystem Subsystem to initiator port WWPN .
- [HWN021679I Finished assignment of volume](#) VolumeID on subsystem Subsystem to initiator port WWPN .
- [HWN021680E The assignment of volume](#) VolumeID on subsystem Subsystem to initiator port WWPN failed.
- [HWN021681I Started unassignment of volume](#) VolumeID on subsystem Subsystem to initiator port WWPN .
- [HWN021682I Finished unassignment of volume](#) VolumeID on subsystem Subsystem to initiator port WWPN .
- [HWN021683E The unassignment of volume](#) VolumeID on subsystem Subsystem to initiator port WWPN failed.
- [HWN021684I Started deletion of volume](#) VolumeID on subsystem Subsystem .
- [HWN021685I Volume deletion completed successfully.](#) Volume VolumeID on subsystem Subsystem was deleted.
- [HWN021686E Volume deletion failed.](#) Volume VolumeID on subsystem Subsystem could not be deleted.
- [HWN021687I Started modification of Pool](#) Pool display name on subsystem Subsystem display name .
- [HWN021688I Pool modification completed successfully.](#) Pool Pool display name on subsystem Subsystem display name was modified.
- [HWN021689E Pool modification failed.](#) Pool Pool display name on subsystem Subsystem display name could not be modified.
- [HWN021690I Started creation of number volumes](#) volumes with size Size in pool Pool on subsystem Subsystem
- [HWN021691I Created number volumes](#) out of total number volumes volumes with size Size in pool Pool on subsystem Subsystem
- [HWN021692E Volume creation failed.](#) Created number volumes out of total number volumes volumes with size Size in pool Pool on subsystem Subsystem
- [HWN021693W Warning:](#) The task succeeded, but the database update failed. Run probe to update the database.
- [HWN021700I Enumerating CIM Associator](#) The CIM association name which is being enumerated. for The name of the DB table which will be populated as result of this query.
- [HWN021701I Enumerating CIM Class](#) The CIM class name which is being enumerated. for The name of the DB table which will be populated as result of this query.
- [HWN021702I Querying SMI-S provider](#)
- [HWN021703I Task starting on SMI-S provider](#) Identifier of the SMI-S provider..
- [HWN021708I Initializing Collection for storage system](#) storage system identification.
- [HWN021709I Collection for storage system](#) storage system identification completed.
- [HWN021710I Discovering devices for SAN Volume Controller](#) The VPD of the SAN Volume Controller.
- [HWN021711I Discovery devices for SAN Volume Controller](#) The VPD of the SAN Volume Controller. failed with error message The exception which has occurred.
- [HWN021712I Collecting Nodes for storage system](#) storage system identification.
- [HWN021713I Collecting fibre channel ports for storage system](#) storage system identification.
- [HWN021714I Collecting volumes for storage system](#) storage system identification.
- [HWN021715I Traversing host to volume assignments for storage system](#) storage system identification.
- [HWN021716I Collecting pools and volumes for storage system](#) storage system identification.
- [HWN021717I Collecting volume settings for storage system](#) storage system identification.
- [HWN021718I Collecting client setting data for storage system](#) storage system identification.
- [HWN021719I Perform collection post process tasks for storage system](#) storage system identification.
- [HWN021720I Flash enclosure is missing drive](#) flash_drive_identifier.
- [HWN021724W SMI-S provider](#) SMI-S provider identifier manages device(s) of type device_type which is supported through the native device interface or SNMP only.
- [HWN021725I IBM Spectrum Control discovered/rediscovered a device with name](#) Identifier of the device. on SMI-S provider Identifier of the SMI-S provider..
- [HWN021726I IBM Spectrum Control discovered/rediscovered no device on SMI-S provider](#) Identifier of the SMI-S provider..

- [HWN021727I IBM Spectrum Control discovery starting on SMI-S provider Identifier of the SMI-S provider..](#)
- [HWN021728I IBM Spectrum Control discovery on SMI-S provider Identifier of the SMI-S provider. is complete.](#)
- [HWN021729W IBM Spectrum Control discovery of Device type value is not supported.](#)
- [HWN021730W IBM Spectrum Control discovery of device value with code level value is not supported on SMI-S provider Identifier of the SMI-S provider..](#)
- [HWN021731I Probing Volumes for Storage System: value.](#)
- [HWN021732I Number of Volumes Found Currently: value. Continuing to Probe Volumes.](#)
- [HWN021733I value Volumes Found.](#)
- [HWN021734I Probing Disks for Storage System: value.](#)
- [HWN021735I Number of Disks Found Currently: value. Continuing to Probe Disks.](#)
- [HWN021736I value Disks Found.](#)
- [HWN021737I Probing Virtual Disks for Cluster: value](#)
- [HWN021738I Number of Virtual Disks currently found: value. Continuing to probe Virtual Disks.](#)
- [HWN021739I value Virtual Disks found.](#)
- [HWN021740I Probing Views of Host Initiator access to Volumes.](#)
- [HWN021741I value Views Found.](#)
- [HWN021742E The SMI-S provider SMI-S provider URL is not managing storage subsystems.](#)
- [HWN021743E The SMI-S provider SMI-S provider URL is not managing switches.](#)
- [HWN021744E Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: http://www.ibm.com/support/docview.wss?uid=swg21976237](#)
- [HWN021745I Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: http://www.ibm.com/support/docview.wss?uid=swg21976237. An alternate resource will be used.](#)
- [HWN021746W SMI-S provider Identifier of the SMI-S provider. manages Cisco device types through SNMP only.](#)
- [HWN021747E Unable to add the specified switch by using SNMP. The switch is a Brocade switch and can be added only by using an SMI agent.](#)
- [HWN021800E Failed to get a database connection.](#)
- [HWN021801E The server failed to get SMI-S provider entity from database.](#)
- [HWN021802E Experienced SQL problems while working with database: The SQL error.](#)
- [HWN021803W The server did not get userid and or password for SMI-S provider The Service URL of the SMI-S provider from database.](#)
- [HWN021804E The server failed to access slp attributes for SMI-S provider The Service URL of the SMI-S provider from database.](#)
- [HWN021805E CIMOMManager failed to get a database mapper of type The type of the database mapper.](#)
- [HWN021806E CIMOMManager failed to get a valid mapper result from The type of the database mapper.](#)
- [HWN021807E CIMOMManager failed to get a proxy for calling slp discovery.](#)
- [HWN021808E The device cannot be contacted through any of the following SMI-S providers The comma separated list of IP and port for the SMI-S providers.. Possible causes are that the SMI-S providers are not accessible or the device is disconnected from the SMI-S providers.](#)
- [HWN021809E The host for SMI-S provider The service URL of the SMI-S providers. was not resolvable in DNS.](#)
- [HWN021810E The service URL for SMI-S provider The service URL of the SMI-S providers. is not valid.](#)
- [HWN021811I The operational status for device The ID of the device. on SMI-S provider The service URL of the SMI-S provider. has this value The operational status vector. .](#)
- [HWN021812E The operational status for device The ID of the device. on SMI-S provider The service URL of the SMI-S provider. could not be retrieved because SMI-S provider is in status The SMI-S provider connection status. .](#)
- [HWN021813E Fabric ID The ID of the fabric was not found.](#)
- [HWN021814E The device device id cannot be contacted through the SMI-S provider SMI-S provider service URL.](#)
- [HWN021899E Switch The wwn of the switch. has no associated Fabric.](#)
- [HWN021901E The virtual disk size cannot exceed maximum size when creating space efficient virtual disks.](#)
- [HWN021902E Invalid grain size. Valid values are valid values.](#)
- [HWN021903E Authentication to ip or name of host failed. Please specify correct authentication information.](#)
- [HWN021904E Connection to IP address or name of host failed with following operating system exception: exception text . Please make sure IP address is correct and machine is up and running. If this is a SVC V4 machine, it could be that its RAS interface is not up. If this is a SVC V5, make sure the SMI-S provider is up and running.](#)
- [HWN021905E Connection to IP address or name of host failed with following operating system exception: exception text .](#)
- [HWN021906E Failed to get native API entity from database.](#)
- [HWN021907E The IP address The service URL of the SMI-S providers. was not resolvable in DNS.](#)
- [HWN021908E Failed to get a proxy for calling NAPI discovery.](#)
- [HWN021909E There are no IO Groups available for Virtual Disk creation.](#)
- [HWN021910E Managed Disk ID The ID of the MDisk is not in unmanaged mode and cannot be added to the specified managed-disk group.](#)
- [HWN021911E Another probe of storage subsystem The Name+Nameformat of the storage subsystem is already in progress.](#)
- [HWN021912E Other probes of storage subsystems The list of Name+Nameformat of the storage subsystems are already in progress.](#)
- [HWN021913E IBM Spectrum Control Device Server could not write to directory The directory.](#)

- [HWN021914E SSH key file The SSH key file name is still in use, so it cannot be deleted.](#)
- [HWN021915E IBM Spectrum Control Device Server could not delete the file The file.](#)
- [HWN021916E The storage subsystem subsystem ID is not configured for file level management.](#)
- [HWN021917E An invalid parameter Name of the parameter which was invalid was specified. The corresponding file system mount point does not exist.](#)
- [HWN021919E The cluster ID The ID of the cluster, was not found.](#)
- [HWN021920E The export ID The ID of the export, was not found.](#)
- [HWN021921E The specified activity or protocol could not be used to change the export The ID of the export..](#)
- [HWN021922E The file system ID file system ID was not found.](#)
- [HWN021923E Invalid parameter Name of the parameter which was invalid. File system does not exist.](#)
- [HWN021924E The parameter Name of the parameter which was invalid is not a valid parameter.](#)
- [HWN021925E The fileset ID fileset ID was not found.](#)
- [HWN021926E The WAN-cache source ID WAN cache source id was not found.](#)
- [HWN021927E The WAN-cache ID WAN cache source id was not found.](#)
- [HWN023000I The Optimization Execution task has started.](#)
- [HWN023001E The task to optimize the volumes was not completed successfully.](#)
- [HWN023002I The Optimization Execution task has completed.](#)
- [HWN023003I The Optimization Execution task retrieved number recommendations](#)
- [HWN023004I The Optimization Automation request persisted recommendations to be processed.](#)
- [HWN023005I The Optimization Execution task updated the status of number recommendations.](#)
- [HWN023006I The Optimization Automation request begins processing number recommendations.](#)
- [HWN023007W The recommendation being processed contains a virtual disk that is no longer detected.](#)
- [HWN023008W The recommendation for virtual disk vdisk name contains a source storage pool that is no longer detected.](#)
- [HWN023009W The recommendation for virtual disk vdisk name contains a target storage pool that is no longer detected.](#)
- [HWN023010I Virtual disk vdisk name was successfully migrated from storage pool source pool name to storage pool target pool name.](#)
- [HWN023011W The recommendation for virtual disk vdisk name contains a virtual disk that does not exist in the source storage pool source pool name or the target storage pool target pool name.](#)
- [HWN023012W The recommendation for virtual disk vdisk name contains a non-mirrored virtual disk that is now a mirrored virtual disk.](#)
- [HWN023013W The recommendation for virtual disk vdisk name contains a mirrored virtual disk that is now a non-mirrored virtual disk.](#)
- [HWN023014I The recommendation for virtual disk vdisk name requires more space on target pool target pool name to be processed.](#)
- [HWN023015I Virtual disk vdisk name will now be migrated from storage pool source pool name to storage pool target pool name.](#)
- [HWN023016I Successfully added virtual disk copy to virtual disk vdisk name.](#)
- [HWN023017I Synchronization for virtual disk vdisk name has completed synchronization percent% and requires about seconds to complete seconds to complete.](#)
- [HWN023018I Synchronization for virtual disk vdisk name has completed.](#)
- [HWN023019I Successfully removed a virtual disk copy from virtual disk vdisk name.](#)
- [HWN023020I Successfully changed the synchronization rate of virtual disk vdisk name to syncrate%.](#)
- [HWN023021I Successfully changed the primary copy of virtual disk vdisk name.](#)
- [HWN023022E There is no space available on target pool target pool name to migrate the virtual disk vdisk name.](#)
- [HWN023023E Unable to submit request to add vdisk copy command for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023024E Unable to complete request to add vdisk copy command for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023025E Unable to submit request to get vdisk synchronization progress for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023026E Unable to complete request to get vdisk synchronization progress for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023027E Unable to submit request to remove vdisk copy command for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023028E Unable to complete request to remove vdisk copy command for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023029E Unable to submit request to change the synchronization rate for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023030E Unable to complete request to change the synchronization rate for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023031E Unable to submit request to change the primary copy for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023032E Unable to complete request to change the primary copy for virtual disk vdisk name due to rc \(rc\).](#)
- [HWN023033E The request failed. Message from failed request: message.](#)
- [HWN023034E The Optimization Automation job completed with errors in the recommendations.](#)
- [HWN023035W The Optimization Execution task completed with warnings.](#)
- [HWN023036E The request failed because there were not enough extents in the storage pool.](#)
- [HWN023037E The request failed because the number of copies of this volume would exceed the limit.](#)
- [HWN023038E The request failed because the copy specified does not exist.](#)
- [HWN023039E The following exception occurred during a migration request: exception](#)
- [HWN023040E The migration request for volume vdisk name is already being processed.](#)
- [HWN023041W The request to migrate the mirrored volume vdisk name is suspended because the secondary volume is offline.](#)
- [HWN023042E The secondary copy needed for migration does not exist.](#)
- [HWN023043I The mirrored volume migration for volume vdisk name will be ignored.](#)

- [HWN023044I The mirrored volume migration for volume vdisk name will result in the current secondary volume becoming the primary volume.](#)
- [HWN023045I The mirrored volume migration for volume vdisk name will result in the primary volume being migrated to the target pool.](#)
- [HWN023046I The Migration of the previously abandoned Optimization Automation job has started.](#)
- [HWN023047I The Migration of the previously abandoned Optimization Automation job has completed.](#)
- [HWN023048I The Optimization Automation cancellation job jobname has started.](#)
- [HWN023049E The Optimization Automation cancellation job completed with errors.](#)
- [HWN023050I The Optimization Automation cancellation job jobname has completed.](#)
- [HWN023051I The Optimization Automation job jobname will be canceled.](#)
- [HWN023052W The Optimization Automation job is not in progress.](#)
- [HWN023053I The migration of volume vdisk name has been canceled.](#)
- [HWN023054W The Optimization Automation job was canceled.](#)
- [HWN023055I The volume that was chosen for transformation, vdisk name, is a secondary volume in a mirrored volume relationship. The secondary volume will be migrated to the specified target pool or converted as specified.](#)
- [HWN024000I An optimization analysis task was started.](#)
- [HWN024001I The analysis is completed.](#)
- [HWN024002W Unable to retrieve any policy for Tier value.](#)
- [HWN024003I Analyzed number of volumes volumes on tier tier_number for storage virtualizer subsystem_name.](#)
- [HWN024006W No target pools in subsystem value were selected.](#)
- [HWN024011W Destination storage pool value in subsystem value was not considered. Reason: value.](#)
- [HWN024012I It is recommended that number of volumes volumes on tier source tier number are moved to tier target tier number.](#)
- [HWN024015I The optimization analysis of the value subsystem was started.](#)
- [HWN024016W Volume value is already in the destination storage pool value. No recommendations will be generated for the volume.](#)
- [HWN024018W No destination storage pools in Tier value have been specified for subsystem value.](#)
- [HWN024019W The following pools on tier tier_number on the storage_system storage system cannot be balanced by redistributing or re-tiering volumes: pool_names.](#)
- [HWN024020I Started analysis to balance pools on tier value.](#)
- [HWN024021W The pool_name pool on tier tier_number on the storage_system storage system cannot be balanced by redistributing the volumes.](#)
- [HWN024027I Storage Pool pool name has insufficient available space for volume volume name in storage pool pool name.](#)
- [HWN024030W One or more entities specified as input for the analysis could not be found or pools or volumes in some input entities could not be found.](#)
- [HWN024031W One or more entities specified as candidate destinations for the analysis could not be found.](#)
- [HWN024032W For one or more mirrored volumes, both the primary and the secondary volume copies were chosen for transformation. You cannot transform both volume copies in the same transform task. Only the primary volume copies are included for transformation. You can transform the secondary volume copies in a separate transformation.](#)
- [HWN024033W The volume volume name cannot be analyzed because it is not in a capacity pool.](#)
- [HWN024034W The pool pool name cannot be analyzed because the pool is not in a capacity pool.](#)
- [HWN024035W The storage virtualizer system name cannot be analyzed because the storage virtualizer is not in a capacity pool.](#)
- [HWN024036W The operation to transform the volumes on the subsystem name storage virtualizer cannot be completed because the destination pools were not available.](#)
- [HWN024037E An unexpected error occurred. The operation to transform the volumes on the subsystem name storage virtualizer cannot be completed because the destination pools were not identified.](#)
- [HWN024043I The capacity pools of the source volumes were selected as the target pools.](#)
- [HWN024046I The option that was selected to handle volumes with mirrored volumes is: After optimization, set the copy of the secondary volume in the destination pool as the primary volume. The original secondary volume remains the secondary volume.](#)
- [HWN024047I The number of days for collecting performance data to analyze the volumes is set to performance_data_collection_period.](#)
- [HWN024050I Automatic tiering was selected to tier the volumes.](#)
- [HWN024051I The tiering analysis is starting.](#)
- [HWN024052I Tier tier# has an I/O density threshold value of value per second per GiB.](#)
- [HWN024053I Tier tier#, has a file age threshold value of value percent of files last accessed within time_unit.](#)
- [HWN024054I The real capacity for the thin-provisioned volumes is set to value unit.](#)
- [HWN024055I The auto expand property of the thin-provisioned volumes is set to yes/no.](#)
- [HWN024056I The warning level for thin-provisioned volumes is set to value %.](#)
- [HWN024057I The grain size that was specified for the thin-provisioned volumes is grain_size KiB.](#)
- [HWN024058I The real capacity for the compressed volumes is set to value unit.](#)
- [HWN024059I The auto expand property for the compressed volumes is set to yes/no.](#)
- [HWN024060I The warning level for the compressed volumes is set to value.](#)
- [HWN024061I The option that was selected to handle volumes with mirrored volumes is: After optimization, set the secondary volume as the primary volume. The volume in the destination pool is the secondary volume.](#)

- [HWN024062I](#) The option that was selected for mirrored volumes is: Do not optimize volumes with mirrored volumes.
- [HWN024066I](#) Tier tier# has an I/O rate threshold value of value I/O per second.
- [HWN024067W](#) Recommendations cannot be generated for number of volumes volumes because the volumes do not meet the tiering criteria for tier current tier number or for any lower tier.
- [HWN024068W](#) Recommendations cannot be generated to move number of volumes volumes from source tier to tier target tier number due to the pool activity limit value.
- [HWN024069W](#) Recommendations cannot be generated to move number of volumes volumes from tier source tier to to tier target tier number because the destination storage pools do not have enough space.
- [HWN024070I](#) The analysis to optimize subsystem storage subsystem was completed.
- [HWN024071I](#) The option that was selected was to restrict the placement of volumes in capacity pools to destination storage pools in the same capacity pool.
- [HWN024072W](#) No file age information for volume volume name.
- [HWN024073W](#) Storage pool {0} in tier {1} needs at least one additional storage pool in the same tier for the Balance Analysis to run on this tier.
- [HWN024074W](#) Storage pool {0} in tier {1} and capacity pool {2} needs at least one additional storage pool in the same tier and capacity pool for the Balance Analysis to run within this capacity pool and on this tier.
- [HWN024075W](#) number of volumes volumes from storage pool pool could not be moved to the destination storage pools because the destination storage pools do not have enough space.
- [HWN024076W](#) number of volumes volumes from storage pool pool could not be moved to the destination pools because the destination storage pools are not in the same capacity pool.
- [HWN024077W](#) number of volumes volumes from storage pool pool could not be moved to the destination storage pools because the destination storage pools would have exceeded the pool activity limit value.
- [HWN024078W](#) number of volumes volumes from storage pool pool could not be moved to the destination storage pools because the destination storage pools already have a volume copy.
- [HWN024079W](#) Because of an internal error, the number of volumes in the pool storage pool that could not be moved to destination storage pools is number of volumes.
- [HWN024080W](#) Destination storage pool pool already contains a copy of storage volume volume.
- [HWN024081W](#) Because the destination storage pool does not have sufficient available space, the volume storage volume in the source pool storage pool cannot be moved to the destination pool destination storage pool.
- [HWN024082W](#) Because the destination storage pool contains a copy of the mirrored volume, the volume volume in the source pool storage pool cannot be moved to the destination pool destination storage pool.
- [HWN024083W](#) Because of an internal error, the volume storage volume in the spool storage pool could not be moved to the destination pool destination storage pool.
- [HWN024084W](#) Because the destination storage pools contain one or more copies of the mirrored volumes, the number of volumes that could not be moved from tier source tier to tier target tier is number of volumes.
- [HWN024085W](#) The pool_name storage pool cannot be balanced because the tier level of the pool was reset to none.
- [HWN024086E](#) Recommendations cannot be generated because the tier level of the destination pool_name destination storage pool was reset to none.
- [HWN024087W](#) Recommendations cannot be generated for one or more of the volumes because collocated volumes cannot be placed in the same destination storage pool.
- [HWN024088I](#) The option to collocate volumes that are assigned to the same server or hypervisor was selected.
- [HWN024089I](#) The option to collocate volumes that are assigned to the same server or hypervisor was not selected.
- [HWN024090W](#) Because the storage pools do not meet the service class requirements, the number of volumes that cannot be moved is no volumes.
- [HWN024091W](#) If the recommendation to move the volume_name volume to the storage_pool_name storage pool is implemented, the service class requirements of the volume_name volume cannot be met.
- [HWN024092W](#) Recommendations cannot be generated to move number of volumes volumes from tier source tier to tier target tier number because the destination storage pools do not meet the service class requirements of the volumes.
- [HWN024093I](#) The number of volumes on tier tier level that were not analyzed because of the instruction to exclude mirrored volumes from the analysis is number of volumes volumes.
- [HWN024094W](#) Valid target pools were not selected for the subsystem name storage virtualizer.
- [HWN024095I](#) The grain size for the thin-provisioned volumes was set to the default value of grain_size KiB.
- [HWN024096W](#) Volumes in the pool_name pool on tier tier level cannot be moved to a higher tier to reduce the activity level of the pool to the user-defined level.
- [HWN024097W](#) Volumes in the pool_name pool on tier tier level cannot be moved to a lower tier to reduce the activity level of the pool to the user-defined level.
- [HWN024098W](#) Cannot generate recommendations to tier volumes from the storage_system_name storage system because all of the source volumes are in the selected destination storage pools.
- [HWN024099I](#) The number of volumes that were excluded from the analysis to plan the tiering of the storage_system_name storage system is vols_count. The volumes were excluded because performance data is not available for the volumes.
- [HWN024100I](#) The number of volumes that were excluded from the analysis to plan the tiering of the storage_system_name storage system is vols_count. The volumes were excluded from the analysis because the capacity of the volumes is zero.
- [HWN024101I](#) The number of volumes that were excluded from the analysis to plan the tiering of the storage_system_name storage system is vols_count. The volumes were excluded from the analysis because the volumes are not assigned to pools that are tiered or the thresholds were not defined for the tiers.

- [HWN024102W](#) The recommendation to move the storage volume name volume from the source pool name storage pool to the target pool name storage pool was not generated because the status of the destination pool is offline or excluded.
- [HWN024103I](#) Reclaiming volumes
- [HWN024104I](#) Planning for tiering volumes
- [HWN024105W](#) The recommendation to move the storage volume name volume from the source pool name storage pool to the target pool name storage pool will not be executed because the status of the destination pool is offline or excluded.
- [HWN024106W](#) The recommendation to move the storage volume name volume from the source pool name storage pool was not generated because the status of the volume is offline.
- [HWN024107W](#) The recommendation to move the storage volume name volume from the source pool name storage pool to the target pool name storage pool will not be executed because the status of the volume is offline.
- [HWN024108E](#) The recommendations can't be shown because the analysis was not completed.
- [HWN024109W](#) The data for the previous analysis of the storage subsystem storage system was not deleted.
- [HWN024110E](#) Volumes reclamation analysis failed for storage subsystem storage subsystem.
- [HWN024111W](#) Recommendations cannot be generated to move number of volumes volumes from tier source tier to tier target tier number because there is no potential destination pool assigned to the recommended tier.
- [HWN024112W](#) Cannot generate recommendations to tier volumes from the storage system name storage system because the source storage pools and the selected destination storage pools are assigned to the same tier.
- [HWN024200I](#) The days of the week to include in the analysis: days of week.
- [HWN024201I](#) The time window for the performance data to include in the analysis is set to start time - end time.
- [HWN024202I](#) The time window for the performance data to include in the analysis is set to start time - end time. The end time occurs on the next day.
- [HWN024203W](#) The volume storage volume name cannot be converted or moved because the target pools do not have sufficient available space or the target pool types are incorrect for the operation.
- [HWN025000I](#) Storage pool value in storage system value has storage from different types of back-end storage systems. Back-end disk data cannot be determined.
- [HWN025001I](#) Storage pool value in storage system value has storage from unknown back-end storage system(s). Back-end disk data cannot be determined.
- [HWN025002I](#) Storage pool value in storage system value has storage from multiple back-end storage systems or from multiple pools in a single storage system. Back-end disk data cannot be determined.
- [HWN025003I](#) Storage pool value in storage system value has storage from a back-end storage pool with multiple disk types. Back-end disk data cannot be determined.
- [HWN025004I](#) Storage pool value in storage system value has storage from a back-end storage pool with a mixed raid type. Back-end disk data cannot be determined.
- [HWN025005I](#) Storage pool value in storage system value has storage from a back-end storage pool with multiple raid types. Back-end disk data cannot be determined.
- [HWN025006I](#) Storage pool value in storage system value has storage from back-end disks of unknown type. Back-end disk data cannot be determined.
- [HWN025007I](#) Storage pool value in storage system value has storage from unknown number of back-end disks. Back-end disk data cannot be determined.
- [HWN025008I](#) Storage pool value in storage system value has storage from back-end disks with unknown raid type. Back-end disk data cannot be determined.
- [HWN025009E](#) Connection to Data Server failed. Make sure Data Server is up.
- [HWN025011W](#) All of the target ports for the storage system are used for the provisioning request. The request might take a long amount of time.
- [HWN025010I](#) Collecting parent pool volumes for storage system: storage system identification.
- [HWN025011E](#) The port the target port ID has a usage restriction which prevents it from being used as a target port for volume assignment.
- [HWN025012E](#) The invocation of CIM method ExposePaths failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.
- [HWN025013E](#) The invocation of CIM method HidePaths failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.
- [HWN025014E](#) The invocation of CIM method CreateOrModifyElementFromStoragePool failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.
- [HWN025015E](#) The invocation of CIM method ReturnToStoragePool failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.
- [HWN025016E](#) The invocation of CIM method DeleteStorageHardwareID failed on SMI-S provider Name of SMI-S provider . The return code is Return code of method.
- [HWN025017E](#) A CLI command failed. Check the logs from EP working dir.
- [HWN025018E](#) An error occurred when attempting to parse the file File name.
- [HWN025019E](#) The requested operation failed. Check the logs from EP working dir.
- [HWN025020E](#) The volume cannot be created. The volume of size Size in pool Pool on storage system Subsystem cannot be created. The pool might already have the maximum number of volumes allowed.
- [HWN025021E](#) Unable to resolve the address for the device because the request was not processed by the data collector.
- [HWN025022E](#) The data collection detected storage system New Subsystem with serial number new serial number instead of expected serial number expected serial number.
- [HWN025025I](#) Starting the task to send the report for schedule Schedule Id by email.

- [HWN025026I The report title report is being created.](#)
- [HWN025027I The report title report with ID report id is being sent by email to the reports recipients.](#)
- [HWN025028I The report title report with ID report id was sent by email to the reports recipients.](#)
- [HWN025029E Can't retrieve the configured settings of the report for schedule Schedule Id .](#)
- [HWN025030E The report can't be sent because the email server was not configured.](#)
- [HWN025031E Can't send the report title report with ID report id by email because of the following error: reported_error.](#)
- [HWN025031I To view the report, choose HTML as the message format or use an email application that supports HTML message formats.](#)
- [HWN025032E Job failed during post processing of collected data from the data source.](#)
- [HWN025033E Failed to send the report name report for schedule Schedule Id.](#)
- [HWN025034I Created number of servers agentless servers automatically.](#)
- [HWN025035I Removed number of servers agentless servers automatically.](#)
- [HWN025036E Can't save the report in the directory.](#)
- [HWN025037E Can't save the report because the path specifies a file name instead of a directory name.](#)
- [HWN025038E Can't save the report, because the directory doesn't exist.](#)
- [HWN025039E Can't save the report because the directory doesn't have enough disk space.](#)
- [HWN025040I The report title report with ID report id is being saved as report file name in the full path directory.](#)
- [HWN025041I The report title report with ID report id was saved as report file name in the full path directory.](#)
- [HWN099990I The method name of the Device Server method of the device server returned return value @\(\[execution context information\]\(#\)\).](#)
- [HWN099991I info trace message@\(\[execution context information\]\(#\)\)](#)
- [HWN099992W warning trace message@\(\[execution context information\]\(#\)\)](#)
- [HWN099993E error/exception trace message @\(\[execution context information\]\(#\)\)](#)
- [HWN099994I An object of class name of the class has been instantiated @\(\[execution context information\]\(#\)\).](#)
- [HWN099995I |==| class name.method name entry, parameter\(s\): parameter value\(s\) @\(\[execution context information\]\(#\)\).](#)
- [HWN099996I ==| class name.method name exit, return value: method return value \(execution time in milliseconds \) @\(\[execution context information\]\(#\)\).](#)
- [HWN099997I External service name of the \(DM\) external service will be invoked with parameter\(s\). parameter value\(s\)@\(\[execution context information\]\(#\)\).](#)
- [HWN099998I Invocation of external service name of the \(DM\) external service returned result invocation result@\(\[execution context information\]\(#\)\).](#)
- [HWN099999I The method name of the device server method of the device server was invoked with parameters invocation parameters@\(\[execution context information\]\(#\)\).](#)
- [HWN6001I Operation operation completed successfully.](#)
- [HWN6002I Unable to set up NLS message file processing.](#)
- [HWN6003E Unable to set up tracing.](#)
- [HWN6004E Operation operation failed.](#)
- [HWN6005E Unknown operation operation.](#)
- [HWN6006E Could not initialize connection, rc is rc](#)
- [HWN6007E Could not parse command arguments: arg](#)
- [HWN6008E Error processing command: command](#)
- [HWN6009E Missing 'operation' property in input file](#)
- [HWN6010I Task arg completed successfully.](#)
- [HWN6011E Task arg failed](#)
- [HWN6012E Cannot connect to this IP, switching to IP](#)
- [HWN6013E An IBM XIV CLI command failed. The error is arg.](#)
- [HWN6014I Command arg completed successfully.](#)
- [HWN6015E Command command failed.](#)
- [HWN6016I Connected with IP address IP](#)
- [HWN6017I Started creation of volume with size size in pool pool.](#)
- [HWN6018I Volume creation completed successfully. New volume volume created with size size in pool pool.](#)
- [HWN6019I Started deletion of volume volume in pool pool.](#)
- [HWN6020I Volume deletion completed successfully. Volume volume deleted in pool pool](#)
- [HWN6021I Started creation of host host with initiator ports ports](#)
- [HWN6022I Finished creation of host host with initiator ports ports](#)
- [HWN6023I Started assignment of volume volume to host host.](#)
- [HWN6024I Finished assignment of volume volume to host host.](#)
- [HWN6025I Started unassignment of volume volume from host host.](#)
- [HWN6026I Finished unassignment of volume volume from host host](#)
- [HWNEP0001I Successfully persisted number of count instances.](#)
- [HWNEP0002E The probe failed as the data collector couldn't write to its output file, value.](#)
- [HWNEP0003E A DS8000 ESSNI command failed. The error code is error_code.](#)
- [HWNEP0004I Started creation of volume group volume_group.](#)
- [HWNEP0005I Finished creation of volume group volume_group with subsystem volume group number number.](#)
- [HWNEP0006I Started adding volumes, with serial numbers volume_list, to subsystem volume group volume_group_number.](#)
- [HWNEP0007I Finished adding volumes to volume group.](#)

- [HWNEP0008I Started assignment of host host on subsystem subsystem to volume group volume_group.](#)
- [HWNEP0009I Finished assigning host on subsystem subsystem to volume group volume_group.](#)
- [HWNEP0010I Started removing volumes, with serial numbers volume_list, from subsystem volume group volume_group_number.](#)
- [HWNEP0011I Finished removing volumes, with serial numbers volume_list, from subsystem volume group volume_group_number.](#)
- [HWNEP0012I Increased virtual capacity of storage pool storage_pool on subsystem subsystem to size size.](#)
- [HWNEP0013I Collecting pools for storage system storage system identification.](#)
- [HWNEP0014I Collecting volumes for lss logical subsystems on storage system storage system identification.](#)
- [HWNEP0015I Collecting volume groups on storage system storage system identification.](#)
- [HWNEP0016I Collecting hosts on storage system storage system identification.](#)
- [HWNEP0017I value Hosts Found.](#)
- [HWNEP0018I Launching external process for devices devices.](#)
- [HWNEP0019I External process for devices devices completed successfully.](#)
- [HWNEP0020E Could not create connection to NAPI The IP for the NAPI..](#)
- [HWNEP0021E ESSNI API query for Space Efficient Volume failed with ESSNI code ESSNI Code. Data from ESSNI is considered suspect.](#)
- [HWNEP0022I Started deletion of volume group with number volume_group_number.](#)
- [HWNEP0023I Finished deletion of volume group with number volume_group_number.](#)
- [HWNEP0100I Probing Volumes for Storage System: value](#)
- [HWNEP0101I Number of Volumes currently found: value. Continuing to probe Volumes.](#)
- [HWNEP0102I value Volumes found.](#)
- [HWNEP0103I Probing Configured Disks for Storage System: value.](#)
- [HWNEP0104I Number of Configured Disks Found Currently: value. Continuing to Probe Disks.](#)
- [HWNEP0105I value Configured Disks Found.](#)
- [HWNEP0106I Probing Views of Host Initiator access to Volumes.](#)
- [HWNEP0107I Finished probing Views.](#)
- [HWNEP0108I Initializing Probe for storage system storage system identification.](#)
- [HWNEP0109I Probe for storage system storage system identification completed.](#)
- [HWNEP0110I Collecting Nodes and fibre channel ports for storage system storage system identification.](#)
- [HWNEP0111E The connection to the storage device failed. The error code is error_code.](#)
- [HWNEP0113E The cluster IP address is not specified in the configuration file.](#)
- [HWNEP0114E The trustore location is not specified in the configuration file.](#)
- [HWNEP0115E The IBM Spectrum Control data is out of synch with the device configuration and a re-probe is required for device device_name.](#)
- [HWNEP0116E The user configured for the subsystem subsystem name is not permitted to perform the requested action.](#)
- [HWNEP0117E The virtual disk \(VDisk\)-to-host mapping was not created because the volume vdiskName is already mapped to the hostName host for the Device deviceName](#)
- [HWNEP0115I Starting Control Process for storage system storage system identification.](#)
- [HWNEP0116I Started deletion of volume VolumeID on subsystem Subsystem.](#)
- [HWNEP0117I Volume deletion completed successfully. Volume VolumeID on subsystem Subsystem was deleted.](#)
- [HWNEP0118I Started adding Managed Disk\(s\) Managed Disk ID to Managed-disk group Managed Disk group name on subsystem Subsystem.](#)
- [HWNEP0119I Finished adding Managed Disk\(s\) Managed Disk ID to Managed-disk group Managed Disk group name on subsystem Subsystem.](#)
- [HWNEP0120I Started creation of volume with size Size in pool Pool on subsystem Subsystem](#)
- [HWNEP0121I Volume creation completed successfully. New volume VolumeID created with size Size in pool Pool on subsystem Subsystem.](#)
- [HWNEP0122I Started assignment of volume VolumeID on subsystem Subsystem to initiator port Initiator Port on host Host.](#)
- [HWNEP0123I Finished assignment of volume VolumeID on subsystem Subsystem to initiator port Initiator Port on host Host Name.](#)
- [HWNEP0124I Started unassignment of volume VolumeID on subsystem Subsystem from initiator port Initiator Port on host Host Name.](#)
- [HWNEP0125I Finished unassignment of volume VolumeID on subsystem Subsystem from initiator port Initiator Port on host Host Name.](#)
- [HWNEP0126I Started creation of host host name on subsystem Subsystem with initiator ports WWPNs.](#)
- [HWNEP0127I Finished creation of host host name on subsystem Subsystem with initiator ports WWPNs.](#)
- [HWNEP0128I Host name hostName already exists for the WWPNs wwpns on the device Subsystem](#)
- [HWNEP0129E The operation failed because the device returned unexpected values.](#)
- [HWNEP0130E A IBM XIV CLI command failed. The error is error_code.](#)
- [HWNEP0131I The host definition for host host name on subsystem Subsystem contains additional Hostports WWPNs that will also be assigned to Volume VolumeID.](#)
- [HWNEP0132E The unassignment of Volume VolumeID from hostport WWPN failed because the definition for host host name on subsystem Subsystem contains additional hostports WWPNs.](#)
- [HWNEP0133E Error invoking the external process for device device_name.](#)
- [HWNEP0134E Following exception occurred: exception.](#)

- [HWNEP0135E External process failed with error code error code.](#)
- [HWNEP0136E Error connecting to IP address with user ID user ID .](#)
- [HWNEP0137I Job job ID submitted for device device name .](#)
- [HWNEP0138I External process was successfully executed for device device name .](#)
- [HWNEP0139I An instruction was issued to add a copy of the volume_name volume_size-byte volume in the pool_name pool on the storage_system_name storage system.](#)
- [HWNEP0140I The copy of the volume_name volume_size-byte volume with the copy ID of VolumeID in the pool_name pool on the storage_system_name storage system was added successfully.](#)
- [HWNEP0141I Probing Internal Drives for Storage System: value.](#)
- [HWNEP0142I Number of Internal Drives Found Currently: value. Continuing to Probe Internal Drives.](#)
- [HWNEP0143I value Internal Drives Found.](#)
- [HWNEP0144I Probing Pools for Storage System: value.](#)
- [HWNEP0145I Number of Pools Found Currently: value. Continuing to Probe Pools.](#)
- [HWNEP0146I value Pools Found.](#)
- [HWNEP0147I Collecting asset and status information about storage_system_id storage system.](#)
- [HWNEP0148I Collecting cluster information for storage_system_id storage system.](#)
- [HWNEP0149I Collecting file system exports for storage_system_id storage system.](#)
- [HWNEP0150I Collecting nodes for storage_system_id storage system.](#)
- [HWNEP0151I Collecting file systems for storage_system_id storage system.](#)
- [HWNEP0152I Collecting pools for storage_system_id storage system.](#)
- [HWNEP0153I Collecting file system storage for storage_system_id storage system.](#)
- [HWNEP0154I Collecting filesets for storage_system_id storage system.](#)
- [HWNEP0155I Collecting links between file systems and nodes for storage_system_id storage system.](#)
- [HWNEP0156I Collecting quotas for storage_system_id storage system.](#)
- [HWNEP0157I Collecting file system snapshots for storage_system_id storage system.](#)
- [HWNEP0158I Collecting capacity for file_system_id file system.](#)
- [HWNEP0159I Creating the export export name on cluster cluster name .](#)
- [HWNEP0160I The export export name on cluster cluster name with path export_path was created.](#)
- [HWNEP0161I The export export name on cluster cluster name is being changed.](#)
- [HWNEP0162I The export export name on cluster cluster name was changed.](#)
- [HWNEP0163I Setting quota quota_type - quota_name on file system file system name .](#)
- [HWNEP0164I Quota quota_type - quota_name on file system file system name has been created.](#)
- [HWNEP0165I Checking quota on file system file system name .](#)
- [HWNEP0166I Quota on file system file system name has been checked.](#)
- [HWNEP0167I The export export name on cluster cluster name is being removed.](#)
- [HWNEP0168I The export export name on cluster cluster name was removed.](#)
- [HWNEP0169E Command: command did not complete. IBM SONAS CLI message](#)
- [HWNEP0170I Creating fileset fileset_name on file system file system name .](#)
- [HWNEP0171I Successfully created fileset fileset_name on file system file system name .](#)
- [HWNEP0172I Removing fileset fileset_name on file system file system name .](#)
- [HWNEP0173I Successfully removed fileset fileset_name on file system file system name .](#)
- [HWNEP0174I Modifying fileset fileset_name on file system file system name .](#)
- [HWNEP0175I Successfully modified fileset fileset_name on file system file system name .](#)
- [HWNEP0176I Creating file system file system on cluster cluster name .](#)
- [HWNEP0177I Successfully created file system file system on cluster cluster name .](#)
- [HWNEP0178I Changing file system file system on cluster cluster name .](#)
- [HWNEP0179I Successfully changed file system file system on cluster cluster name .](#)
- [HWNEP0180I Removing file system file system on cluster cluster name .](#)
- [HWNEP0181I Successfully removed file system file system on cluster cluster name .](#)
- [HWNEP0182I Mounting file system file system .](#)
- [HWNEP0183I Successfully mounted file system file system .](#)
- [HWNEP0184I Unmounting file system file system .](#)
- [HWNEP0185I Successfully unmounted file system file system .](#)
- [HWNEP0186I Linking fileset fileset on file system file system .](#)
- [HWNEP0187I Successfully linked fileset fileset on file system file system .](#)
- [HWNEP0188I Unlinking fileset fileset on file system file system .](#)
- [HWNEP0189I Successfully unlinked fileset fileset on file system file system .](#)
- [HWNEP0190E The IBM Spectrum Control server could not connect to IP address using the SSH protocol.](#)
- [HWNEP0191E The IBM Spectrum Control server could not authenticate with IP address using the SSH protocol.](#)
- [HWNEP0192E The IBM Spectrum Control server could not execute a command on the IBM Storwize V7000 Unified/IBM SONAS device at IP address .](#)
- [HWNEP0193E The command name command failed because the following command executed on the NAS device failed with the return code return_code : command returned: command_output](#)
- [HWNEP0195I modify_fileset](#)
- [HWNEP0196I change_export](#)
- [HWNEP0197I create_export](#)

- [HWNEPO198I remove export](#)
- [HWNEPO199I create fileset](#)
- [HWNEPO200I link fileset](#)
- [HWNEPO201I remove fileset](#)
- [HWNEPO202I unlink fileset](#)
- [HWNEPO203I change filesystem](#)
- [HWNEPO204I create filesystem](#)
- [HWNEPO205I mount filesystem](#)
- [HWNEPO206I remove filesystem](#)
- [HWNEPO207I unmount filesystem](#)
- [HWNEPO208I check quota](#)
- [HWNEPO209I set quota](#)
- [HWNEPO210I probe](#)
- [**HWNEPO211W The command name command completed, however during post-processing the following command executed on the NAS device failed with the return code return code : command returned: command output As a result, the IBM Spectrum Control database is now out of sync with the current state of the NAS device.**](#)
- [HWNEPO212I create disk in modifying file system](#)
- [HWNEPO213I Started deletion of host host name on subsystem Subsystem .](#)
- [HWNEPO214I Finished deletion of host host name on subsystem Subsystem .](#)
- [HWNEPO215I Collecting cache information for storage system id storage system.](#)
- [HWNEPO216I remove cached source](#)
- [HWNEPO217I create cached node](#)
- [HWNEPO218I remove cached node](#)
- [HWNEPO219I create cache](#)
- [HWNEPO220I remove cache](#)
- [HWNEPO221I modify cache source](#)
- [HWNEPO222I Creating cache source cache source name on cluster file system name.](#)
- [HWNEPO223I Created cache source cache source name on cluster file system name.](#)
- [HWNEPO224I Removing cache source cache source name on cluster file system name.](#)
- [HWNEPO225I Removed cache source cache source name on cluster file system name.](#)
- [HWNEPO226I Modifying cache source cache source name on cluster file system name.](#)
- [HWNEPO227I Modified cache source cache source name on cluster file system name.](#)
- [HWNEPO228I Creating cache cache name on file system file system name.](#)
- [HWNEPO229I Created cache cache name on file system file system name.](#)
- [HWNEPO230I Removing cache cache name on file system file system name.](#)
- [HWNEPO231I Removed cache cache name on file system file system name.](#)
- [HWNEPO232I Modifying cache cache name on file system file system name.](#)
- [HWNEPO233I Modified cache cache name on file system file system name.](#)
- [HWNEPO234I modify cache](#)
- [HWNEPO235I create cached source](#)
- [HWNEPO236I Configuring nodes node names as cached nodes.](#)
- [HWNEPO237I Configured nodes node names as cached nodes.](#)
- [HWNEPO238I Unconfiguring cached nodes node names.](#)
- [HWNEPO239I Unconfigured cached nodes node names.](#)
- [HWNEPO240I Executed control operation on cache cache name on filesystem file system name .](#)
- [HWNEPO241I control cache](#)
- [HWNEPO242I run prepop](#)
- [HWNEPO243I list prepop](#)
- [HWNEPO244I Retrieving cache prepopulation status for file system file system name .](#)
- [HWNEPO245I Cache prepopulation status for file system file system name has been retrieved.](#)
- [HWNEPO246I Prepopulate cache data for fileset fileset name on file system file system name using policy policy name.](#)
- [HWNEPO247I Command to pre populate cached data for fileset fileset name was successful.](#)
- [**HWNEPO248W An error was encountered while parsing protocol options for export export name. The options were not persisted, the probe will continue.**](#)
- [HWNEPO249W The connection to the storage device failed. The error code is error code.](#)
- [HWNEPO250I Started adding initiator port\(s\) initiator ports to host host name on subsystem subsystem .](#)
- [HWNEPO251I Finished adding initiator port\(s\) initiator ports to host host name on subsystem subsystem .](#)
- [HWNEPO252W A CLI command completed with warning. The warning message is : warning_message](#)
- [HWNEPO253W Volume creation completed with warning. New volume VolumeID created with size Size in pool Pool on subsystem Subsystem .](#)
- [HWNEPO254W Volume deletion completed with warning. Volume VolumeID on subsystem Subsystem was deleted.](#)
- [HWNEPO255I The task to execute the recommendations for optimizing the volumes on the storage system with an ID of storage_system_id was paused.](#)
- [HWNEPO256I The task for optimizing the volumes on the storage system with an ID of storage_system_id was canceled.](#)
- [HWNEPO257I The task for optimizing the volumes on the storage system with an ID of storage_system_id was resumed.](#)

- [HWNEP0258E](#) The optimization task cannot be paused because the synchronization rate for the volume cannot be reset. The ID of the volume is volume_id and the ID of the storage system is storage_system_id.
- [HWNEP0259E](#) The optimization task cannot be resumed because the synchronization rate for the volume cannot be reset. The ID of the volume is volume_id and the ID of the storage system is storage_system_id.
- [HWNEP0260I](#) Started creation of host port host_port_name on storage_system Storage System with initiator_port WWPN.
- [HWNEP0261I](#) Finished creation of host port host_port_name on storage_system Storage System with initiator_port WWPN.
- [HWNEP0262E](#) The recommendation for the volume_name volume was not implemented because the command that was issued by the storage virtualizer returned the following error: error_message
- [HWNEP0263I](#) The synchronization of the volume_name volume with the volume_copy was successful.
- [HWNEP0264E](#) The synchronization of the volume_name volume with the volume_copy was unsuccessful.
- [HWNEP0265E](#) The CLI command that was issued for the storage_system_name storage system failed and generated the following error: error_message
- [HWNEP0266I](#) Started expanding the capacity of volume_name volume on subsystem subsystem from oldsize_to_newsize bytes.
- [HWNEP0267I](#) Finished expanding the capacity of volume_name volume on subsystem subsystem to newsize bytes.
- [HWNEP0268E](#) The server operating system or version is not supported by IBM Spectrum Control for IBM Spectrum Scale.
- [HWNEP0269E](#) The IBM Spectrum Scale cluster information cannot be displayed. All the nodes in the cluster are down or cannot be contacted.
- [HWNEP0270E](#) The switch cannot respond to SNMP queries because of an authentication error.
- [HWNEP0271E](#) The following password decryption exception occurred: exception
- [HWNEP0272E](#) The switch cannot respond to SNMP queries because of the following exception: exception
- [HWNEP0273E](#) The following exception occurred because the OID format is incorrect: exception
- [HWNEP0274E](#) The switch cannot respond to SNMP queries because of a timeout problem.
- [HWNEP0270I](#) Retrieved the file module address file_module_address.
- [HWNEP0271I](#) No quota data was collected. Quota limits are not activated for the file systems that are associated with the IBM Spectrum Scale cluster.
- [HWNEP0272I](#) Collecting file systems that are mounted on the nodes of storage_system storage_system_id.
- [HWNEP0275W](#) One or more operations failed for the CLI command that was issued for the storage system. The following error was generated: errorMsg.
- [HWNEP0276E](#) Command execution failed because sudo is not installed.
- [HWNEP0277I](#) Commands are executed through 'sudo'.
- [HWNEP0278E](#) User can not execute command through sudo.
- [HWNEP0279I](#) Collecting remote file systems for storage_system_id storage system.
- [HWNEP0280I](#) Collecting remote file systems that are mounted on the nodes of storage_system storage_system_id.
- [HWNEP0281E](#) The switch is returning corrupted data.
- [HWNEP0282E](#) Zoning data cannot be collected because there is a transaction in progress on the switch
- [HWNEP0283E](#) VSAN vsan_name was not found.
- [HWNEP0284E](#) No zoning data collected from the switch.
- [HWNEP0285E](#) Cannot authenticate to the object storage using the specified user credentials.
- [HWNEP0286E](#) An object storage request failed on the GPFS cluster.
- [HWNEP0287E](#) Error when collecting Accounts information from Object Storage Service using REST protocol.
- [HWNEP0288E](#) Error when collecting Containers information from Object Storage Service using REST protocol.
- [HWNEP0281I](#) Collecting object storage accounts for storage_system_id storage system.
- [HWNEP0282I](#) Collecting object storage containers for storage_system_id storage system.
- [HWNEP0289E](#) Failed to retrieve container information because the number of containers now exceeds the maximum number of containers that can currently be collected for an account (MAX Containers).
- [HWNEP0290E](#) The probe failed to retrieve object storage account information from the storage system storage_system_id because the userid user does not have the required authority.
- [HWNEP0291E](#) The probe failed to retrieve object storage container information from the storage system storage_system_id because the userid user does not have the required authority.
- [HWNEP0292E](#) Cannot query the object service for information about accounts and containers as the specified user does not have admin privileges.
- [HWNEP0293W](#) The probe did not collect information about all the object accounts for the storage system storage_system_id as the userid user does not have sufficient authority on the storage system.
- [HWNEP0294W](#) An authentication error prevented the switch from responding to SNMP queries regarding the ability of the switch to perform zone control.
- [HWNEP0295W](#) A timeout prevented the switch from responding to SNMP queries regarding the ability of the switch to perform zone control.
- [HWNEP0296W](#) The switch cannot respond to SNMP queries to check the ability of the switch to perform zone control because of the following exception: exception
- [HWNEP0297W](#) The switch cannot respond to SNMP queries to check the ability of the switch to perform zone control because of the following exception: exception
- [HWNEP0298I](#) Collecting IBM Cloud Object Storage configuration.
- [HWNEP0299I](#) Collecting IBM Cloud Object Storage vaults.
- [HWNEP0300I](#) Collecting detailed IBM Cloud Object Storage status.
- [HWNEP0301W](#) The IP address ip_address for the FlashSystem storage system is not the management IP address.
- [HWNEP0302I](#) Collecting Transparent Cloud Tiering information for storage_system_id storage system.

- [HWNEPO303I No Transparent Cloud Tiering configuration was detected on the IBM Spectrum Scale cluster.](#)
- [HWNEPO304E Cannot connect to IBM Cloud Object Storage.](#)
- [HWNEPO305I Collecting disk controllers for storage system storage system identification.](#)
- [HWNEPO306I Collecting disks for storage system storage system identification.](#)
- [HWNEPO307I Collecting CIFS shares for storage system storage system identification.](#)
- [HWNEPO308I Collecting NFS exports for storage system storage system identification.](#)
- [HWNEPO309I The data is being collected by the data collector: data collector host.](#)
- [HWNEPO310I Discovery found number storage systems.](#)
- [HWNEPO311I Probing nodes or directors for storage system name storage system.](#)
- [HWNEPO312I Probe found number nodes or directors.](#)
- [HWNEPO313I Probing pools for storage system name storage system.](#)
- [HWNEPO314I Probe found number pools.](#)
- [HWNEPO315I Probing disk groups for storage system name storage system.](#)
- [HWNEPO316I Probe found number disk groups.](#)
- [HWNEPO317I Probing disks for storage system name storage system.](#)
- [HWNEPO318I Probe found number disks.](#)
- [HWNEPO319I Probing host connections for storage system name storage system.](#)
- [HWNEPO320I Probing ports for storage system name storage system.](#)
- [HWNEPO321I Probing volumes for storage system name storage system.](#)
- [HWNEPO322I Probe found number volumes. Continuing to probe volumes.](#)
- [HWNEPO323I Probe found number volumes for storage system name storage system.](#)
- [HWNEPO324I Probing NAS nodes for storage system name storage system.](#)
- [HWNEPO325I Probe found number NAS nodes.](#)
- [HWNEPO326I Probing file systems that are mounted on the NAS nodes of storage system name storage system.](#)
- [HWNEPO327I Probe found number file systems.](#)
- [HWNEPO328I Probing file system exports for storage system name storage system.](#)
- [HWNEPO329W profile name version version number SMI-S Profile is not supported.](#)
- [HWNEPO330E Unable to find minimum required SMI-S profile to proceed with requested task.](#)
- [HWNEPO331I Probing copy pair relationships for storage system name storage system.](#)
- [HWNEPO332I Probe found number copy pairs.](#)
- [HWNEP1111E There is no connection for the specified device.](#)
- [HWNEP1112E No SSH server found on the device.](#)
- [HWNEP1113E Unsupported version.](#)
- [HWNEP1114E The connection to the device failed.](#)
- [HWNEP1115E Authentication failed.](#)
- [HWNEP1116E Unknown host.](#)
- [HWNEP1117E The passphrase is wrong.](#)
- [HWNEP1118E The passphrase is missing.](#)
- [HWNEP1119E Unknown error.](#)
- [HWNEP1120E ESSNI not available.](#)
- [HWNEP1121E Private key not found.](#)
- [HWNEP1122E Invalid format for the private key.](#)
- [HWNEP1123E Unable to establish a connection to the device through http port 80.](#)
- [HWNEP1124I Log collection successfully started for storage system name storage system.](#)
- [HWNEP1125E The activity requested is already in progress on storage system name storage system.](#)
- [HWNEP1126I The support log activity has started successfully storage system name storage system.](#)
- [HWNEPO112E The CLI command that was issued for the storage system failed and generated the following error: error message](#)
- [HWNPM5412E The process failed because it was unable to find the Export Tool. Expected location was loc of tool](#)
- [NAD0001I Connecting to hostname using protocol protocol.](#)
- [NAD0002W Connection to hostname failed using protocol protocol: error.](#)
- [NAD0003I Connected to hostname using protocol protocol.](#)
- [NAD0005E Connection to hostname failed using protocol protocol: error message.](#)
- [NAD0006E Exception thrown for method method name: error message.](#)
- [NAD0007I Closing connection to hostname.](#)
- [NAD0008E Invalid protocol protocol passed to method name.](#)
- [NAD0010E Invalid parameter\(s\) parameter name passed to method name.](#)
- [NAD0013I Installing GUID on remote machine: hostname.](#)
- [NAD0014I GUID successfully installed on remote machine: hostname.](#)
- [NAD0018E Command on remote machine: host name failed. Error code = value executing command value.](#)
- [NAD0019E Parameter parameter passed to method is null or 0 length.](#)
- [NAD0055E Failed to connect to remote host host.](#)
- [NAD0097I Opening connection to hostname.](#)
- [NAD0180I Installing re-distributable package on .](#)
- [NAD0181I Install of re-distributable package on succeeded.](#)
- [NAD0182E Failed to install re-distributable package on .](#)

- [NAD0186I Trying to locate package TIVguid using pkginfo ...](#)
- [NAD0187I Package TIVguid is not installed.](#)
- [NAD0188I Checking TIVguid default install path : path ...](#)
- [NAD0259W Unable to determine Storage Resource Agent version on host . Fabric Discovery will not be invoked.](#)
- [NAD0145E Cannot get version information from agent on host .](#)
- [NAD0146E The connection to remote machine failed because the Remote Execution and Access component was unable to create a temporary directory on the remote machine. Remove unneeded ~CSRI* directories in the remote machine's temporary directory.](#)
- [NAD0156E The server host address cannot be reached because the host name or IP address is not recognized.](#)
- [NAD0157E The server host name cannot be contacted. The server might be down, unreachable due to network problems, or the SSH credentials might be invalid.](#)
- [NAD0260I Agent is active.](#)
- [NAD0272W The connection to the Storage Resource Agent on host name was not established. Retrying using the IP address.](#)
- [NAD0274E An SSH certificate certificate name already exist.](#)
- [NAD0275E Failed to connect to remote host hostname and port. Failed to establish a secure connection.](#)
- [NAD0276E Failed to connect to remote host hostname and port. Failed to establish a secure connection because the SSL handshake failed.](#)
- [NAD0277E Failed to connect to remote host hostname and port. Failed to establish a secure connection because of an invalid SSL key.](#)
- [NAD0278E Failed to connect to remote host hostname and port. Failed to establish a secure connection because the identity of the peer could not be verified.](#)
- [NAD0279E Failed to connect to remote host hostname and port. Failed to establish a secure connection because of an SSL protocol error.](#)
- [NAD0281E The Storage Resource agent cannot be deployed because of insufficient space or other issues on the target system. The error is: error message.](#)
- [BTAVM2272W Unsupported virtual disk backing info for disk "Disk name" of hypervisor Hypervisor name, virtual machine "VM name": Virtual disk type.](#)
- [BTAVM2273W Unable to find file "File name" which is the backing device of the virtual disk "Disk name" of hypervisor Hypervisor name, virtual machine "VM name".](#)
- [BTAVM2274W Probe of hypervisor Name of the Hypervisor completed with warnings.](#)

BTADS0000I Starting Discover Process value , with Device Server RUN ID value , and Job ID value .

Explanation

The specified discovery request has been started.

Action

None.

BTADS0001I Discover Process with Device Server run ID value and job ID value is complete.

Explanation

The specified discovery request has completed.

Action

None.

BTADS0002I Starting Child Discover Process value with Job ID= *value* .

Explanation

The specified child discovery request has started.

Action

None.

BTADS0003I The Child Discover Process with Job ID *value* has completed with Status= *value* and Return Code= *value* .

Explanation

The specified child discovery request has completed.

Action

None.

BTADS0004W The child discovery request with job ID *job_id* completed with status *status_number* and return code *value*.

Explanation

The specified child discovery request completed with one or more warnings.

Action

For more information about the warnings, check the job log for the child discovery request. To find the child discovery request, check the job logs that have the same run ID.

BTADS0005E The child discovery request with job ID *job_id* completed with status *status_number* and return code *value*.

Explanation

The specified child discovery request completed with one or more errors.

Action

For more information about the errors, check the job log for the child discovery request. To find the child discovery request, check the job logs that have the same run ID.

BTADS0010I Invoking outband scanner value on agent value .

Explanation

The specified scan has been invoked.

Action

None.

BTADS0011I Outband scanner value on agent value completed successfully.

Explanation

The specified scan has been completed.

Action

None.

BTADS0012E Outband Scanner value on agent value failed with return code value .

Explanation

The specified scan failed.

Action

None.

BTADS0019E An outband scanner failed to capture the scan data .

Explanation

An error condition prevented the scanner from processing the outband scan data.

Action

If the problem continues, contact IBM customer support.

BTADS0020I Processing value data from agent value .

Explanation

TSANMLegacyParser is running the specified Device Server job to parse XML that represents a fabric.

Action

None.

BTADS0021W Warning encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value

.

Explanation

The DESaxParser has encountered a warning while parsing XML that represents a fabric.

Action

None.

BTADS0022E Exception encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value

.

Explanation

The DESaxParser has encountered an exception while parsing XML that represents a fabric.

Action

Contact IBM customer technical support.

BTADS0023E Fatal error encountered while parsing Fabric XML for job: RUN ID= value , and Job ID= value . value

.

Explanation

The DESaxParser has encountered a fatal error while parsing XML that represents a fabric.

Action

Contact IBM customer technical support.

BTADS0024E Error encountered processing scanner *value* data from agent *value* . *value* .

Explanation

TSANMLegacyParser has encountered an error while parsing XML that represents a fabric.

Action

Contact IBM customer technical support.

BTADS0025I Running job to discover SMI-S providers through Service Location Protocol: RUN ID= *value* , Job ID= *value* .

Explanation

SLPObjectParser is running the specified job to discover SMI-S providers through Service Location Protocol.

Action

None.

BTADS0026I Service Location Protocol has found *value* SMI-S providers.

Explanation

SLPObjectParser has found SMI-S providers through Service Location Protocol.

Action

None.

BTADS0027E Error encountered by a Service Location Protocol job: RUN ID= *value* , and Job ID= *value* . *value* .

Explanation

SLPObjectParser has encountered an error while discovering SMI-S providers through Service Location Protocol. One or more SMI-S providers may not have been discovered.

Action

Information for one or more SMI-S providers may need to be manually entered. Contact IBM customer technical support if automatic discovery of SMI-S providers through Service Location Protocol is needed.

BTADS0028W The Device Server Job with RUN ID=: *value* , Job ID= *value* , Discover Request= *value* has been cancelled since it is long running.

Explanation

The specified job has been cancelled.

Action

None.

BTADS0029I Scanner *value* data from agent *value* has not changed since last scan.

Explanation

The specified scan has been invoked.

Action

None.

BTADS0030I Invoking inband Scanner *value* on agent *value* .

Explanation

The specified scan has been invoked.

Action

None.

BTADS0031I Inband Scanner *value* on Agent *value* completed successfully.

Explanation

The specified scan has been completed.

Action

None.

BTADS0032E Inband Scanner *value* failed on agent *value* with Return Code *value* .

Explanation

The specified scan failed.

Action

None.

BTADS0033E Error invoking *value* on host *value* .

Explanation

The specified scan failed.

Action

None.

BTADS0034E Fatal error encountered while persisting the data for job: RUN ID= *value* , and Job ID= *value* .
value .

Explanation

The DESaxParser has encountered a fatal error while persisting fabric information.

Action

Contact IBM customer technical support.

BTADS0035E The execution of the job failed with: *value* .

Explanation

An error occurred during the execution of a job.

Action

See the message and trace file for more information. Contact IBM customer technical support.

BTADS0036I Found SNMP Target at *value* .

Explanation

The specified SNMP agent was detected.

Action

None.

BTADS0037E Found SNMP Target at *value* but it is not persisted in the database. Will NOT perform discovery of information using the address.

Explanation

The specified SNMP agent was detected but the agent information was not found in the database.

Action

Check the message and trace files for more information.

BTADS0038I Starting scan of SNMP agents from *value* to *value* .

Explanation

Scanning the specified range of IP Addresses for SNMP agents.

Action

None.

BTADS0039I Starting probe of detected agents.

Explanation

Starting a probe against the discovered agents to collect fabric information.

Action

None.

BTADS0040I Processing of Scanner *value* data from Agent *value* completed successfully.

Explanation

The specified scan has been completed.

Action

None.

BTADS0041I Discover Process with Device Server RUN ID *value* and Job ID *value* completed successfully.

Explanation

The specified discovery request has completed successfully.

Action

None.

BTADS0042E Discover Process with Device Server RUN ID *value* and Job ID *value* failed with return code *value*.

Explanation

The specified discovery request failed.

Action

See the message and trace files for more information. Contact IBM customer technical support.

BTADS0043I Invoking *value* scanner *value* on target *value*.

Explanation

The specified scan has been invoked.

Action

None.

BTADS0044I *value* scanner *value* on target *value* completed successfully.

Explanation

The specified scan completed successfully.

Action

None.

BTADS0045E value Scanner value on target value failed with return code value .

Explanation

See the message and trace files for more information. Contact IBM customer technical support.

Action

None.

BTADS0046I Processing value data from agent value .

Explanation

The specified parser is running the specified Device Server Job to parse XML from the agent.

Action

None.

BTADS0047W The value parser encountered a warning while parsing XML for job with RUN ID= value , and Job ID value . The return code from the parser job is value .

Explanation

The specified Parser has encountered a warning while parsing XML from the agent.

Action

None.

BTADS0048E The value parser encountered an exception while parsing XML from job with RUN ID= value , and Job ID= value .The return code from the parser is value .

Explanation

The Parser has encountered an exception while parsing XML from the agent.

Action

Contact IBM customer technical support.

BTADS0049E The value parser for Device Server job with RUN ID= *value* , and Job ID= *value* failed. The return code from the parser is *value* .

Explanation

The Parser job failed

Action

Contact IBM customer technical support.

BTADS0050I Service Location Protocol has found SMI-S provider, *value* , at address *value* .

Explanation

SLPObjectParser has found SMI-S providers through Service Location Protocol.

Action

None.

BTADS0051I Service Location Protocol has found SMI-S provider, *value* , at address *value* , which requires security information to be configured.

Explanation

SLPObjectParser has found an SMI-S provider. Currently unable to communicate with the SMI-S provider because of missing or incorrect login information.

Action

Configure the login information for the SMI-S provider on the Services->Agents->CIMOMs configuration dialog under Administrative Services.

BTADS0052W Warning encountered while parsing *value* data from agent *value*. *value*.

Explanation

The DESaxParser has encountered a warning while parsing XML that represents a fabric.

Action

None.

BTADS0053E Exception encountered while parsing value data from agent value. value.

Explanation

The DESaxParser has encountered an exception while parsing XML that represents a fabric.

Action

Contact IBM customer technical support.

BTADS0054E Fatal error encountered while parsing value data from agent value. value.

Explanation

The DESaxParser has encountered a fatal error while parsing XML that represents a fabric.

Action

Contact IBM customer technical support.

BTADS0055E Outband Scanner value on agent value encountered the presence of a McData i10k. These devices do not report correctly via SNMP and can only be used with SMI-S provider.

Explanation

McData i10k devices do not work properly with SNMP agents. They should only be used with SMI-S providers. Remove this SNMP agent.

Action

Remove this device as an Out of band Fabric agent and add it as an SMI-S provider.

BTADS0056E Errors in Topology XML generator.

Explanation

Some of the data generated by the scanner appears to have errors.

Action

Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTADS0057E Errors occurred while resolving InterconnectElement and Port relationship.

Explanation

Some of the data returned from the scanner could not be resolved.

Action

Get the SANQueryEngine service trace information from the trace log, and contact IBM customer support.

BTADS0058E Errors in creating an entity.

Explanation

Errors occurred while attempting to create an entity from the results of a scan.

Action

Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTADS0059E The outband agent target address IP address is not a Cisco device or is invalid.

Explanation

The Cisco scan cannot be run on the outband agent target address. Either the device is not a Cisco device or the IP address is not valid.

Action

Verify that the connection information for the device is valid. Ensure that the network and the device are up and available. Try the action again.

BTADS0060E Outband Scanner value is not responding.

Explanation

The specified scan failed has failed due to a timeout.

Action

Please check network connections to the switch and SNMP settings on the switch.

BTADS0062E Encountered SQL error value while persisting some data.

Explanation

Some discovered data was not stored in the database due to an SQL error.

Action

Please check the device server trace log for more detail. If the problem continues, contact IBM support.

BTADS0063E The execution of the PM BSP invocation failed with: value .

Explanation

An error occurred during the PM BSP invocation.

Action

See the message and trace file for more information. Contact IBM customer technical support.

BTADS0063W The performance data collection for the current device is not enabled.

Explanation

The performance collection service is disabled. Please check the external provider documentation.

Action

None.

BTADS0064I Starting scan of Storage Subsystems from value to value .

Explanation

Scanning the specified range of IP Addresses for Storage Subsystems.

Action

None.

BTADS0065I Outband and inband agents for fabric(s) specified in probe are value

Explanation

Determining outband and inband agents that can be used to probe fabric(s)

Action

None.

BTADS0066I Could not find scanners for agent value

Explanation

Unable to find scanners for agent and so will not be able to invoke the scanners for this particular agent during the probe

Action

None.

BTADS0067I Agent value is configured for no SAN calls and so no scanners will be invoked for this particular agent

Explanation

Determining outband and inband agents that can be used to probe fabric(s)

Action

None.

BTADS0068I Could not retrieve connection information for agent value. Will not be able to invoke scanners for this particular agent

Explanation

Unable to invoke scanners for a agent since connection information for the agent could not be obtained

Action

None.

BTADS0069I Added inband scanner job with id value discover request value for agent value.

Explanation

Added a job to invoke scanner for a particular agent to probe a fabric

Action

None.

BTADS0070I Agent value has not discovered any fabrics and will not be used during the probe.

Explanation

This particular agent has not discovered a fabric previously and will not be used during this probe run

Action

None.

BTADS0071I Invoked inband Scanner value on agent value

.

Explanation

The specified scan has been invoked successfully.

Action

None.

BTADS0072I Successfully received response from agent for job value with request id value .

Explanation

Response received from agent successfully. Server will process the response.

Action

None.

BTADS0073E Received error response from agent for job value with request id value. Return code is value.

Explanation

Error response received from agent for specified job or there was a error encountered while receiving job. Job will be considered failed.

Action

None.

BTADS0074E IP Scan Discovery was canceled due to a hung socket/thread detected. Partial result of the scan will be persisted.

Explanation

IP Scan Discovery was canceled since a hung thread or socket was detected. Available results will be persisted in the database.

Action

None.

BTADS0075E IP Scan Discovery was canceled due to a hung socket/thread detected.

Explanation

IP Scan Discovery was canceled since a hung thread or socket was detected.

Action

None.

BTADS0076I IP Scan Discovery has started for DS, XIV, and IBM SONAS subsystems.

Explanation

IP Scan Discovery for DS, XIV, and IBM SONAS subsystems has started

Action

None.

BTADS0077I Scanning value out of value IP addresses.

Explanation

Informational message on number of IP being scanned.

Action

None.

BTADS0078I IP Scan Discovery has started for SVC subsystems.

Explanation

IP Scan Discovery for SVC subsystems has started

Action

None.

BTADS0079I IP Scan Discovery for DS and XIV was done.

Explanation

IP Scan Discovery for DS, XIV, and IBM SONAS was done

Action

None.

BTADS0080I IP Scan Discovery for SVC was done

Explanation

IP Scan Discovery for SVC was done.

Action

None.

BTADS0081I Inband Scanner value for agent address value is not required for probing switches and will not be used.

Explanation

The information that can be collected using the specified scanner will be collected by another scanner or agent instead.

Action

None.

BTADS0082W A first run of a switch probe failed. Additional agents will be used.

Explanation

A probe that used a subset of agents to probe switches did not complete. The probe will now use previously unassigned agents. Depending on the types of agents that are available, all or a subset of information will be collected about the switches.

Action

Check the trace log for more detail. Determine whether the agent or agents that failed are currently down for a known reason. If the problem continues, contact IBM Software Support.

BTADS0083I The available agents provide a subset of possible features for the probed switch: value

Explanation

Some switches require more than one type of agent (such as a Storage Resource agent, SNMP agent, and SMI agent) to collect all the available information for the switch.

Action

To determine if any additional agent types are required for the switch and fabric functions that you need, go IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93> and view the Reference section. If you have all the required agents deployed for the switch, ensure that they are configured and running properly.

BTADS0084I There are no limitations for probing switch value based on the mix of agents that are configured.

Explanation

With the current mix of configured agents, there are no known limitations on the information that can be collected from a probe of the specified switch.

Action

No action is required.

BTADS0085W A problem was encountered when agent assignments were being determined for the probe. All available agents will be used to collect information about the switch.

Explanation

Typically, agent assignment is used to reduce the number of agents that are used by a probe. Because an exception was encountered while determining agent assignments, all the available agents will be used.

Action

Check the device server message and trace log for more information. If the problem continues, contact IBM support.

BTADS0086I The following storage systems were discovered value

Explanation

This message is for informational purposes only.

Action

No action is required.

BTADS0087I IP Scan Discovery did not find any DS8000, SVC, XIV, and IBM SONAS storage systems in the given IP range.

Explanation

This message is for informational purposes only.

Action

No action is required.

BTADS0088I IP Scan Discovery finished.

Explanation

This message is for informational purposes only.

Action

No action is required.

BTADS0089E The Device server is not registered with agent manager. Scanners cannot be used for agent value. value.

Explanation

The Device server must be registered with the agent manager.

Action

Configure the Device server to register with the agent manager. Check the Device server message and trace log for more information. If the problem continues, contact IBM support.

BTADS0090E There are no agents currently available to probe switch value.

Explanation

There are no agents configured to probe the specified switch or the agents configured are not operational.

Action

Configure the agents to probe switches. If agents are already configured, check if they are operational. Check the trace log for more detail. If the problem continues, contact IBM Software Support.

BTADS0091I Inband Scanner value for agent address value is currently not running and will not be used.

Explanation

The specified scanner is currently not running and will not be used.

Action

Check the status of specified agent and determine the reason that it is not running. Check the device server message and trace log for more detail. Check if an alternate agent can be used for the probe. If the problem continues, contact IBM support.

BTADS0092I Inband Scanner value for agent address value is currently disabled from performing fabric functions and will not be used.

Explanation

The specified scanner must be enabled if you want to perform fabric functions.

Action

Check the reason for disabling the fabric functions for the specified agent. Check if an alternate agent can be used for the probe.

BTADS0093I Inband Scanner value for agent address value is currently not reachable and will not be used.

Explanation

The specified scanner must be reachable to use it for a probe.

Action

Check if the host on which the agent is running is reachable from the server and that the server is reachable from the agent. Check the trace log for more detail. Check if an alternate agent can be used to probe switches. If the problem continues, contact IBM Software Support.

BTADS0094W The probe for switch value has some limitations.

Explanation

There are some limitations for the information collected by a probe of the switch based on the mix of agents that are configured and operational.

Action

Check if there are additional agents that can be configured for the probe. Check the status of the configured agents. Check the device server message and trace log for more detail. If the problem continues, contact IBM support.

BTADS0095W For switch value some information will not be collected.

Explanation

There are some limitations for the information collected by a probe of the fabric based on the mix of agents that are configured and operational.

Action

Check if there are additional agents that can be configured for the probe. Check the status of the configured agents. Check the device server message and trace log for more detail. If the problem continues, contact IBM support.

BTADS0096I The probe limitation can be overcome by configuring an SMI agent to manage fabric value.

Explanation

An SMI agent is required to manage the fabric. Note that there might be more than one type of agent that can manage the fabric.

Action

Configure an SMI agent to manage the specified fabric. For more information about the types of agents that are available to manage a fabric, go IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93> and view the Reference section.

BTADS0097I The probe limitation can be overcome by configuring SNMP agents to manage switches in fabric value.

Explanation

SNMP agents are required to manage the specified fabric. Note that there might be more than one type of agent that can manage the fabric.

Action

Configure an SNMP agent to manage the specified fabric. For more information about the types of agents that are available to manage a fabric, go IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93> and view the Reference section.

BTADS0098I The probe limitation can be overcome by configuring a Storage Resource agent to manage fabric value.

Explanation

A Storage Resource agent is required to manage the specified fabric. Note that there might be more than one type of agent that can manage the fabric.

Action

Configure a Storage Resource agent to manage the specified fabric. For more information about the types of agents that are available to manage a fabric, go IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93> and view the Reference section.

BTADS0099W The following WWN is not recognized as belonging to a known vendor: value.

Explanation

A unique identifier contained in the WWN was not found and associated with a known vendor.

Action

Contact IBM support for more information about associating the identifier in the WWN with a corresponding vendor.

BTADS0100W Invalid relationships between switches and fabrics were identified. If possible, these relationships will be fixed automatically for the following switches: value.

Explanation

Some switches were identified as belonging to more than one fabric. This issue might occur if two fabric data sources report different principal switches for the same fabric. The firmware on the switches might be the root cause of this problem. One of the principal switches is chosen to be displayed as the fabric WWN and the other switch WWN is not shown as a separate fabric.

Action

Ensure that all switches in your fabric are running the same firmware level. If the problem continues, upgrade the switches to the latest firmware level. If the problem still occurs, contact IBM customer support.

BTADS0101W The discover process that has the Device server run ID value and job ID value completed with one or more warnings.

Explanation

The specified discovery process completed with one or more warnings.

Action

See the probe logs for this run ID to view the warning messages.

BTADS0102E The probe with the run ID *value* completed with errors.

Explanation

Configuration, capacity, and status information couldn't be collected about the resource.

Action

Complete one or more of the following actions:

- [Pro] Check the probe log for related error messages that might help determine the cause of the problem.
- Verify that the resource that is being monitored is up and available.
- Verify that the local area network is available and that the firewall is not preventing network access to product services and data collectors. Contact your firewall administrator to ensure that the required ports are open.
- Restart data collection. If the problem persists, go to the IBM support portal and open a case against IBM Storage Insights or IBM Storage Insights Pro. To help us troubleshoot, include the URL of your product's instance in the problem description.

Related reference

- ➔ [IBM Support Portal](#)
- ➔ [Ports for collecting metadata from storage systems](#)

BTADS0103E No data source is available to probe switch *switch_name*.

Explanation

No data source is configured to probe the specified switch or the data source that is configured is not operational.

Action

Configure a data source to probe the switch. If a data source is already configured, check whether it is operational. Also, check the message and trace log on the Device server for more detail. If you cannot resolve the problem, contact IBM Software Support.

BTADS0104E A timeout occurred while processing the request. Try the request again.

Explanation

The request could not be processed in the time allowed.

Action

Try the request again.

BTADS0105E A response from the data collector was not received within the specified time.

Explanation

The data collector did not respond to the server in the specified time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server. Then try the request again.

BTADS0106E The requested action on agent *agent_name* did not complete because the data collector stopped or is not responding. The request failed with error code *error_code*.

Explanation

The specified scan did not complete.

Action

Verify that the data collector is running and that it can connect to the server. Then try the request again.

BTADS0107W Outband Scanner *outband_scanner_name* on agent *agent_name* failed because of another transaction in progress on the switch.

Explanation

The switch is busy handling another transaction. To avoid this error, wait for the transaction to be done and try to run the probe again.

Action

Check the trace file for more details. Try the operation again.

BTADS0108E Outband Scanner *outband_scanner_name* on agent *agent_name* failed because unexpected data was returned by the switch. Check the trace file for more details.

Explanation

The switch is returning unexpected data. To avoid this error, review recent configuration changes and try to run the probe again.

Action

Check the trace file for more details. Try the operation again.

BTADS0109I Outband Scanner *outband_scanner_name* on agent *agent_name* did not collect zoning data.

Explanation

The switch did not return zoning data. There may be issues with the switch configuration or zoning configuration.

Action

Review recent configuration changes. Try the operation again.

BTADS0110I Outband Scanner *outband_scanner_name* on agent *agent_name* did not pass write capabilities check.

Explanation

The IBM Spectrum Control server could not verify write capabilities either due to an incorrect write community string or an authentication failure. Without correct credentials, zone control functions will not work.

Action

Check and if necessary correct either the write community string or the authentication parameters.

BTADS0111E The probe was unable to collect some details of the switch.

Explanation

A problem was encountered during the probe of the switch. The switch properties might be reported incorrectly until a later probe is completed.

Action

Try the following actions to resolve the problem:

- Check the logs for an indication of the error or exception, and resolve the problem if possible. For information about probe logs, see the Viewing probe logs topic in the IBM Spectrum Control Knowledge Center.
- Try the probe again at a later time. For instructions on how to start a probe, see the Starting probes topic in the IBM Spectrum Control Knowledge Center.
- If the problem continues, contact IBM customer support.

BTADS0112E Error encountered while persisting some data. *value*

Explanation

Some discovered data was not stored in the database due to an error.

Action

See the message and trace file for more information. Contact IBM customer for technical support.

BTADS0113E Error encountered while processing a probe job. value

Explanation

An error encountered while processing a probe job.

Action

See the message and trace file for more information. Contact IBM customer for technical support.

BTADS0114E The information cannot be saved to the database repository.

Explanation

The issue is being investigated and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to the IBM support portal and open a case against IBM Storage Insights or IBM Storage Insights Pro. To help us troubleshoot, include the URL of your product's instance in the problem description.

Related reference

- [IBM Support Portal](#)

BTADS0115E The probe failed when collecting information about the resource. The data collector returned the following error status: value.

Explanation

Configuration, capacity, and status information couldn't be collected about the resource.

Action

Check the probe log for related error messages that might help determine the cause of the problem.

BTAFM0000I Operation op_name processed successfully.

Explanation

A Device server API has been executed successfully.

Action

No action is required.

BTAFM0100I Initializing Collection.

Explanation

Discovery or probe is being initialized.

Action

No action is required.

BTAFM0110I Querying the SMI-S provider.

Explanation

An SMI-S provider query is in process.

Action

No action is required.

BTAFM0113I Collecting for db_table, current_obj of num_objs.

Explanation

This is a discovery or probe status message indicating the Fabric objects for which data is being collected, and the expected number of objects to build.

Action

No action is required.

BTAFM0114I Probing data for switch switch_name.

Explanation

The attributes are being gathered for a particular switch.

Action

No action is required.

BTAFM0115I Probing data for port *port_name*.

Explanation

The attributes are being gathered for a particular port.

Action

No action is required.

BTAFM0150I Storing Information.

Explanation

The discovery or probe is currently storing collected data.

Action

No action is required.

BTAFM0151I The *db_table* of *current_obj num_objs* stored.

Explanation

The discovery or probe is currently storing information. The progress of the discovery or probe is contained in the message.

Action

No action is required.

BTAFM0200I Traversing fabric topology.

Explanation

The discovery or probe is currently traversing CIM classes that are related to switches and ports.

Action

No action is required.

BTAFM0500I The IBM Spectrum Control Device Server service has started successfully.

Explanation

The startup of the IBM Spectrum Control Device Server service has completed without error.

Action

No action is required.

BTAFM0501I The IBM Spectrum Control Device Server service was shut down successfully.

Explanation

The shutdown of the IBM Spectrum Control Device Server service has completed without error.

Action

No action is required.

BTAFM0502I The IBM Spectrum Control Device Server service provides methods to collect, report and configure the fabric hardware.

Explanation

This is a description of the Device Server service component of IBM Spectrum Control.

Action

No action is required.

BTAFM0505I The delete missing function has started.

Explanation

The delete missing function has started to remove objects in the 'missing' state from the database.

Action

No action is required.

BTAFM0506I The delete missing method was processed in milliseconds milliseconds.

Explanation

The delete missing function finished successfully and objects in the 'missing' state were removed from the database.

Action

No action is required.

BTAFM2000W Operation *op_Name* partially processed.

Explanation

A request has been partially executed. Some operations as part of this request have failed.

Action

Check the logs for an indication of an error or exception and contact IBM customer support.

BTAFM2501W Unable to shut down Device Server Service smoothly.

Explanation

An exception occurred while shutting down one or more components.

Action

No further action needed since the service will be forced to shut down.

BTAFM4000E Operation *op_Name* failed.

Explanation

A request has failed. None of the operations that are part of this request were processed successfully.

Action

Check the logs for an indication of an error or exception and contact IBM customer support.

BTAFM4001E An internal error occurred.

Explanation

An internal error occurred during execution.

Action

Check the logs for an indication of an error or exception and contact IBM customer support.

BTAFM4002E Could not get requested information due to an internal error - *errorMessage*

Explanation

An error occurred during the attempt to retrieve information from the database.

Action

Check the health of the database. Then, rerun the discovery and probe process, and then run a data collection task.

BTAFM4100E Mandatory parameter *parameter_Name* is missing.

Explanation

A service has been called without a required parameter.

Action

Check the mandatory parameters and retry the operation.

BTAFM4101E Invalid parameter *parameter_name*.

Explanation

A service has been called with an invalid parameter.

Action

Check the valid parameters and retry the operation.

BTAFM4103E Entity *entity_name* was not found.

Explanation

The database entity that was specified was not found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4104E Attribute *attribute_name* was not found.

Explanation

The database column specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4105E Computer *computer_name* was not found.

Explanation

No computer system was found that corresponds to the key that was passed in as an input parameter. The computer system specified as a parameter can not be found.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4106E Fabric *fabric_name* was not found.

Explanation

The fabric specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4107E Switch *switch_name* was not found.

Explanation

The switch specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4108E Port *port_name* was not found.

Explanation

The port specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4109E Zone set *zoneset_name* was not found.

Explanation

The zone set specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4110E Zone zone_name was not found.

Explanation

The zone specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4111E Zone alias zone_alias_name was not found.

Explanation

The zone alias specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4112E Zone member zone_member_name was not found.

Explanation

The zone member specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4113E Subsystem subsystem_name was not found.

Explanation

The subsystem specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4114E Host Bus Adapter HBA_name was not found.

Explanation

The Host Bus Adapter specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4115E Node node_name was not found.

Explanation

The node specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4116E Link from port from_port_name to port to_port_name was not found.

Explanation

The link specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4117E Hub hub_name was not found.

Explanation

The hub port specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4118E Router router_name was not found.

Explanation

The router specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4119E Bridge *bridge_name* was not found.**Explanation**

The bridge specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4120E LUN *LUN_name* was not found.**Explanation**

The LUN specified as a parameter can not be found in the database.

Action

Rerun the discovery and probe process, and then run a data collection task.

BTAFM4140E Agent *Agent_name* was not found.**Explanation**

The agent specified as a parameter can not be found in the database.

Action

Open the agent configuration panel and check on the status of the agents.

BTAFM4141E Scanner *scanner_name* on agent *agent_name* was not found.**Explanation**

The scanner specified as a parameter can not be found in the database.

Action

Open the agent configuration panel and check on the status of the agents.

BTAFM4142W Agent *agent_name* was ignored because the switch *switch_name* was probed by agent *agent1_name*.**Explanation**

The agent specified was ignored because another, more appropriate one, was used for the same WWN.

Action

No action is required.

BTAFM4150E *Indexed properties `property_name` don't match.*

Explanation

Indexed input parameters different sizes.

Action

Make sure that all the indexed input parameters are the same size.

BTAFM4180E *Agent to gather sensor and event data is not available for the switch `switch_name`.*

Explanation

The switch event and sensor data is only available through SNMP agents.

Action

Make sure you have configured the correct IP address for the switch for which you want to obtain sensor and event data.

BTAFM4200E *Credentials not found.*

Explanation

A problem occurred while accessing the user credentials.

Action

Make sure the database is running and that the IBM Spectrum Control setup completed successfully.

BTAFM4300E *The connection to the SMI agent for switch `switch_name` could not be made.*

Explanation

The creation of the SMI agent client failed.

Action

Ensure that the SMI agent is running and that the correct user ID and password have been set for this SMI agent in the user interface panels.

BTAFM4301E The invocation of CIM method *method_name* failed on SMI-S provider *SMI-S provider name*. The return code is *return_code*.

Explanation

The CIM method that was invoked on the specified SMI-S provider failed.

Action

Check the health of the SMI-S provider. Check the trace log for an indication of an error or exception and contact IBM customer support.

BTAFM4302E The invocation of CIM method *method_name* failed on SMI-S provider *SMI-S provider name* with the following exception text: *exception_text*.

Explanation

The CIM method that was invoked on the specified SMI-S provider failed.

Action

Check the health of the SMI-S provider. Check the trace log for an indication of an error or exception and contact IBM customer support.

BTAFM4303E Received unexpected values from SMI-S provider *SMI-S provider name* .

Explanation

The SMI-S provider returned values that are unexpected and might indicate that the SMI-S provider is not working correctly.

Action

Using the CIMBrowser, make sure the SMI-S provider has the correct information. If not, fix the problem on the SMI-S provider. Otherwise, check the logs for an indication of an error or exception and contact IBM customer support.

BTAFM4304E SMI agent *SMI agent name* can not contact switch *switch_name*.

Explanation

The SMI agent can not contact the switch that it manages.

Action

Check the SMI agent logs to determine why it cannot contact the switch.

BTAFM4305E The CIM method *method_name* is not supported on the switch *switch_name*.

Explanation

The switch does not support the specified function.

Action

No action is required.

BTAFM4306E Could not create connection to SMI-S provider *SMI-S provider name*. Reason: *reason*.

Explanation

A connection to the SMI-S provider could not be established.

Action

Check the health of the SMI-S provider. Check the trace log for an indication of an error or exception and contact IBM customer support.

BTAFM4307E The username *user_name* or password is wrong on SMI-S provider *SMI-S provider name*.

Explanation

The username or password specified for the SMI-S provider are not valid.

Action

Specify the correct username/password combination for the SMI-S provider.

BTAFM4308I Could not create connection to SMI-S provider *SMI-S provider name*. Reason: *reason*. An alternate SMI-S provider will be used.

Explanation

A connection to the SMI-S provider could not be established. An alternate SMI-S provider has been identified to be used to manage the fabric or switch.

Action

Ensure that the server and the SMI-S provider service are running properly.

Check the dmSvcTrace.log file for an indication of the error or exception, and for the URL of the problematic SMI-S provider. This file is located in installation_directory\IBM\TPC\device\log. Contact IBM customer support.

BTAFM4501E No agent is available to configure the zoning on the fabric with ID *fabric_name*.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric. An agent to change the zone configuration was not found.

Action

Check the health of all agents for the fabric. Check that the user id and password are valid.

BTAFM4502E The fabric with ID *fabric_name* is currently locked by another client of IBM Spectrum Control.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric. The fabric is currently reserved by another client of IBM Spectrum Control. This fabric lock is used to prevent other clients of this instance of IBM Spectrum Control from attempting concurrent zone configuration changes to the same fabric.

Action

Try the zone configuration again after the other client of IBM Spectrum Control has finished.

BTAFM4503E A token for fabric *fabric_name* has expired for client *client_name*.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric. The token specified has expired.

Action

The client must call reserve again to get a new token.

BTAFM4504E The transaction for fabric *fabric_name* has expired.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric. The transaction has expired.

Action

Start a new transaction to continue the control operations.

BTAFM4505E Another transaction is in progress for fabric *fabric_name*.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric. Another transaction is already in progress.

Action

Wait until the other client finishes before starting a new transaction.

BTAFM4506E Zone set *zoneset_name* already exists.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric because a zone set already exists with the specified name.

Action

Retry the operation with a unique zone set name.

BTAFM4507E Zone *zone_name* already exists.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric because a zone already exists with the specified name.

Action

Retry the operation with a unique zone name.

BTAFM4508E Zone alias *zone_alias_name* already exists.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric because a zone alias already exists with the specified name.

Action

Retry the operation with a unique zone alias name.

BTAFM4509E Zone member *zone_member_name* already exists.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric because a zone member already exists with the specified name.

Action

Retry the operation with a unique zone member name.

BTAFM4510E Another job is in progress for fabric *fabric_name*.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric. Another job is already in progress.

Action

Wait until the other job finishes before starting a new transaction.

BTAFM4550E The Device Server encountered an error accessing the database.

Explanation

The Device Server service cannot access data stored in the database.

Action

Check the status of the database. Also, check the logs for an indication of an error or exception and contact IBM customer support.

BTAFM4600E Unable to start the Device Server service.

Explanation

An exception occurred while starting up one or more components.

Action

If this is a new installation, make sure the install procedures have been followed. Also, check the trace log for an indication of an error or exception and contact IBM customer support.

BTAFM5000E Step failed after collecting Count of collected entities entities for switch *switch* where entities exist. Continuing with next step.

Explanation

During a probe job one of the collection steps has failed. This entity type is probably not entirely collected. The probe will continue to execute the subsequent collection steps.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5001E No set of fabrics or switches was defined for this probe.

Explanation

No set of fabric WWNs or switch WWNs was passed as an input argument to the probe.

Action

If this error occurs during a scheduled probe or a probe that starts immediately, reschedule the probe.

If this error occurs in the message logs for a probe that was run by an event, you can ignore the error if no other problems are observed.

BTAFM5002E The SMI agents SMIURL returned an error or can no longer contact the switches.

Explanation

When a fabric uses a data source from an SMI agent, the fabric probe uses the data source to try to rediscover the fabrics and switches. A problem was encountered during this step. The SMI agents either returned an error, or the SMI agents can no longer contact the switches.

Action

Check that the SMI agent service is running. Check the SMI agent logs and UI for problems, for example, problems with contacting the switches. Check for any general problems on the SMI agent system. For example, check the memory available on the system, and check that the disk drive space is sufficient. If you cannot resolve the problem, contact IBM Software Support.

BTAFM5003E Requests to an SMI agent did not correctly collect a set of switches for fabric fabric identity.

Explanation

The probe of an SMI agent did not collect a set of switches for the fabric. This may indicate that the SMI agent was not able to contact the switches during the probe.

Action

Check that the SMI agent service is running. Check the SMI agent logs and UI for problems, for example, problems with contacting the switches. Check for any general problems on the SMI agent system. For example, check the memory available on the system, and check that the disk drive space is sufficient. If you cannot resolve the problem, contact IBM Software Support.

BTAFM5004E No switch retrieved from the SMI agent for fabric *fabric identity*.

Explanation

During a probe job associator call from Fabric to Switch returns nothing.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5005E No switch found for fabric *fabric identity*.

Explanation

During a probe job no switch found for fabric.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5006E No switch retrieved from database.

Explanation

During a probe job cannot retrieve switch from database.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5007E Failed to get CIM entity for fabric *fabric_name*.

Explanation

Failed to get fabric CIM entity.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5008E Failed to get CIM entity for switch *switch_name*.

Explanation

Failed to get switch CIM entity.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5009E Failed to enumerate CIM entity *Entity class name*.

Explanation

Failed to enumerate CIM entity.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5010E SMI-S provider is not available.

Explanation

SMI-S provider is not available.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5011E Failed to get blade for switch *Switch name*.

Explanation

Failed to get blade for switch.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5012E Failed to get physicalpackage for blade with slot number *Blade slot name*.

Explanation

Failed to get blade physicalpackage.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5013E Blade serial number is NULL.

Explanation

Blade serial number is NULL.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5014E Step failed after collecting Count of collected entities entities for fabric fabric where entities exist. Continuing with next step.

Explanation

During a probe job one of the collection steps has failed. This entity type is probably not entirely collected. The probe will continue to execute the subsequent collection steps.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5015E Data source could not be retrieved from the IBM Spectrum Control database for fabric fabric where data source exists.

Explanation

Data source could not be retrieved from the IBM Spectrum Control database.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5016E The selected data source could not be contacted for fabric fabric where data source exists.

Explanation

The inactive data source could not be contacted.

Action

Make sure the selected data source is up running. If not, select another data source and re-run the probe.

BTAFM5017E Failed to get fabric for switch *Switch name*.**Explanation**

Failed to get fabric for switch.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5018E Failed to get CIM entity for port *port_name*.**Explanation**

Failed to get port CIM entity.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5019E Failed to get switch for port *port_name*.**Explanation**

Failed to get switch for port.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5020E Failed to get blade for port *port_name*.**Explanation**

Failed to get blade for port.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5021E Failed to get CIM entity for blade *blade_name*.**Explanation**

Failed to get blade CIM entity.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5022E Failed to get switch for blade *blade_name*.

Explanation

Failed to get blade switch.

Action

Look for prior error messages in this log and review the traceFabric.log file. If the problem persists, contact IBM Support.

BTAFM5023E Failed to discover Fabric and Switch.

Explanation

Failed to discover Fabric and Switch.

Action

Look for prior error messages in this log and review the device discover log file. If the problem persists, contact IBM Support.

BTAFM5024E The data source for switch *switch_name* was not retrieved from the database repository.

Explanation

The data source for the switch was not retrieved from the database repository. This error might occur if the database repository is unavailable, if an internal error such as an SQL exception occurred, or if the data source for the switch was removed.

Action

Check the log for the probe for previous error messages that might help determine the cause of the problem. Review the trace log for the fabric.

If the problem continues, contact IBM Software Support.

BTAFM0600I Count of collected entities blades collected for switch *switch* where entities exist.

Explanation

A probe job has collected the given number of blades so far.

Action

No action is required.

BTAFM0601I Starting collection of switch blades for switch switch identifier.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0602I Collection of switch blades completed. Count of collected entities entities collected in total for switch switch identifier.

Explanation

A probe job has collected the given number of entities.

Action

No action is required.

BTAFM0603I Starting collection of switch fcports for switch switch identifier.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0604I Collection of switch fcports completed. count of collected entities entities collected in total for switch switch identifier.

Explanation

A probe job has collected the given number of entities.

Action

No action is required.

BTAFM0605I Start probing switch entities switches.

Explanation

A probe job starts to probe the given number of switch entities.

Action

No action is required.

BTAFM0606I Start topology probing for fabric fabric entity.

Explanation

A topology probe job starts to probe the given fabric entity.

Action

No action is required.

BTAFM0609I Count of entities fcports collected for switch switch where entities exist.

Explanation

A probe job has collected the given number of fcports so far.

Action

No action is required.

BTAFM0614I The probe task is to probe topology and zone. The probe algorithm is CIM association.

Explanation

The fabric topology and zone probe algorithm is to use a series of associator requests to the SMI-S provider to collect fabric inventory.

Action

No action is required.

BTAFM0616I The probe policy involves discovering segmented or merged fabrics.

Explanation

The probe policy will discover segmented or merged fabrics.

Action

No action is required.

BTAFM0617I The probe policy doesn't involve discovering segmented or merged fabrics.

Explanation

The probe policy will not discover segmented or merged fabrics.

Action

No action is required.

BTAFM0618I The probe task is to probe topology. The probe algorithm is CIM association.

Explanation

The fabric topology probe algorithm is to use a series of associator requests to the SMI-S provider to collect fabric inventory.

Action

No action is required.

BTAFM0620I Start zone probing for fabric *fabric entity*.

Explanation

A zone probe job starts to probe the given fabric entity.

Action

No action is required.

BTAFM0621I Starting collection of zone set for switch *switch entity*.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0622I Starting collection of zone for switch switch entity.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0623I Starting collection of zone alias for switch switch entity.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0624I Starting collection of zone member from zone alias for switch switch entity.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0625I Starting collection of zone member and zone alias from zone for switch switch entity.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0626I Starting collection of zone member from zone for switch switch entity.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0627I Starting collection of zone set for fabric fabric entity.

Explanation

A probe job has begun to collect entities from the given fabric.

Action

No action is required.

BTAFM0628I Count of collected entities zone sets collected.

Explanation

A probe job has collected the given number of zone sets so far.

Action

No action is required.

BTAFM0629I Collection of zone set completed. Count of collected entities entities collected in total for fabric fabric entity.

Explanation

A probe job has collected the given number of entities.

Action

No action is required.

BTAFM0630I Starting collection of zone for fabric fabric entity.

Explanation

A probe job has begun to collect entities from the given fabric.

Action

No action is required.

BTAFM0631I Count of collected entities zones collected.

Explanation

A probe job has collected the given number of zone sets so far.

Action

No action is required.

BTAFM0632I Collection of zone completed. Count of collected entities entities collected in total for fabric fabric entity.

Explanation

A probe job has collected the given number of entities.

Action

No action is required.

BTAFM0633I Starting collection of zone alias for fabric fabric entity.

Explanation

A probe job has begun to collect entities from the given fabric.

Action

No action is required.

BTAFM0634I Count of collected entities zone aliases collected.

Explanation

A probe job has collected the given number of zone sets so far.

Action

No action is required.

BTAFM0635I Collection of zone alias completed. Count of collected entities entities collected in total for fabric fabric entity.

Explanation

A probe job has collected the given number of entities.

Action

No action is required.

BTAFM0636I Starting collection of zone member from zone alias for fabric fabric entity.

Explanation

A probe job has begun to collect entities from the given fabric.

Action

No action is required.

BTAFM0637I Starting collection of zone member and zone alias from zone for fabric fabric entity.

Explanation

A probe job has begun to collect entities from the given fabric.

Action

No action is required.

BTAFM0638I Starting collection of zone member from zone for fabric fabric entity.

Explanation

A probe job has begun to collect entities from the given fabric.

Action

No action is required.

BTAFM0639I Collection of zone member completed. Count of collected entities entities collected in total for fabric fabric entity.

Explanation

A probe job has collected the given number of entities.

Action

No action is required.

BTAFM0640I Zone probe will discover both active and inactive zone definitions at selected data source datasource name for zone probe.

Explanation

Zone probe job discovers both active and inactive zone definitions on a selected data source.

Action

No action is required.

BTAFM0641I Zone probe will discover only active zone sets at data source datasource name for zone probe.

Explanation

Zone probe job discovers only active zone sets on an alternative data source.

Action

No action is required.

BTAFM0654I The port is not switch port.

Explanation

This is not switch port.

Action

No action is required.

BTAFM0655I The switch profile doesn't support this switch `switch_name`. No further process to probe this switch.

Explanation

This is not a switch registered profile supported switch. No further process to probe this switch.

Action

No action is required.

BTAFM0656I Start enumerating entity of association between fabric and zone set at selected data source `Url entity`.

Explanation

Start enumeration collection.

Action

No action is required.

BTAFM0657I Start enumerating entity of association between fabric and zone at selected data source `Url entity`.

Explanation

Start enumeration collection.

Action

No action is required.

BTAFM0658I Start enumerating entity of association between fabric and zone alias at selected data source `Url entity`.

Explanation

Start enumeration collection.

Action

No action is required.

BTAFM0659I Start enumerating entity of association between switch and zone set at selected data source Url entity.

Explanation

Start enumeration collection.

Action

No action is required.

BTAFM0660I Start enumerating entity of association between switch and zone at selected data source Url entity.

Explanation

Start enumeration collection.

Action

No action is required.

BTAFM0661I Start enumerating entity of association between switch and zone alias at selected data source Url entity.

Explanation

Start enumeration collection.

Action

No action is required.

BTAFM0662I Start enumerating associations between virtual fabric and zoning entities at selected data source Url entity.

Explanation

Start enumeration collection.

Action

No action is required.

BTAFM0663I Starting collection of switch control processor blades for switch *switch identifier*.

Explanation

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0664I Count of collected entities control processor blades collected for switch *switch where entities exist*.

Explanation

A probe job has collected the given number of control processor blades so far.

Action

No action is required.

BTAFM0665I Collection of switch control processor blades completed. Count of collected entities entities collected in total for switch *switch identifier*.

Explanation

A probe job has collected the given number of entities.

Action

No action is required.

BTAFM0666I Checksums for the active and defined Zone Database could not be updated for fabric entity.

Explanation

Zone Database Checksums are not available for the fabric, or an error occurred while processing the Checksums. These Checksums are used only as a performance enhancement to quickly determine whether the Zone Database on the fabric has changed. This message is expected in certain scenarios. Since the Checksums cannot be saved, the Zone Database will be collected from the SMI-S provider during the next Probe.

Action

No action is required.

BTAFM0667E Job id or request id is missing for a SRA job that is been processed.

Explanation

Server is attempting to process a job for which response was received from SRA. Job id and/or request id is missing and so the response cannot be matched with a server job that is currently running.

Action

No action is required.

BTAFM0668E Command and/or job timestamp is missing for job id with request id .

Explanation

Command and/or job timestamp is missing for a SRA job and so the job cannot be processed successfully.

Action

No action is required.

BTAFM0669I job id with request id was is not found. Device server may have been restarted after job was created.

Explanation

Job was notfound and will not be processed. Device server may have been restarted after the job was created.

Action

No action is required.

BTAFM0670E could not retrieve output file for job id with request id .

Explanation

Unable to retrieve output file from agent for specified job. Job will be considered failed.

Action

No action is required.

BTAFM0671E Another probe of fabric *The Name+Nameformat of the fabric is already in progress.*

Explanation

Another probe for the same fabric was already started and is in progress, so the new probe cannot be started.

Action

Start again the new probe only after the previous one is finished.

BTAFM0672E Device server is not registered with agent manager. Will not be able to invoke scanner on host .

Explanation

The device server is unable to register with the agent manager using the credentials provided through the agent manager registration panel.

Action

Verify the credentials specified through the agent manager registration configuration panel. Also verify the connectivity between hosts running device server and agent manager if they are hosted on different servers.

BTAFM0673E There are no agents that are currently available to probe fabric .

Explanation

There are no agents configured to probe specified fabric or the agents configured are not operational.

Action

Configure agents to probe fabric. If agents are already configured, check if they are operational.

BTAFM0674W No fabric found for event source that is associated with switch with IP address .

Explanation

No fabric was found for event resource generated by the switch.

Action

No action is required.

BTAFM0675E Unable to start parsing of SRA fabric probe data for SRA job id request id file name .

Explanation

An error was encountered while attempting to start parsing of fabric probe data returned by SRA for specified job id and request id.

Action

Check if there are any connectivity issues with the SRA. Also, check the device server message and trace log for more detail. If the problem continues, contact IBM support.

BTAFM0676E Error parsing SRA fabric probe data for SRA job id request id file name .

Explanation

An error was encountered while parsing of fabric probe data returned by SRA for specified job id and request id.

Action

Check the device server message and trace log for more detail. If the problem continues, contact IBM support.

BTAFM0677E Unable to connect to SNMP port (another application may already be connected and forwarding messages) .

Explanation

The device server is trying to connect to port for all SNMP Traps.

Action

Check to make sure another process is not listen on the port.

BTAFM0678I The Name of the switch switch was removed.

Explanation

This message is for informational purposes only.

Action

No further action is required.

BTAFM0679I The *The Name+Nameformat of the fabric fabric was removed.*

Explanation

This message is for informational purposes only.

Action

No further action is required.

BTAFM0680E The *Name of the switch switch was not removed because it is not missing.*

Explanation

There are Data Sources configured managing this switch. Only switches which are no more managed by any Data Source can be removed.

Action

Remove all Data Sources which are managing this switch.

BTAFM0681E The *Name+Nameformat of the fabric fabric was not removed because it is not missing.*

Explanation

There are Data Sources configured managing switches of this fabric. The fabric can only be removed after all Data Sources which are managing switches of this fabric are removed.

Action

Remove all Data Sources which are managing switches of this fabric.

BTAFM0682E An error occurred while checking for access to the database to save new zoning information for fabric to the database.

Explanation

The device server is unable to save new zoning information to the database because an error occurred while checking for other currently running jobs that might cause conflicts.

Action

Try the operation again later. If the problem continues, restart the device server.

BTAFM0683E Unable to access the database to save zoning information for fabric . Another job is currently saving new zoning information to the database for the same fabric.

Explanation

The device server cannot save new zoning information to the database because another job is saving new zoning information to the database for the same fabric. A maximum wait timeout occurred while attempting to access the database to save new zoning information for this fabric.

Action

Try the operation again later. If the problem continues, contact IBM Software Support.

BTAFM0684I The job is waiting to access the database to save new zoning information for fabric . Another job is currently saving zoning information to the database for the same fabric.

Explanation

The device server is waiting to save new zoning information to the database because another job is currently saving new zoning information for the same fabric. The job will continue when access to the database is available.

Action

No action is required.

BTAFM0685W Host/IP Address is not a switch.

Explanation

Host or IP address is not a switch.

Action

Please make sure to type in the correct host or IP address.

BTAFM0686W Switch is not a supported switch.

Explanation

Switch being processed is not a supported switch.

Action

Please make sure to specify a supported switch.

BTAFM0687W The switch does not respond to SNMP queries .

Explanation

Switch does not respond to SNMP queries.

Action

Please make sure to specify a valid switch. Check to see if the switch is configured to respond to SNMP queries.

BTAFM0688W Cannot communicate with host or IP address .

.

Explanation

Not able to communicate with the specified host or IP address.

Action

Please make sure to specify a valid fully qualified hostname or IP address.

BTAFM0689W No ports were discovered for the switch .

Explanation

The probe did not discover any ports for the switch. The switch cannot be monitored for performance information.

Action

Make sure the switch is correctly configured with the SMI agent.

BTAFM0690I Collection of data from trunks is completed. Data was collected from count of collected entities trunks .

Explanation

A probe job has collected data from trunks in your storage environment.

Action

No action is required.

BTAFM0691I Starting collection of data from trunks for switch *switch identifier*.**Explanation**

A probe job has begun to collect entities from the given switch.

Action

No action is required.

BTAFM0692I Count of entities trunks collected for switch *switch where entities exist*.**Explanation**

A probe job has collected the given number of trunks so far.

Action

No action is required.

BTAFM0692E A response from the data collector was not received within the specified time.**Explanation**

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server. Then try the request again.

BTAFM0693E A response from the data collector was not received. The request failed with return code *return_code***Explanation**

The specified scan did not complete.

Action

None.

BTAFM0694W Zoning data cannot be collected because there is a transaction in progress on the switch key

Explanation

The specified scan did not complete.

Action

None.

BTAFM0695E The switch key is returning unexpected data.

Explanation

The specified scan did not complete.

Action

None.

BTAFM0696E Zone set *zoneset_name* is already active.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric because a zone set with the specified name is already active.

Action

Try the operation again with a different zone set name.

BTAFM0697E Zone set *zoneset_name* is already inactive.

Explanation

A failure occurred during an attempt to configure zoning on the specified fabric because a zone set with the specified name is already inactive.

Action

Try the operation again with a different zone set name.

BTAFM0698E On the switch *switch_name* VSAN *vsan_name* was not found.

Explanation

The VSAN specified as a parameter can not be found in the switch.

Action

Try the operation again with a different VSAN name.

BTAFM0699E The switch *key* did not return zoning data.

Explanation

The switch did not return zoning data. There may be issues with the switch configuration or zoning configuration.

Action

Review recent configuration changes and try to run the probe again.

BTAFM0700E Duplicate entries for the same switch: *switch*.

Explanation

The list of switches contains duplicate entries. Either a DNS name matches an IP address or there are duplicate DNS names or IP addresses.

Action

Ensure the list of switches contains only one entry per switch.

BTAFM0701E Current active full zone configuration is not synchronized with the zone configuration on the switch *switch_name* for VSAN *vsan_name* .

Explanation

The active zone configuration for the VSAN does not match the configuration on the switch. The zoning action will not be performed.

Action

Activate the zone set using the switch command line or management application. Activating the zone set on a switch synchronizes the active zone configuration for the VSAN with the zone configuration of the switch.

BTAFM0702E You cannot monitor Brocade Access Gateway switches without Network Advisor.

Explanation

You must use Network Advisor to monitor Brocade Access Gateway switches, also known as NPV switches. You cannot use SNMP agents as the data source for Brocade Access Gateway switches, you must use SMI agents that are installed with Network Advisor.

Action

Use Network Advisor to monitor Brocade Access Gateway switches.

BTAFM0703I Waiting for probes of other Access Gateway switches to complete.

Explanation

An Access Gateway switch is a Brocade switch that is operating in Access Gateway mode. Only one Access Gateway switch at a time can be probed by using the same SMI agent.

A probe of an Access Gateway switch was requested, but a probe of another Access Gateway switch is already in progress. The current probe waits until the first probe is completed. If there are no probes of other Access Gateway switches in progress, the current probe proceeds without any wait.

Brocade switches in Access Gateway mode are also known as NPV switches.

Action

No action is required.

BTAFM0704W Distributing zone configuration across all the switches for VSAN vsan_name did not succeed on the switch switch_name .

Explanation

The active zone configuration for the VSAN does not match the configuration on the switch. The zoning action will not be performed.

Action

Activate the zone set using the switch command line or management application. Activating the zone set on a switch synchronizes the active zone configuration for the VSAN with the zone configuration of the switch.

BTAFM0705W Zone data collection after zone changes were made failed on the switch switch_name .

Explanation

Zone changes were successful. Zone data collection to update the latest zone changes failed. The most current zone information will not be reported.

Action

Run a data collection for the failing switch. If the problem persists, contact IBM Software Support.

BTAFM0706E The fabric probe was unable to collect some details of the blades on the switches.

Explanation

A problem was encountered during the probe of the switch blades. The switch blade properties might be reported incorrectly until a later probe is completed.

Action

Try the following actions to resolve the problem:

- Check the logs for an indication of the error or exception, and resolve the problem if possible. For information about probe logs, see the Viewing probe logs topic in the IBM Spectrum Control Knowledge Center.
- Try the probe again at a later time. For instructions on how to start a probe, see the Starting probes topic in the IBM Spectrum Control Knowledge Center.
- If the problem continues, contact IBM customer support.

BTAFM0707I You cannot use IBM Spectrum Control to make zoning changes for provisioning on switch *switch_name*.

Explanation

A check of the ability to perform zone control operations on the switch has failed. Zone control operations through IBM Spectrum Control are not possible on this switch.

This affects the Provisioning feature.

Action

You can ignore this message if:

- You do not plan to use the provisioning feature of IBM Spectrum Control.
- You plan to use the provisioning feature of IBM Spectrum Control for volume creation and assignment but not for zoning.

Otherwise, check that the model of the switch supports fibre channel zone control, and check that the switch is configured properly for zone control.

BTAFM0708E The probe was unable to collect some details of the switches.

Explanation

A problem was encountered during the probe. The fabric or switch properties might be reported incorrectly until a later probe is completed.

Action

Try the following actions to resolve the problem:

- Check the logs for an indication of the error or exception, and resolve the problem if possible. For information about probe logs, see the Viewing probe logs topic in the IBM Spectrum Control Knowledge Center.
- Try the probe again at a later time. For instructions on how to start a probe, see the Starting probes topic in the IBM Spectrum Control Knowledge Center.
- If the problem continues, contact IBM customer support.

BTAQE1107E InbandScanHandler failed to start InbandScanner scanner name on managed host target.

Explanation

The InbandScanner scans managed hosts for device information and displays that information in the network topology display. The InbandScanner is necessary for providing accurate information about your SAN.

Action

Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTAQE1108E InbandScanHandler failed to get callback information for InbandScanner scanner name on managed host target.

Explanation

The InbandScanHandler service was unable to receive device information from the scanner. This can cause the network topology displays to show inaccurate SAN data. Other services will be affected as well.

Action

Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTAQE1112E During an outband scan, the scanner scanner name was unable to identify the target host target.

Explanation

The target host might have an invalid IP address.

Action

Verify the IP address of the target managed host. Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTAQE1113E Unable to invoke an Outband scan scanner name on target target.

Explanation

IBM Spectrum Control was unable to start an outband scan for Fabric. There might be problems with the SAN connectivity.

Action

Make sure the SAN is working properly. Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTAQE114E OutbandScannerHandler received invalid callback information for Outband scanner *scanner name* on target *target*.

Explanation

The information received from an outband scan appears to be invalid.

Action

Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTAQE1115E The outband scanner *scanner name* did not return the SAN ID on target *target*.

Explanation

The switch vendor may not support FE MIB or certain fields in the FC MGMT MIB.

Action

Check the Tivoli Support Web site to see if the switch is supported by IBM Spectrum Control. Get the SANQueryEngine service trace information from the trace log and contact IBM customer support.

BTAVM0001I The operation *Name of the operation* processed successfully.

Explanation

The operation on the Virtualization Manager completed successfully. No error condition encountered.

Action

No action required.

BTAVM0002I The Web service call *Name of the operation* processed successfully.

Explanation

The Web service call from the Virtualization Manager completed successfully. No error condition encountered.

Action

No action required.

BTAVM0003I Data source *Name of the datasource* successfully added.

Explanation

The data source has been added successfully.

Action

No action required.

BTAVM0004I Data source *Name of the datasource* successfully deleted.

Explanation

The data source has been deleted successfully.

Action

No action required.

BTAVM0005I Data source *Name of the datasource* successfully modified.

Explanation

The data source has been modified successfully.

Action

No action required.

BTAVM0006I Discovery on data source *Name of the datasource* has started.

Explanation

The discovery on the data source collects the hypervisors managed by that data source.

Action

No action required.

BTAVM0007I Discovery on data source *Name of the datasource* completed successfully.

Explanation

The discovery on the data source completed successfully.

Action

No action required.

BTAVM0008I Probe of hypervisor *Name of the Hypervisor* has started.

Explanation

The probe collects configuration details of the hypervisor.

Action

No action required.

BTAVM0009I Probe of hypervisor *Name of the Hypervisor* completed successfully.

Explanation

The probe of the hypervisor completed successfully.

Action

No action required.

BTAVM0010I A connection test to data source *Name of the data source* has started.

Explanation

A connection test to the data source has started.

Action

No action required.

BTAVM0011I The Connection test to data source *Name of the data source* completed successfully.

Explanation

Connectivity to the data source was validated successfully.

Action

No action required.

BTAVM0012I Hypervisor *Name of the Hypervisor discovered/rediscovered.*

Explanation

The hypervisor has been discovered.

Action

No action required.

BTAVM0013I Discovery: Hypervisor *Name of the hypervisor will not be discovered as it is managed by another data source.*

Explanation

The hypervisor is managed by another data source.

Action

No action is required.

BTAVM0014I Discovery: Hypervisor *Name of the hypervisor will not be discovered as it itself is registered as a data source.*

Explanation

The hypervisor is registered directly as a data source.

Action

No action is required.

BTAVM0015I Collection of the physical storage configuration for hypervisor *Name of the hypervisor has started.*

Explanation

The probe collects physical storage configuration details of the hypervisor.

Action

No action is required.

BTAVM0016I Collection of the physical storage configuration for hypervisor *Name of the hypervisor* completed successfully.

Explanation

The probe of the hypervisors physical storage configuration completed successfully.

Action

No action is required.

BTAVM0017I Collection of the logical storage configuration for hypervisor *Name of the hypervisor* has started.

Explanation

The probe collects logical storage configuration details of the hypervisor .

Action

No action is required.

BTAVM0018I Collection of the logical storage configuration for hypervisor *Name of the hypervisor* completed successfully.

Explanation

The probe of the hypervisors logical storage configuration completed successfully.

Action

No action is required.

BTAVM0019I Collection of the virtual machines configuration for hypervisor *Name of the hypervisor*

has started.

Explanation

The probe collects virtual machines configuration details of the hypervisor.

Action

No action is required.

BTAVM0020I Collection of the virtual machines configuration for hypervisor *Name of the hypervisor* completed successfully.

Explanation

The probe of the hypervisors virtual machines configuration completed successfully.

Action

No action is required.

BTAVM0021I The probe of *name of the hypervisor* found *number of physical disks* physical disks.

Explanation

The probe collects the number of physical disks found in the hypervisors physical storage configuration.

Action

No action is required.

BTAVM0022I The probe of *name of the hypervisor* found *number of logical volumes* logical volumes.

Explanation

The probe collects the number of logical volumes found in the hypervisors logical storage configuration.

Action

No action is required.

BTAVM0023I The probe of *name of the hypervisor* found *number of virtual machines* virtual machines.

Explanation

The probe collects the number of virtual machines found in the hypervisors virtual machines configuration.

Action

No action is required.

BTAVM0024I *The Name of the hypervisor hypervisor was removed.*

Explanation

This message is for informational purposes only.

Action

No further action is required.

BTAVM0025I *vmWare Cluster Name of the Cluster discovered/rediscovered.*

Explanation

The cluster has been discovered.

Action

No action required.

BTAVM1301I *The probe of name of the hypervisor could collect partial information only for the disk with the device name Device name of the disk.*

Explanation

The disk attributes number of heads, number of sectors and number of cylinders are not available.

Action

No action is required.

BTAVM1302I *LUN correlation is not supported for disk with device name Device name of the disk, vendor: Vendor name, model: model name, for hypervisor hypervisor name.*

Explanation

LUN correlation is not supported for this disk. LUN definition data for this disk will not be available.

Action

Refer to the IBM Spectrum Control Supported Product List.

BTAVM1503E An internal error occurred: *Text describing the internal error.*

Explanation

An internal operating error occurred. Any exceptions are logged in the traceTPCDeviceServer.log file. This log file resides in the installation subdirectory device/log.

Action

Review the traceTPCDeviceServer.log file. If the problem persists, contact IBM Technical Support.

BTAVM2001E The mandatory parameter *Name of the mandatory parameter which is missing* is missing.

Explanation

A mandatory parameter for a Virtualization Manager operation is missing.

Action

Contact IBM Technical Support.

BTAVM2002E Invalid parameter *Name of the parameter which was invalid.*

Explanation

A parameter passed to the Virtualization Manager is invalid.

Action

Contact IBM Technical Support.

BTAVM2003E A database error was encountered during database query or insert.

Explanation

Data could not be retrieved from or inserted into the database. There may be a problem with database access or the database is not available.

Action

Try the action again. If the problem persists, check the Device server log files for error messages that might help determine the problem.

BTAVM2004E Cannot connect to the database repository.

Explanation

IBM Spectrum Control cannot connect to the database repository. There may be a problem with database access or the database is not available.

Action

Verify that the database service is up and running. Verify that you have a network connection to the computer on which the database repository is located. Try the action again.

BTAVM2006E The operation *Name of the operation that failed* failed for the following reason: *Reason of the failure*.

Explanation

The operation on the Virtualization Manager failed.

Action

Contact IBM Technical Support.

BTAVM2007E The Web service call *Name of the operation* failed for the following reason: *Reason of the failure*.

Explanation

The Web service call from the Virtualization Manager has failed.

Action

Contact IBM Technical Support.

BTAVM2008E The product *Name of the unsupported product* is not supported.

Explanation

This virtualization product is not supported by IBM Spectrum Control.

Action

Use a supported virtualization product. Refer to the IBM Spectrum Control Supported Product List.

BTAVM2010E The user name or password is invalid for Address of the host

Explanation

The user name or password is not valid.

Action

Enter the correct user name and password. Try the action again.

BTAVM2011E The operation *Name of the timed out operation* could not complete within the time limit of *Timeout threshold in milliseconds* milliseconds.

Explanation

For each service method invocation a timeout is defined. The timeout for this operation has been exceeded.

Action

Check the Hypervisor or increase the timeout value.

BTAVM2012E An error occurred while trying to establish secure communication over SSL.

Explanation

The communication to the data source over SSL failed. There may be a configuration error.

Action

Make sure that the SSL certificate of the data source has been imported correctly to the local truststore. If the problem persists, contact IBM Technical Support.

BTAVM2013E The Add Device wizard could not add the *Name of the data source* data source.

Explanation

The VMWare data source might already be monitored by IBM Spectrum Control. A data source that is being monitored cannot be added again.

Action

Ensure that the data source is not already being monitored by IBM Spectrum Control. Verify that the IBM Spectrum Control server is up and running and that you have a network connection. If the data source is not being monitored, try to add it again. Ensure that you enter the correct authentication credentials in the wizard.

BTAVM2014E The deletion of data source *Name of the data source* failed.

Explanation

Failed to delete the data source from the database.

Action

Contact IBM Technical Support.

BTAVM2015E The modification of data source *Name of the data source* failed.

Explanation

Failed to modify the data source in the database. The data source was not modified.

Action

Contact IBM Technical Support.

BTAVM2016E Discovery on data source *Name of the datasource* failed.

Explanation

The discovery on the data source failed.

Action

Check the trace logs to find the error reason. The log files reside in the installation subdirectory device/log. If possible correct the error and rerun the discovery on the data source. If the problem persists, contact IBM Technical Support.

BTAVM2017E Probe of the hypervisor *Name of the Hypervisor* failed.

Explanation

The probe of the hypervisor failed.

Action

Check the trace logs to find the error reason. The log files reside in the installation subdirectory device/log. If possible correct the error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2018E IBM Spectrum Control can't connect to the data source *Name of the datasource*.

Explanation

A connection test to the data source failed.

Action

Check the trace logs to find the error reason. The log files reside in the installation subdirectory device/log. If possible correct the error and rerun the connection test to the data source. If the problem persists, contact IBM Technical Support.

BTAVM2201E Probe: An error occurred during the collection of the physical storage configuration.

Explanation

The physical storage configuration of the hypervisor could not be collected.

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2202E Probe: An error occurred during the collection of the logical storage configuration.

Explanation

The logical storage configuration of the hypervisor could not be collected.

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2204E Probe: An error occurred during the collection of the virtual machine configuration.

Explanation

The virtual machines on the hypervisor could not be collected.

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2206E Discovery: the hypervisor *Name of the hypervisor* will not be discovered because its version is not supported.

Explanation

The IBM Spectrum Control does not support the version. Refer to the IBM Spectrum Control Supported Product List.

Action

Refer to the IBM Spectrum Control Supported Product List and upgrade the Hypervisor code level to a supported level.

BTAVM2207E Calculation of the summary data for the hypervisor *Name of the hypervisor* failed.

Explanation

The calculation of the summary information for the hypervisor did not succeed.

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2208E Unable to obtain the hypervisor version(s) from the datasource *Name of the datasource*.

Explanation

The discovery was not able to obtain the version of the hypervisors.

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2209E Unable to obtain information about other Virtual Centers managing the hypervisor(s) of datasource *Name of the datasource*.

Explanation

The discovery was not able to obtain information about other Virtual Centers which are managing the hypervisor(s).

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2210W Error getting LUN definition data for the disk with the device name *Device name of the disk*, storage subsystem vendor: *Vendor name*, model: *model name*, for hypervisor *hypervisor name*.

Explanation

The LUN definition data will not be available.

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the probe of the hypervisor. If the problem persists, contact IBM Technical Support.

BTAVM2211E Probe: Virtualization Manager failed to get the VMWare VI data source for the hypervisor *Name of the hypervisor* from the database.

Explanation

The VMWare VI data source managing the hypervisor may have been deleted.

Action

Add the VMWare VI data source, perform a VMWare VI data source discovery and re-create the probe.

BTAVM2212E Probe: The hypervisor *Name of the hypervisor* is not available on the VMWare VI datasource *Name of the datasource*.

Explanation

The hypervisor may have been deleted or moved to another datasource.

Action

Add the VMWare VI datasource the hypervisor was moved to. Perform a VMWare VI data source discovery and re-create the probe.

BTAVM2213E Data source *Name of the datasource* is disconnected from Virtual Center.

Explanation

A connection test to the data source failed.

Action

Connect data source in Virtual Center and run discovery again.

BTAVM2214E The probe job encountered an NFS file system while probing ESX server {0}. IBM Spectrum Control currently does not support probes of ESX servers with NFS file systems. The probe job for this ESX server has been stopped. Probes of other ESX servers that are included in this probe job will continue.

Explanation

ESX servers with NFS file systems are not supported. Probes of other ESX servers that do not have NFS file systems will continue.

Action

If this is a repeating probe job, remove the ESX servers that have NFS file systems from the probe job to prevent this error from occurring again.

BTAVM2215W Unsupported storage subsystem disk with device name *Device name of the disk*, vendor: *Vendor name*, model: *model name*, for hypervisor *hypervisor name* with hypervisor version less than 3.5.0.

Explanation

Hypervisors with version less than 3.5.0 do not offer the necessary support for getting LUN definition data for this storage subsystem type. LUN definition data for this disk will not be available.

Action

Refer to the IBM Spectrum Control Supported Product List and upgrade the Hypervisors and Virtual Centers to the latest supported level.

BTAVM2216E Unable to get keystore instance.

Explanation

The required keystore type (JKS) is not available.

Action

Make sure the required keystore application is available in the Java environment. If the problem persists, contact IBM Technical Support.

BTAVM2217E Unable to load keystore file.

Explanation

The default keystore file used by IBM Spectrum Control could not be loaded.

Action

Make sure that the keystore password has not been changed. If the problem persists, contact IBM Technical Support.

BTAVM2218E Unable to set certificate entry in keystore file.

Explanation

The certificate entry couldn't be added to the keystore file

Action

Make sure the certificate being added to the keystore is a valid certificate. If the problem persists, contact IBM Technical Support.

BTAVM2219E Unable to open keystore for writing.

Explanation

An exception occurred attempting to open keystore for writing.

Action

Make sure that the keystore file is valid and has the proper permissions. If the problem persists, contact IBM Technical Support.

BTAVM2220E Unable to close keystore file.

Explanation

An exception occurred attempting to close keystore file.

Action

Make sure there are proper permissions on the keystore file and that no other user or process has it locked.

BTAVM2221E Unable to acquire lock on keystore file.

Explanation

The keystore file cannot be locked for write access.

Action

Make sure that no other user or process has the keystore locked.

BTAVM2222E Unable to store certificate in keystore file.

Explanation

The certificate could not be stored in the keystore file.

Action

Make sure that the keystore is valid and that the keystore password has not been changed.

BTAVM2223E Unable to release lock on keystore file.

Explanation

Keystore could not be unlocked.

Action

Make sure that the keystore is accessible and no other user or process has it locked.

BTAVM2224E Unable to decrypt keystore password.

Explanation

An error occurred while trying to decrypt the provided password to the keystore.

Action

The keystore may have become corrupted. Save the keystore to a new location so a new one will be created in the default location, and try again. If the problem persists, contact IBM Technical Support.

BTAVM2225E Unable to open keystore for reading.

Explanation

The keystore could not be opened for reading.

Action

Make sure that the keystore is not locked and is set with the proper read permissions.

BTAVM2226E Certificate already exists in keystore.

Explanation

Unable to store the certificate in the keystore because a certificate already exists for hostname.

Action

Either choose the option to replace the certificate, or specify a different alias (hostname) for the certificate.

BTAVM2227E host_address hypervisor is already being monitored and could not be added.

Explanation

A hypervisor cannot be added if it is already monitored by IBM Spectrum Control.

Action

Verify that the hypervisor has already been added to IBM Spectrum Control. If the hypervisor is not being monitored, try to add it again. If it is being monitored, enter the name of a different hypervisor.

BTAVM2228E Missing host name.

Explanation

The host name of the hypervisor was not provided.

Action

Make sure to provide a hostname for the certificate.

BTAVM2229E Missing certificate.

Explanation

A valid certificate was not provided

Action

Make sure to provide a valid certificate for insertion into the keystore.

BTAVM2230E Cannot create keystore directory.

Explanation

The default keystore directory could not be created.

Action

Make sure file permissions have been set to allow creation of the default keystore directory.

BTAVM2231E Cannot download the certificate from Data Source Name of the data source.

Explanation

The SSL certificate cannot be downloaded from the specified data source. The certificate must be downloaded before the data source can be added. A data source can be a VMWare hypervisor or vSphere server.

Action

Verify that the specified Data Source is a VMWare hypervisor or vSphere server. Verify that you have a network connection to the data source. Try to add the data source again.

BTAVM2232E Cannot connect to the Name of the data source data source.

Explanation

The host name or IP address that was entered for the data source might not be valid.

Action

Ensure that the network is up and available and that you have a network connection to the data source. Verify the correct host name or IP address. Try to add the data source again.

BTAVM2233E Cannot download the certificate from the port.

Explanation

The port that was entered for the data source might not be valid.

Action

Specify the correct port. The default port number is 443.

BTAVM2234E The hypervisor name hypervisor was not removed because IBM Spectrum Control is running other actions on the device.

Explanation

The hypervisor is in use by IBM Spectrum Control and cannot be removed from the database repository at this time. For example, a probe schedule is collecting data about the hypervisor.

Action

Wait for the probe schedule or other action to complete and try to remove the hypervisor again.

BTAVM2235E Unable to obtain the cluster(s) from the datasource *Name of the datasource*.

Explanation

The discovery was not able to obtain the clusters.

Action

Check the configuration of your environment. Check the trace logs. The log files reside in the installation subdirectory device/log. If possible correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM Technical Support.

BTAVM2236W Subsequent steps of probe process may not be able to collect data for the hypervisor *Name of the hypervisor* because the hypervisor is in critical state.

Explanation

The hypervisor is in critical state and the probe process may not be able to do data collection.

Action

Check the VMWare ESX or VirtualCenter for the cause of critical state for the hypervisor. If possible correct the issue and rerun the probe of the hypervisor.

BTAVM2237E Datastore Browser Task failed for hypervisor *Name of the hypervisor*, datastore *Name of the datastore* with error: *Error*

Explanation

The datastore could not be browsed.

Action

The datastore could not be browsed due to the error specified. If possible correct the issue and rerun the probe of the hypervisor.

BTAVM2238E The registration of the vSphere Web Client extension for IBM Spectrum Control has started on *Name of the vCenter server*.

Explanation

The registration process has started.

Action

No action required.

BTAVM2239E The registration of the vSphere Web Client extension for IBM Spectrum Control did not extract the extension package.

Explanation

The configuration process updates the vSphere Web Client extension for IBM Spectrum Control Centre package. The extension package, TPC_VmPlug.zip, could not be updated because the packaged was not extracted.

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2240E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete while updating the VASA web archive file, vasa.war, with the IBM Spectrum Control server configuration.

Explanation

The configuration process updates the IBM Spectrum Control Web Client extension for VMware package. The update operation could not be completed.

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2241E The registration of the vSphere Web Client extension for IBM Spectrum Control completed.

Explanation

The registration process has completed.

Action

No action required.

BTAVM2242E Unable to register IBM Spectrum Control as an extension on the vCenter server *Name of the vCenter server*. The validation of input values did not complete.

Explanation

The validation of input values did not complete. One or more of the supplied values may be empty or invalid.

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2243E Unable to register IBM Spectrum Control as an extension on the vCenter server *Name of the vCenter server*. Could not authenticate with the vCenter server.

Explanation

Could not authenticate with the vCenter server.

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2244E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete.

Explanation

The configuration process was unable to register the IBM Spectrum Control Web Client extension for VMware

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2245E Unable to connect to the vCenter Server Name of the datasource.

Explanation

The data source configuration process was not able to connect to the vCenter server.

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2246E Unable to configure the vCenter Server.

Explanation

The configuration process was unable to remotely register the vSphere Web Client extension for IBM Spectrum Control.

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2247E The registration of the vSphere Web Client extension for IBM Spectrum Control did not delete the temporary directory Name of the directory.

Explanation

The registration process was unable to delete a temporary directory on the vCenter Server

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2248E The registration of IBM Spectrum Control as a VASA provider did not complete.

Explanation

The configuration process was unable to register IBM Spectrum Control as a VASA provider for VMware.

Action

Check the trace logs. The log files reside in the installation subdirectory log under device. Correct any error and rerun the discovery of the hypervisor(s). If the problem persists, contact IBM customer technical support.

BTAVM2249E Automatic registration of IBM Spectrum Control as a VASA provider is not supported for vCenter Server version 5.0 and earlier.

Explanation

vCenter Server version 5.1 or later is required to automatically register IBM Spectrum Control as a VASA provider.

Action

Register IBM Spectrum Control as a VASA provider manually in the vSphere Web Client.

BTAVM2250E IBM Spectrum Control is already registered as a VASA provider for vCenter Server *server_name*. Register IBM Spectrum Control as a VASA provider manually in the vSphere Web Client to update the credentials.

Explanation

Automatic update of IBM Spectrum Control as a VASA provider is not supported if the provider is already registered for this vCenter Server.

Action

Remove IBM Spectrum Control as a VASA provider and register it again manually to update the user name or password.

BTAVM2251E One or more third-party VASA providers are already registered with the vCenter Server. IBM Spectrum Control VASA provider was not registered. Register IBM Spectrum Control as a VASA provider manually.

Explanation

If one or more third-party VASA providers are already registered with the vCenter Server, you must register IBM Spectrum Control VASA provider manually.

Action

Register IBM Spectrum Control as a VASA provider manually in the vSphere Web Client.

BTAVM2252E The registration of IBM Spectrum Control as a VASA provider has started on *Name of the vCenter server*.

Explanation

The VASA provider registration process has started.

Action

No action required.

BTAVM2253E The registration of IBM Spectrum Control as a VASA provider has completed.

Explanation

The VASA provider registration process has completed.

Action

No action required.

BTAVM2254E The registration of the vSphere Web Client extension for IBM Spectrum Control did not complete. The current session is invalid.

Explanation

The current session is invalid.

Action

Log out of the vCenter Server and then log back in.

BTAVM2255E The registration of IBM Spectrum Control as a VASA provider did not complete. The current session is invalid.

Explanation

The current session is invalid.

Action

Log out of the vCenter Server and then log back in.

BTAVM2256W Could not determine the host for VM with ID: *host id* and Name: *Vendor name*. Check if the same mac address is used on other computers.

Explanation

The correlation between the VM and the host cannot be done if the MAC Addresses are not unique.

Action

Change the MAC Address of the VM.

BTAVM2257I Found *number of files* files on *name of datastore* of *name of the hypervisor*.

Explanation

The probe collected details on given number of files from the datastore of the hypervisor.

Action

No action is required.

BTAVM2258I The probe of *name of the hypervisor* found *number of controllers* controllers.

Explanation

The probe collected the number of controllers for the hypervisors.

Action

No action is required.

BTAVM2259I Collecting file system details for hypervisor *Name of the hypervisor*.

Explanation

The probe collects file system details of the hypervisor.

Action

No action is required.

BTAVM2260I Collecting list of files for hypervisor *Name of the hypervisor*.

Explanation

The probe collects list of files on the datastores Yes of the hypervisor.

Action

No action is required.

BTAVM2261I Collecting logical volumes for hypervisor
Name of the hypervisor.

Explanation

The probe collects logical volumes details of the hypervisor.

Action

No action is required.

BTAVM2262I Collecting disk partition for hypervisor
Name of the hypervisor.

Explanation

The probe collects disk partitions details of the hypervisor.

Action

No action is required.

BTAVM2263I Files details for *Name of the datastore* being collected by *id of the Hypervisor*.

Explanation

The file details for the given datastore is already in progress as part of another hypervisor's probe, hence will be skipped.

Action

No action is required.

BTAVM2264I Files details for *Name of the datastore* were collected by *id of the Hypervisor* on *timestamp*.

Explanation

The file details for the given datastore were collected on given time as part of another hypervisor's probe, hence will be skipped.

Action

No action is required.

BTAVM2265E Invalid host name or IP address.

Explanation

Host name or IP address is not valid.

Action

Enter a valid host name or IP address

BTAVM2266E The connection information cannot be updated because it points to another device.

Explanation

To change the host name or IP address at least one hypervisor has to be managed by the new host name/IP address.

Action

Enter the correct host name or IP address.

BTAVM2268E The connection information cannot be updated because IBM Spectrum Control cannot determine if the hypervisor is managed by the *Name of the data source* data source.

Explanation

This problem might occur if the hypervisor is unavailable or the connection was lost.

Action

Try the following actions:

- Verify that the hypervisor is available.
- Ensure that a connection to the hypervisor is active.
- Check the log files for error messages to determine the cause. For information about the location of log files, see the IBM Knowledge Center at <http://www.ibm.com/support/knowledgecenter/SS5R93/>.

BTAVM2269E The connection information cannot be updated because a data source with this host name or IP address is already present.

Explanation

You cannot change the host name or IP address of a data source to match an existing one because you cannot move hypervisors from one data source to another data source.

Action

Let the existing event mechanism detect when a hypervisor was moved to another data source.

BTAVM2270E The connection information cannot be updated because it doesn't point to a data source of the same type (vCenter/ESX) .

Explanation

Changing the host name or IP address of a data source is allowed only within the same connection type. You cannot change a vCenter Server address to an ESX Server address. Similarly, you cannot change an ESX Server address to a vCenter address.

Action

Enter a host name or IP address that points to a data source of the same type as the one you are trying to update.

BTAVM2271W The hypervisor *Name of the Hypervisor* cannot be discovered because its connection state is "*Connection State*".

Explanation

The vCenter Server discovery process ignores the hypervisors that do not have the connection state of "CONNECTED". The hypervisor might have been disconnected from the vCenter Server intentionally for maintenance purposes. It might have been moved to another vCenter Server, but remains disconnected in the inventory of the old vCenter Server. Or it might have been accidentally disconnected due to a functional problem.

Action

Verify why the hypervisor is not connected to the vCenter Server.

BTAVM2272E The user *User Name* does not have the privilege to browse the datastore *Name of the Datastore*.

Explanation

The hypervisor scan failed because the user does not have the Datastore.Browse privilege that is required to execute the SearchDatastoreSubFolders task. For more details, go to the IBM Knowledge Center and check Administering>Administering resources and data sources>Hypervisors and VMware data sources>Checking permissions to browse data stores. You can access the IBM Knowledge Center for the product at <http://www.ibm.com/support/knowledgecenter/SS5R93>.

Action

Assign the user to a role that has the Datastore.Browse privilege. An appropriate default role is Virtual machine power user.

HWN020001I Operation *Name of the operation processed successfully.*

Explanation

The request has been executed successfully. No error condition has been encountered.

Action

No action is required.

HWN020002E Mandatory parameter *Name of the mandatory parameter which is missing* missing

Explanation

Mandatory parameter {0} missing

Action

Pass the mandatory parameters.

HWN020003E Invalid parameter *Name of the parameter which was invalid*

Explanation

Invalid Parameter{0}

Action

Pass a valid parameter.

HWN020101E The external process terminated unexpected.

Explanation

The external process for the current job did not complete successful because the process terminated unexpected.

Action

If available check the logfile of the external process to find the cause of the error. Make sure that no external event on the IBM Spectrum Control server terminated or ended the process. Try to rerun the job. If the problem persists, enable high level tracing as explained in the IBM Spectrum Control Installation and Configuration Guide and contact IBM Software Support.

HWN020102W The external process was canceled per users request.

Explanation

The external process for the current job did not complete successful because the process was terminated per users request to cancel the job.

Action

No action is required.

HWN020103E The external process exceeded the timeout limit and was canceled.

Explanation

The external process for the current job did not complete within the timeout limit and was terminated.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

HWN020104E The external process could not be started.

Explanation

Unable to start the external process for the current job.

Action

If available check the logfile of the external process to find the cause of the error. Try to rerun the job. If the problem persists, enable high level tracing as explained in the IBM Spectrum Control Installation and Configuration Guide and contact IBM Software Support.

HWN020105E The data collector is not responding to the server.

Explanation

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server.

HWN020106E An external process was cancelled by the data collector.

Explanation

An external process for the current job did not complete because the process was cancelled during the shutdown of the data collector. The data collector was shut down for one of the following reasons:

- The user stopped the data collector.
- The system that the data collector runs on was shut down or restarted.
- The data collector is being upgraded.

Action

Wait until the data collector starts again, then try the task or job again.

HWN021503E The action cannot be completed

Explanation

The error occurred while processing a request from the GUI.

Action

Wait a few minutes and try again. If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

HWN021504E Entity *The ID of the entity* was not found.

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

The server or the interface might be out of sync with the co-server. Rerun the discovery process, and then run a data collection task.

HWN021508E Credentials not found

Explanation

There was a problem accessing the user credential on the coserver

Action

Ensure the database is running and that the IBM Spectrum Control setup was completed successfully.

HWN021514E The invocation of CIM method *Name of method* failed on SMI-S provider *Name of SMI-S provider*. The return code is *Return code of method*

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed.

Action

Ensure that the correct input parameters for the CIM method have been used.

HWN021515E The invocation of CIM method *Name of method* failed on SMI-S provider *Name of SMI-S provider* with the following exception text: *Exception text*

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed.

Action

Check the ErrorTrace.log file for further information. If the log file does not exist, enable tracing as follows: (1) Enter the WAS administration console. Click Application Servers, click the server name, and click Diagnostic Trace Service. (2) Select the Enable trace check box, and enable tracing for the MDM groups. (3) Restart the server and run the application again. (4) Check the errorTrace.log file to determine which problems were encountered.

HWN021516E The LSS specified *LSS name* on subsystem *Name of subsystem* is already at the maximum volume number (255). Volume creation can not be done on this LSS, please select a different one.

Explanation

Only 255 volumes can be created on a particular LSS. IBM Spectrum Control believes that this LSS is full because the highest numbered volume on the LSS is 255.

Action

If volume number 255 has been deleted, try rerunning a probe of the subsystem. Otherwise, either choose a different LSS or else delete volume #255 (and any others as necessary depending on the number of new volumes needed)

HWN021517E The connection to SMI-S provider for storage system *VPD of the storage system* could not be made.

Explanation

Creation of the CIM client failed.

Action

Ensure that the SMI-S provider is running and that the correct user ID and password have been set for this SMI-S provider in the IBM Spectrum Control UI.

HWN021520E The attribute *Name of the attribute* was not found.

Explanation

A method was called with wrong attributes.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN021522E Host port *The WWPN of the host port* not assigned to Volume *The PK of the volume*

Explanation

The host port is not assigned to the volume.

Action

Specify a port that is assigned to the volume.

HWN021524E Indexed Properties Names don't match

Explanation

Indexed input parameters are not of the same size

Action

Make sure that all the indexed input parameters are of the same size.

HWN021529E An SMI-S provider has reported unexpected values: *IP and port of SMI-S provider*.

Explanation

The values returned by the SMI-S provider might indicate an SMI-S provider malfunction.

Action

If not already enabled, enable tracing for the Device server. To enable tracing for the Device server, go to the IBM Spectrum Control Information Center and search for "Configuring tracing". Restart the Device server, run the application again, and check the Device server log files for more information about this error.

HWN021530E The Volume - Port mapping can not be created. There are existing mappings that prevent this combination. VolumeCOP: *The ID of the volume , Port: The WWPN of the port that should be mapped to the volume*

Explanation

For FASST it is not possible to merge existing mappings. That means, if you have volume A mapped to port 1, and volume B mapped to port 2, you will neither be able to map port 1 to volume B, nor port 2 to volume A.

Action

Build up mappings beginning with one volume-port mapping, and then add further volumes and ports. For Example, first map volume A and port 1, then volume A and port 2, finally volume B and port1 or port 2. The volume will be mapped to both ports. See also documentation for details.

HWN021531E SMI-S provider *The IP and port of the SMI-S provider can not reach storage system The VPD of the storage system*

Explanation

The SMI-S provider can not reach the subsystem that it manages.

Action

Check logs on SMI-S provider side to determine why it can't reach the device.

HWN021535E There is not enough space left in the storage pool *The primary key of the Poolon storage system The VPD of the storage system to create a volume of The requested volume size bytes.*

Explanation

The size of the volume to be created is too large for the selected storage pool.

Action

Choose or create a storage pool with enough space or create a smaller volume.

HWN021536E The CIM method *The CIM method that is not supported.* is not supported on the storage system *The VPD of the storage system*

Explanation

The storage system does not support the specified function.

Action

No action is required.

HWN021537E Could not create connection to SMI-S provider *The IP and port for the SMI-S provider..Reason: The exception returned by the SMI-S provider.*

Explanation

No connection to the SMI-S provider could be established.

Action

Check the given reason.

HWN021538E The username *The username that was used to connect to the SMI-S provider.* or password is wrong on SMI-S provider *The IP and port for the SMI-S provider.*

Explanation

The username and/or password specified for the SMI-S provider are not valid.

Action

Set correct username/password combination for the SMI-S provider.

HWN021539E The SVC with IP *The IP of the SVC.* which is managed by SMI-S provider *The IP and port for the SMI-S provider.* can not be discovered. The status is *The status of the SVC.* .

Explanation

The SMI-S provider can not reach the SVC. The SVC is not added to the IBM Spectrum Control repository.

Action

There is a SVC which is disconnected and not reachable from the SMI-S provider. Please check the status of this SVC and run discovery again.

HWN021540E The invocation of CIM method *Name of method* failed on SMI-S provider *Name of SMI-S provider*. The return code is *Return code of method*. Details provided by the SMI-S provider : *Description of Returncode*

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed.

Action

Ensure that the correct input parameters for the CIM method have been used.

HWN021600W Operation *Name of the operation*. partially processed.

Explanation

The request has been partially executed. Some operations as part of this request have failed. Please check the detailed error messages.

Action

No action is required.

HWN021601E The operation(s) *Operation_names* failed.

Explanation

Multiple operations failed. None of the requested operations was carried out.

Action

Check the error messages in the system log files for the jobs that failed.

HWN021602E It is necessary to specify target ports for storage device VPD of the storage subsystem

Explanation

This storage subsystem requires that target FCPorts are specified during the assignment operation.

Action

Re-run the operation and specify the target ports

HWN021603W More storage volumes and ports than specified will loose access

Explanation

The unassignment operation was executed successfully, but more storage volumes and ports have been unassigned than specified because the 'force' option was set to true for this command. All unassigned WWPNs and storage volumes are returned in the return object.

Action

Check that the additionally unassigned volumes/ports do not cause any problems.

HWN021604E WWPNs and storage volumes to be unassigned not completely specified. Assigned WWPNs: All WWPNs that are assigned to the volumes in the host port collection , missing WWPNs: The WWPNs that are assigned but were not specified in the input parameter in the method unassign . Storage volumes to be unassigned not completely specified. Assigned storage volumes: Lists all storage volumes that are really assigned to the WWPNs. }, missing storage volumes: The storage volumes that are really assigned but were not specified in the input parameter in the method unassign

Explanation

Not all ports that belong to a host port collection were specified. In order to unassign a host port collection, all ports have to be specified. Not all storage volumes that are assigned to the WWPNs were specified in the input. In order to unassign the WWPNs, all storage volumes have to be specified.

Action

Specify all ports belonging to the host port collection. Specify all storage volumes that are assigned to the WWPNs. You can alternatively specify the force flag to automatically unassign all WWPNs and volumes that need to be included.

HWN021605I More storage volumes and ports than specified will gain access.

Explanation

The assignment operation was executed successfully, but more storage volumes and ports have been assigned than specified because the 'force' option was set to true for this command. All assigned WWPNs and storage volumes are returned in the return object.

Action

Check that the additionally assigned volumes/ports do not cause any problems.

HWN021606E WWPNs and storage volumes to be assigned not completely specified. Missing WWPNs: *The WWPNs that need to be assigned but were not specified in the input parameter.* . Storage volumes to be assigned not completely specified. Missing storage volumes: *The storage volumes that need to be assigned but were not specified in the input parameter.*

Explanation

Not all ports that belong to a host port collection were specified. In order to assign a host port collection, all ports have to be specified. Not all storage volumes that need to be assigned due to existing assignments to the WWPNs were specified in the input. In order to assign the WWPNs, all storage volumes have to be specified.

Action

Specify all ports belonging to the host port collection. Specify all storage volumes that need to be assigned to the WWPNs. You can alternatively specify the force flag to automatically assign all WWPNs and volumes that need to be included.

HWN021607E The client type *the client type with description the client description* is not supported on SMI-S provider *the SMI-S provider IP and port for storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in*

Explanation

The SMI-S provider for the storage device does not support the chosen client type

Action

Specify the client type that is supported by the SMI-S provider. Because the supported client types also depend on the SMI-S provider version, you might need to change or upgrade the SMI-S provider.

HWN021608E The target port *the target port ID* does not belong to storage subsystem *the subsystem ID of volumes the volumeIDs of the subsystem which were passed in*

Explanation

The target ports specified do not belong to the subsystem of the input volumes

Action

Specify target ports of the same subsystem as the volumes or specify no target ports

HWN021609E There is not enough space left in the storage pool *The primary key of the Pool on storage system The VPD of the storage system to create The number of volumes to create volumes of The total size needed bytes total.*

Explanation

The size of the volumes to be created is too large for the selected storage pool.

Action

Choose or create a storage pool with enough space or create smaller volumes.

HWN021610E The specified size *The size of the volume to create is not supported on pool The storage pool ID Size has to be dividable by Divisor returned by getSupportedSizeRange and in between Minimum returned by getSupportedSizeRange and Maximum returned by getSupportedSizeRange*

Explanation

This pool supports sizes within the given range and divisible by the given divisor only.

Action

Use a size which is divisible by the given divisor and within the provided range.

HWN021611E Volume *The volume ID has mappings, it can not be deleted.*

Explanation

A volume can not be deleted as long as it has mappings

Action

Delete all mappings of the volume.

HWN021612E The mapping between volume *The volume ID* and port *The initiator port wwpn* exists already

Explanation

A mapping that exists already can not be created again

Action

None

HWN021613E The WWPN *The WWPN not found* can not be found on subsystem *The subsystem*

Explanation

The subsystem does not know the WWPN given.

Action

The information in the database repository might be out of sync with the monitored devices in your environment. Rerun data collection jobs against those monitored devices to refresh the information stored in the database repository.

HWN021614E The WWPNs *The WWPNs without mappings* have no mappings on storage system *The storage system*

Explanation

The WWPNs do not have any mappings on this storage system.

Action

The information in the database repository might be out of sync with the monitored devices in your environment. Rerun data collection jobs against those monitored devices to refresh the information stored in the database repository.

HWN021615E WWPNs *WWPNs that can not share mappings* can not share mappings on storage system *Storage system*. There are existing mappings that prevent this.

Explanation

For some devices (e.g. FASST, HDS) it is not possible to merge existing mappings. That means, if you have volume A mapped to port 1, and volume B mapped to port 2, you will not be able to create any mapping that has both port1 and port2 included.

Action

Create all mappings at once; specify all ports and volumes to be mapped together. OR: Build up mappings beginning with one volume-port mapping, and then add further volumes and ports. For Example, first map volume A and port 1, then volume A and port 2, finally volume B and port1 or port 2. The volume will be mapped to both ports. See also documentation for details.

HWN021616E Volumes VolumeIDs can not share mappings on storage system Storage system }. There are existing mappings that prevent this.

Explanation

For some devices (e.g. FASST, HDS) it is not possible to merge existing mappings. That means, if you have volume A mapped to port 1, and volume B mapped to port 2, you will not be able to create any mapping that has both volume A and volume B included.

Action

Create all mappings at once; specify all ports and volumes to be mapped together. OR: Build up mappings beginning with one volume-port mapping, and then add further volumes and ports. For Example, first map volume A and port 1, then volume A and port 2, finally volume B and port1 or port 2. The volume will be mapped to both ports. See also documentation for details.

HWN021617E The stored data for storage system The storage system is not in sync with the environment. Rerun data collection.

Explanation

The data stored for the storage system does not seem to be in sync with the environment

Action

Rerun data collection.

HWN021618E Modifying target ports is not supported by subsystem the subsystem .

Explanation

The subsystem does not support modifying target ports of existing mappings.

Action

Remove the mapping and re-create with the new set of target ports.

HWN021619E Modifying the target ports for mapping of initiator port initiator port WWPN and volume volume name will also modify the target ports of the following mappings: port - volume list

Explanation

The initiator port has mappings to more volumes than were specified. The mappings to all volumes will be modified.

Action

Specify all volumes that are impacted.

HWN021620I Modifying the target ports for mapping of initiator port *initiator port WWPN* and volume *volume name* will modify the target ports of more mappings than specified.

Explanation

The initiator port has mappings to more volumes than were specified. The mappings to all volumes will be modified.

Action

Check the job log to see the additionally modified mappings.

HWN021621E It is not supported to modify the target ports of existing mappings and create new mappings in one step. Modify the existing mappings first and then create the new mappings. Existing mappings: *port - volume list*

Explanation

It is not supported to modify the target ports of existing mappings and create new mappings in one step.

Action

Modify the existing mappings first and then create the new mappings.

HWN021622I Started modification of the assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN*. Target ports to add: *target ports to add* Target ports to remove: *target ports to remove*

Explanation

The task was started. The log will inform about the further process.

Action

No action required.

HWN021623I Finished modification of the assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN*. Target ports to add: *target ports added*
Target ports to remove: *target ports removed*

Explanation

The task succeeded.

Action

No action required.

HWN021624E The modification of the assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN* failed. Target ports to add: *target ports to add*
Target ports to remove: *target ports to remove*

Explanation

The task failed.

Action

Check the log for failure reason.

HWN021650E A timeout occurred while connecting to SMI-S provider *SMI-S provider IP and port*.

Explanation

There was a timeout on an attempted connection to an SMI-S provider. The service is unavailable or not responding, or the network may be congested.

Action

Check that:

1. 1.The SMI-S provider is running.
2. 2.The SMI-S provider is able to answer IBM Spectrum Control requests without delay.
3. 3.There is a good network connection between IBM Spectrum Control and the SMI-S provider.

If the SMI-S provider is running correctly and the network connection is fine, increase the timeout and try again.

HWN021651E Job on SMI-S provider *SMI-S provider IP and Port in format IP:Port* failed. Job Status: *Job status*. Error code is *Error code*, error description: *Error description*. Check IBM Spectrum Control and SMI-S provider logs.

Explanation

An asynchronous job on the SMI-S provider failed.

Action

Check IBM Spectrum Control and SMI-S provider logs.

HWN021652E The process has timed out. Check the IBM Spectrum Control log files for more information.

Explanation

The process has taken longer than the specified timeout period. The process might be continuing even though the timeout has occurred.

Action

Check the log file at TPC_installation_directory\device\log\dmSvcTrace.log. If there are no additional error messages, then the process completed successfully in a longer amount of time than expected.

HWN021653E The attribute *Name of the attribute* was not found.

Explanation

A IBM Spectrum Control execution error occurred. Check IBM Spectrum Control logs.

Action

Check IBM Spectrum Control logs.

HWN021654E Pool ID was not found.

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021655E Volume ID *The ID of the volume was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021656E Port ID *The ID of the port was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021657E Subsystem ID *The ID of the subsystem was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021658E Managed Disk ID *The ID of the MDisk was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021659E SMI-S provider *The ID of the SMI-S provider was not found*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021660E IO Group *The SVC IO Group was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021661E Extent *The storage extent external key was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021662E Physical volume *The physical volume external key was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021670E *The client type the client type with description the client description is not unique on SMI-S provider the SMI-S provider IP and port } for storage subsystem the subsystem ID of volumes the volumeIDs of the subsystem which were passed in*

Explanation

This SMI-S provider for the storage device does not have several entries for the chosen client type.

Action

Specify client type and description that are unique for the SMI-S provider. The supported client types also depend on the SMI-S provider version. Maybe you will need to change or upgrade the SMI-S provider.

HWN021671I The storage system *The storage system* was deleted from the database

Explanation

This storage system was deleted from the database.

Action

No action is required.

HWN021672E The storage system *name* storage system was not removed because other monitoring actions are running on the device.

Explanation

The storage system is in use by other monitoring actions and cannot be removed from the database repository at this time. For example, a probe schedule is collecting data about the storage system.

Action

Wait for the probe schedule or other action to complete and try to remove the storage system again.

HWN021673E The probe job on SMI-S provider *SMI-S provider IP and Port* in format *IP:Port* did not complete within the time limit of *Microseconds* microseconds. The job is *Percent complete* percent complete. Check the SMI-S provider log for job status. Job information: *JobCOP*. Run the probe job again after the current job has completed.

Explanation

The probe job was started on the SMI-S provider, but did not complete in the specified time limit. The time limit can be set by using the setsdscfg CLI command to modify the CIMJobContext.JobRetrievalRetry and CIMJobContext.JobRetrievalSleep parameters in the Db2 table.

- CIMJobContext.JobRetrievalRetry defines the maximum number of retries to check a job for completion.

- CIMJobContext.JobRetrievalSleep defines the wait time in microseconds between two retries.

Action

Check the SMI-S provider logs for status of the probe job. Use the setdscfg CLI command to change the CIM job retrieval parameters if necessary. Run the probe again to get the most recent data from the subsystem.

For more information about CLI commands, see the Command-line interface section of the Knowledge Center.

HWN021674E Job on SMI-S provider *SMI-S provider IP and Port in format IP:Port* returned unexpected results.
Job information: JobCOP Job status: *JobState*, status description: *JobStatus* Check SMI-S provider log. Redo probe if the job completed.

Explanation

The job was started on the SMI-S provider, but returned an unexpected status.

Action

Check the SMI-S provider logs for job information. If the job completed, probe the subsystem again to get the up to date data.

HWN021675I Started creation of volume with size *Size* in pool *Pool* on subsystem *Subsystem*

Explanation

The task was started. The log will inform about the further process.

Action

No action required.

HWN021676I Volume creation completed successfully. New volume *VolumeID* created with size *Size* in pool *Pool* on subsystem *Subsystem*.

Explanation

The task succeeded.

Action

No action required.

HWN021677E Volume creation failed. The volume of size *Size* in pool *Pool* on subsystem *Subsystem* could not be created.

Explanation

The task failed.

Action

Check the log for failure reason.

HWN021678I Started assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN* .

Explanation

The task was started. The log will inform about the further process.

Action

No action required.

HWN021679I Finished assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN* .

Explanation

The task succeeded.

Action

No action required.

HWN021680E The assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN* failed.

Explanation

The task failed.

Action

Check the log for failure reason.

HWN021681I Started unassignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN* .

Explanation

The task was started. The log will inform about the further process.

Action

No action required.

HWN021682I Finished unassignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN* .

Explanation

The task succeeded.

Action

No action required.

HWN021683E The unassignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *WWPN* failed.

Explanation

The task failed.

Action

Check the log for failure reason.

HWN021684I Started deletion of volume *VolumeID* on subsystem *Subsystem* .

Explanation

The task was started. The log will inform about the further process.

Action

No action required.

HWN021685I Volume deletion completed successfully. Volume *VolumeID* on subsystem *Subsystem* was deleted.

Explanation

The task succeeded.

Action

No action required.

HWN021686E Volume deletion failed. Volume *VolumeID* on subsystem *Subsystem* could not be deleted.

Explanation

The task failed.

Action

Check the log for failure reason.

HWN021687I Started modification of Pool *Pool display name* on subsystem *Subsystem display name* .

Explanation

The task was started. The log will inform about the further process.

Action

No action required.

HWN021688I Pool modification completed successfully. Pool *Pool display name* on subsystem *Subsystem display name* was modified.

Explanation

The task succeeded.

Action

No action required.

HWN021689E Pool modification failed. Pool *Pool display name* on subsystem *Subsystem display name* could not be modified.

Explanation

The task failed.

Action

Check the log for failure reason.

HWN021690I Started creation of *number volumes* volumes with size *Size* in pool *Pool* on subsystem *Subsystem*

Explanation

The task was started. The log will inform about the further process.

Action

No action required.

HWN021691I Created *number volumes* out of total *number volumes* volumes with size *Size* in pool *Pool* on subsystem *Subsystem*

Explanation

The task succeeded.

Action

No action required.

HWN021692E Volume creation failed. Created *number volumes* out of total *number volumes* volumes with size *Size* in pool *Pool* on subsystem *Subsystem*

Explanation

The task failed.

Action

Check the log for failure reason.

HWN021693W Warning: The task succeeded, but the database update failed. Run probe to update the database.

Explanation

The task succeeded, but the database update failed.

Action

Run probe for the subsystem to update the database.

HWN021700I Enumerating CIM Associator *The CIM association name which is being enumerated. for The name of the DB table which will be populated as result of this query.*

Explanation

The discovery or probe is currently enumerating a CIM associator. Inventory collection enumerates CIM classes in order to collect data for a particular IBM Spectrum Control entity, such as storage subsystem or storage volume.

Action

No action is required.

HWN021701I Enumerating CIM Class *The CIM class name which is being enumerated. for The name of the DB table which will be populated as result of this query.*

Explanation

The discovery or probe is currently enumerating a CIM class. Inventory collection enumerates CIM classes in order to collect data for a particular IBM Spectrum Control entity, such as storage subsystem or storage volume.

Action

No action is required.

HWN021702I Querying SMI-S provider

Explanation

An SMI-S provider query is in process

Action

No action is required.

HWN021703I Task starting on SMI-S provider *Identifier of the SMI-S provider..*

Explanation

The task is starting on the specified SMI-S provider.

Action

No action is required.

HWN021708I Initializing Collection for storage system storage system identification.

Explanation

Probe is being initialized.

Action

No Action is required

HWN021709I Collection for storage system storage system identification completed.

Explanation

Probe is completed.

Action

No action is required.

HWN021710I Discovering devices for SAN Volume Controller The VPD of the SAN Volume Controller.

Explanation

Prior to the discovery or probe, a fiber channel discovery on this SAN Volume Controller is issued.

Action

No action is required.

HWN021711I Discovery devices for SAN Volume Controller The VPD of the SAN Volume Controller. failed with error message The exception which has occurred.

Explanation

Fiber channel discovery issued prior to discovery or probe on the SAN Volume Controller was failing.

Action

Collection will continue without discovery.

HWN021712I Collecting Nodes for storage system storage system identification.

Explanation

The probe is currently traversing and storing CIM information that are related to the Nodes of the storage system.

Action

No action is required.

HWN021713I Collecting fibre channel ports for storage system storage system identification.

Explanation

The probe is currently traversing and storing CIM information that are related to the fibre channel ports of the storage system.

Action

No action is required.

HWN021714I Collecting volumes for storage system storage system identification.

Explanation

The probe is currently traversing and storing CIM information that are related to the volumes of the storage system.

Action

No action is required.

HWN021715I Traversing host to volume assignments for storage system storage system identification.

Explanation

The probe is currently traversing and storing CIM information that are related to host to volume assignment.

Action

No action is required.

HWN021716I Collecting pools and volumes for storage system storage system identification.

Explanation

The probe is currently traversing and storing CIM information that are related to the pools and volumes of the storage system.

Action

No action is required.

HWN021717I Collecting volume settings for storage system storage system identification.

Explanation

The probe is currently traversing and storing CIM information that are related to the volume settings of the storage system.

Action

No action is required.

HWN021718I Collecting client setting data for storage system storage system identification.

Explanation

The probe is currently traversing and storing CIM information that are related to the client setting data of the storage system.

Action

No action is required.

HWN021719I Perform collection post process tasks for storage system storage system identification.

Explanation

CIM based collection is completed and post collection tasks for the probe are performed.

Action

No action is required.

HWN021720I Flash enclosure is missing drive *flash_drive_identifier*.

Explanation

The drive is missing from its enclosure. Typically, all drives of a flash enclosure are installed.

Action

No action is required. Consider replacing the missing drive. However, the missing drive does not adversely affect the operation of the storage system or the ability to monitor the storage system.

HWN021724W SMI-S provider *SMI-S provider identifier* manages device(s) of type *device_type* which is supported through the native device interface or SNMP only.

Explanation

The specified device type is not supported through the SMI-S provider.

Action

Add the device again using a supported interface such as the CLI, the native API, or SNMP.

HWN021725I IBM Spectrum Control discovered/rediscovered a device with name *Identifier of the device*. on SMI-S provider *Identifier of the SMI-S provider*..

Explanation

The discovery found a device on an SMI-S provider it is examining.

Action

No action is required.

HWN021726I IBM Spectrum Control discovered/rediscovered no device on SMI-S provider *Identifier of the SMI-S provider*..

Explanation

The discovery found no device on an SMI-S provider.

Action

Check if this is correct that there is no device on the SMI-S provider.

HWN021727I IBM Spectrum Control discovery starting on SMI-S provider *Identifier of the SMI-S provider*.

Explanation

The discovery is starting on an SMI-S provider.

Action

No action is required.

HWN021728I IBM Spectrum Control discovery on SMI-S provider *Identifier of the SMI-S provider*. is complete.

Explanation

The discovery is finished on an SMI-S provider.

Action

No action is required.

HWN021729W IBM Spectrum Control discovery of Device type *value* is not supported.

Explanation

The device type specified is not supported.

Action

No action is required.

HWN021730W IBM Spectrum Control discovery of device value with code level *value* is not supported on SMI-S provider *Identifier of the SMI-S provider*.

Explanation

The code level specified is not supported.

Action

Upgrade the device to a version supported by the SMI-S provider.

HWN021731I Probing Volumes for Storage System: value.

Explanation

The probe is finding the volumes for this storage system.

Action

No action is required.

HWN021732I Number of Volumes Found Currently: value. Continuing to Probe Volumes.

Explanation

The Probe is finding the Volumes. This status update is to inform how many volumes have been processed at this point during the probe.

Action

No action is required.

HWN021733I value Volumes Found.

Explanation

This status message is to inform you of the total number of volumes found for this storage system or storage pool.

Action

No action is required.

HWN021734I Probing Disks for Storage System: value.

Explanation

The probe is finding the disks for this storage system.

Action

No action is required.

HWN021735I Number of Disks Found Currently: value. Continuing to Probe Disks.

Explanation

The probe is finding the disks. This status update is to inform how many disks have been processed at this point during the probe.

Action

No action is required.

HWN021736I value Disks Found.

Explanation

This status message to inform you of the total number of disks found for this storage system or storage pool.

Action

No action is required.

HWN021737I Probing Virtual Disks for Cluster: value

Explanation

The probe is finding the virtual disks for this SAN Volume Controller cluster.

Action

No action is required.

HWN021738I Number of Virtual Disks currently found: value. Continuing to probe Virtual Disks.

Explanation

The probe is finding the virtual disks. This status update is to inform of the number of virtual disks that have been processed at this point during the probe.

Action

No action is required.

HWN021739I value Virtual Disks found.

Explanation

This is the total number of Virtual disks found on the corresponding SAN Volume Controller cluster.

Action

No action is required.

HWN021740I Probing Views of Host Initiator access to Volumes.

Explanation

The probe is finding the Host Initiator access to Volumes.

Action

Check logs for SQLExceptions logged for ServiceUtils.getConnection().

HWN021741I value Views Found.

Explanation

This status message to inform you of the total number of Views for Host Initiator access to Volumes that are found for this storage system.

Action

Check logs for SQLExceptions logged for ServiceUtils.getConnection().

HWN021742E The SMI-S provider *SMI-S provider URL* is not managing storage subsystems .

Explanation

The SMI-S provider is managing switches and no storage subsystems.

Action

Specify the correct SMI-S provider which manages the storage subsystems.

HWN021743E The SMI-S provider *SMI-S provider URL* is not managing switches .

Explanation

The SMI-S provider is managing storage subsystems only and no switches.

Action

Specify the correct SMI-S provider which manages switches.

**HWN021744E Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: **

<http://www.ibm.com/support/docview.wss?uid=swg21976237>

Explanation

This communication problem might be caused by an error with the SSL certificate on the resource.

Action

To learn about how to troubleshoot the problem, go to <http://www.ibm.com/support/docview.wss?uid=swg21976237>.

HWN021745I Cannot connect to a resource because of an SSL certificate error. Troubleshooting information: <a href="<http://www.ibm.com/support/docview.wss?uid=swg21976237>". An alternate resource will be used.

Explanation

This communication problem might be caused by an error with the SSL certificate on the resource.

An alternate resource has been identified and will be used instead for the fabric or switch.

Action

To learn about how to troubleshoot the problem, go to <http://www.ibm.com/support/docview.wss?uid=swg21976237>.

HWN021746W SMI-S provider Identifier of the SMI-S provider. manages Cisco device types through SNMP only.

Explanation

The device type specified is not supported through the SMI-S provider.

Action

Use the add switch wizard to add and configure switches of the specified device type by using the SNMP interface.

HWN021747E Unable to add the specified switch by using SNMP. The switch is a Brocade switch and can be added only by using an SMI agent.

Explanation

Brocade switches must be added by using an SMI agent rather than by SNMP.

Action

Restart the Add Switch wizard and select Brocade as the vendor, and complete the information for the SMI agent.

HWN021800E Failed to get a database connection.

Explanation

Failed to get a database connection. Null was returned instead.

Action

Check logs for SQLExceptions logged for ServiceUtils.getConnection().

HWN021801E The server failed to get SMI-S provider entity from database.

Explanation

The server failed to get SMI-S provider entity from database. Either cursor on table T_RES_REGISTERED_CIMOM or contained object was null.

Action

No action is required.

HWN021802E Experienced SQL problems while working with database: *The SQL error.*

Explanation

Failed to work with database. Received SQL error instead.

Action

No action is required.

HWN021803W The server did not get userid and or password for SMI-S provider *The Service URL of the SMI-S provider* from database.

Explanation

The server found userid and or password being null in database.

Action

No action is required.

HWN021804E The server failed to access slp attributes for SMI-S provider *The Service URL of the SMI-S provider* from database.

Explanation

The server failed to access slp attributes for this SMI-S provider. Either cursor on table T_RES_SLP_ATTRIBUTES or contained object was null.

Action

No action is required.

HWN021805E CIMOMManager failed to get a database mapper of type *The type of the database mapper*.

Explanation

The CIMOMManager failed to get a database mapper. Unable to persist data to database.

Action

No action is required.

HWN021806E CIMOMManager failed to get a valid mapper result from *The type of the database mapper*.

Explanation

The CIMOMManager failed to get a valid mapper result from a database mapper. Unable to persist data to database.

Action

No action is required.

HWN021807E CIMOMManager failed to get a proxy for calling slp discovery.

Explanation

The CIMOMManager failed to get a proxy for calling slp discovery. Unable to discover SMI-S providers.

Action

Restart DiscoveryService if not running.

HWN021808E The device cannot be contacted through any of the following SMI-S providers *The comma separated list of IP and port for the SMI-S providers..* Possible causes are that the SMI-S providers are not accessible or the device is disconnected from the SMI-S providers.

Explanation

No connection to the SMI-S provider could be established.

Action

Check the given reason.

HWN021809E The host for SMI-S provider *The service URL of the SMI-S providers.* was not resolvable in DNS.

Explanation

The hostname of the SMI-S provider could not be translated to an IP address.

Action

Check the hostname.

HWN021810E The service URL for SMI-S provider *The service URL of the SMI-S providers.* is not valid.

Explanation

The hostname of the SMI-S provider could not be translated to an IP address.

Action

Check the URL fragments.

HWN021811I The operational status for device *The ID of the device.* on SMI-S provider *The service URL of the SMI-S provider.* has this value *The operational status vector.* .

Explanation

The operational status for this device was retrieved from the specific SMI-S provider. The value is a string representation of an vector of integers.

Action

No action is required.

HWN021812E *The operational status for device **The ID of the device**. on SMI-S provider **The service URL of the SMI-S provider**. could not be retrieved because SMI-S provider is in status **The SMI-S provider connection status**.*

Explanation

The operational status for this device was not retrieved from the specific SMI-S provider. The SMI-S provider is in a state which does not allow retrieval of operational status for the device.

Action

Action depends on returned SMI-S provider connection status.

HWN021813E *Fabric ID **The ID of the fabric** was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Rerun the discovery process, and then run a data collection task.

HWN021814E *The device **device id** cannot be contacted through the SMI-S provider **SMI-S provider service URL**.*

Explanation

The SMI-S provider is in a state which does not allow retrieval of operational status for the device or the device is disconnected from the SMI-S provider.

Action

Check that the device can be reached from the machine that the SMI-S provider is running on.

HWN021899E *Switch The wwn of the switch. has no associated Fabric.*

Explanation

The SMI agent that has reported the switch is not reporting a fabric for the switch. The discovered switch is not persisted, due to this failure.

Action

Try restarting the switch SMI agent. If this does not fix the problem, contact customer support for your switch vendor.

HWN021901E *The virtual disk size cannot exceed maximum size when creating space efficient virtual disks.*

Explanation

When creating space efficient virtual disks, the maximum virtual disk size cannot be higher than the specified value.

Action

Provide a correct size for the virtual disk.

HWN021902E *Invalid grain size. Valid values are valid values.*

Explanation

The specified grain size parameter is invalid.

Action

Pass a valid parameter value.

HWN021903E *Authentication to ip or name of host failed. Please specify correct authentication information.*

Explanation

Cannot authenticate with given authentication information.

Action

Make sure username and password are correct.

HWN021904E Connection to *IP address or name of host failed with following operating system exception: exception text*. Please make sure IP address is correct and machine is up and running. If this is a SVC V4 machine, it could be that its RAS interface is not up. If this is a SVC V5, make sure the SMI-S provider is up and running.

Explanation

Connection to the host failed.

Action

Make sure IP address is valid and machine is up.

HWN021905E Connection to *IP address or name of host failed with following operating system exception: exception text*.

Explanation

Connection to the host failed.

Action

Contact IBM support.

HWN021906E Failed to get native API entity from database.

Explanation

The NAPIManager failed to get native API entity or related information from database.

Action

Configure Subsystem connection again, run Discovery and Probe again for the failing device. Ensure that everything completes successful.

HWN021907E The IP address *The service URL of the SMI-S providers*. was not resolvable in DNS.

Explanation

The hostname could not be translated to an IP address.

Action

Check the hostname.

HWN021908E Failed to get a proxy for calling NAPI discovery.

Explanation

The NAPIManager failed to get a proxy for calling NAPI discovery. Unable to discover subsystems.

Action

Restart DiscoveryService if not running.

HWN021909E There are no IO Groups available for Virtual Disk creation.

Explanation

A virtual disk creation using system chosen parameters was attempted but there are no valid IO Groups available to choose from.

Action

Probe the San Volume Controller again. Check San Volume Controller configuration and ensure there is at least one IO Group that has nodes. Should the problem persist, contact IBM support.

HWN021910E Managed Disk ID *The ID of the MDisk is not in unmanaged mode and cannot be added to the specified managed-disk group.*

Explanation

The Managed Disk specified in the command is not in unamanged mode. To be a candidate for a managed-disk group, a managed disk cannot be part of another managed group. It also cannot be either offline or excluded.

Action

Choose a different Managed Disk ID to add to the specified managed-disk group.

HWN021911E Another probe of storage subsystem *The Name+Nameformat of the storage subsystem is already in progress.*

Explanation

Another probe for the same subsystem was already started and is in progress, so the new probe cannot be started.

Action

Probe this subsystem only after the previous probe for it is finished.

HWN021912E Other probes of storage subsystems *The list of Name+Nameformat of the storage subsystems are already in progress.*

Explanation

Other probes for the same subsystems were already started and are in progress, so the new probes cannot be started.

Action

Probe these subsystems only after the previous probes for them are finished.

HWN021913E IBM Spectrum Control Device Server could not write to directory *The directory.*

Explanation

The IBM Spectrum Control Device Server is not able to write to the directory. Possible reasons could be insufficient disk space, missing access privileges, etc.

Action

Check the free disk space and ensure that the access permissions for the directory are set correctly. If the problem still occurs, please contact IBM support.

HWN021914E SSH key file *The SSH key file name is still in use, so it cannot be deleted.*

Explanation

The SSH key is still used by IBM Spectrum Control to manage one or more SVC devices, so it cannot be deleted.

Action

No action is required.

HWN021915E IBM Spectrum Control Device Server could not delete the file *The file.*

Explanation

The IBM Spectrum Control Device Server is not able to delete the file. A possible reason could be missing or wrong access privileges.

Action

Ensure that the access permissions for the file are set correctly. If the problem still occurs, please contact IBM support.

HWN021916E The storage subsystem *subsystem ID* is not configured for file level management.

Explanation

File level management information is not available for the storage subsystem.

Action

Verify the storage subsystem is configured for file level management. If the storage subsystem is configured for file level management, run a storage subsystem probe. Then try the operation again.

HWN021917E An invalid parameter *Name of the parameter which was invalid* was specified. The corresponding file system mount point does not exist.

Explanation

An invalid parameter was specified. The corresponding file system mount point does not exist.

Action

Specify a valid file system mount point and try the operation again.

HWN021919E The cluster ID *The ID of the cluster.* was not found.

Explanation

The cluster ID specified in the command was not found.

Action

Some of the IBM Spectrum Control components might be out of sync. Run a discovery, then run a data collection task, such as a subsystem probe. Try the command again.

HWN021920E The export ID *The ID of the export.* was not found.

Explanation

The export ID specified in the command was not found.

Action

Some of the IBM Spectrum Control components might be out of sync. Run a discovery, then run a data collection task, such as a subsystem probe. Try the command again.

HWN021921E *The specified activity or protocol could not be used to change the export. The ID of the export..*

Explanation

A valid activity or protocol is required to change an export.

Action

Specify a valid activity or protocol to change the export.

HWN021922E *The file system ID `file_system_ID` was not found.*

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Run the discovery process again, and then run a data collection task.

HWN021923E *Invalid parameter `Name of the parameter which was invalid`. File system does not exist.*

Explanation

The file system system does not exist.

Action

Specify a file system.

HWN021924E *The parameter `Name of the parameter which was invalid` is not a valid parameter.*

Explanation

The NFS position option is only used by NFS add or NFS change option.

Action

In order to use the NFS position option, you must also specify either the NFS add option or the NFS change option.

HWN021925E The fileset ID *fileset_ID* was not found.

Explanation

No DB row was found that corresponds to the key that was passed in as an input parameter.

Action

IBM Spectrum Control components may be out of sync. Run the discovery process again, and then run a data collection task.

HWN021926E The WAN-cache source ID *WAN_cache_source_id* was not found.

Explanation

The WAN-cache source ID specified in the command was not found.

Action

Some IBM Spectrum Control components may be out of sync. Run a discovery, and then run a data collection task, such as a subsystem probe. Try the command again.

HWN021927E The WAN-cache ID *WAN_cache_source_id* was not found.

Explanation

The WAN-cache ID specified in the command was not found.

Action

Some IBM Spectrum Control components may be out of sync. Run a discovery, and then run a data collection task, such as a subsystem probe. Try the command again.

HWN023000I The Optimization Execution task has started.

Explanation

This message is for informational purposes. No further investigation is required.

Action

No action is required.

HWN023001E The task to optimize the volumes was not completed successfully.

Explanation

The action was not completed because unexpected errors occurred.

Action

Open the logs for the task and complete the following actions:

- Examine the log messages that were generated before the errors occurred.
- Determine the current state of the volumes.

Depending on the error, it might be necessary to access the storage virtualizer. If this is the case, complete the following actions:

- Carry out further investigations to determine the cause of the errors.
- Resolve the issues that caused the errors.

When the issues are resolved, probe the storage virtualizer, and then rerun the task to optimize the volumes. If the issues cannot be resolved, contact IBM Software Support.

HWN023002I The Optimization Execution task has completed.

Explanation

This message is for informational purposes. No further investigation is required.

Action

No action is required.

HWN023003I The Optimization Execution task retrieved number recommendations

Explanation

The Optimization Execution request will process the number of recommendations retrieved.

Action

No action is required.

HWN023004I The Optimization Automation request persisted recommendations to be processed.

Explanation

The Optimization request persisted the recommendations to be processed.

Action

No action is required.

HWN023005I The Optimization Execution task updated the status of *number* recommendations.

Explanation

The Optimization Execution task has updated the status of the specified number of recommendations.

Action

No action is required.

HWN023006I The Optimization Automation request begins processing *number* recommendations.

Explanation

The Optimization request is processing the specified number of recommendations.

Action

No action is required.

HWN023007W The recommendation being processed contains a virtual disk that is no longer detected.

Explanation

The recommendation list contains a recommendation request where the virtual disk is no longer detected by IBM Spectrum Control. The recommendation will be ignored.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer detected by TPC. It would therefore be recommended to resubmit the analysis job to generate a new set of recommendations that would not contain entities that no longer exist.

HWN023008W The recommendation for virtual disk *vdisk name* contains a source storage pool that is no longer detected.

Explanation

The recommendation list contains a recommendation request where the source storage pool is no longer detected by IBM Spectrum Control. The recommendation will be ignored.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer detected by TPC. It would therefore be recommended to resubmit the analysis job to generate a new set of recommendations that would not contain entities that no longer exist.

HWN023009W The recommendation for virtual disk *vdisk name* contains a target storage pool that is no longer detected.

Explanation

The recommendation list contains a recommendation request where the target storage pool is no longer detected by IBM Spectrum Control. The recommendation will be ignored.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer detected by TPC. It would therefore be recommended to resubmit the analysis job to generate a new set of recommendations that would not contain entities that no longer exist.

HWN023010I virtual disk *vdisk name* was successfully migrated from storage pool *source pool name* to storage pool *target pool name*.

Explanation

The Recommendation processed successfully migrated the virtual disk to the target pool.

Action

No action is required.

HWN023011W The recommendation for virtual disk *vdisk name* contains a virtual disk that does not exist in the source storage pool *source pool name* or the target storage pool *target pool name*.

Explanation

The recommendation list contains a recommendation request where the virtual disk does not exist in either the source or target storage pool. The recommendation will be ignored.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer in a relationship once detected by IBM Spectrum Control. It would therefore be recommended to resubmit the analysis job to generate a new set of recommendations that would not contain entities that no longer exist.

HWN023012W The recommendation for virtual disk *vdisk name* contains a non-mirrored virtual disk that is now a mirrored virtual disk.

Explanation

The recommendation list contains a recommendation request where a non-mirrored virtual disk is now a mirrored virtual disk. The recommendation will be ignored.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer in a relationship once detected by IBM Spectrum Control. It would therefore be recommended to resubmit the analysis job to generate a new set of recommendations that would not contain entities that no longer exist.

HWN023013W The recommendation for virtual disk *vdisk name* contains a mirrored virtual disk that is now a non-mirrored virtual disk.

Explanation

The recommendation list contains a recommendation request where a mirrored virtual disk is now a non-mirrored virtual disk. The recommendation will be ignored.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer in a relationship once detected by IBM Spectrum Control. It would therefore be recommended to resubmit the analysis job to generate a new set of recommendations that would not contain entities that no longer exist.

HWN023014I The recommendation for virtual disk *vdisk name* requires more space on target pool *target pool name* to be processed.

Explanation

The Recommendation processed requires space to be freed by dependent migrations before the recommendation can be processed. Once the dependent migrations have been completed, the recommendation will be retried with the expectation that the recommendation will succeed since the space required was freed.

Action

No action is required.

HWN023015I Virtual disk *vdisk name* will now be migrated from storage pool *source pool name* to storage pool *target pool name*.

Explanation

The Recommendation processed will now perform the virtual disk migration.

Action

No action is required.

HWN023016I Successfully added virtual disk copy to virtual disk *vdisk name*.

Explanation

The Recommendation processed successfully added a virtual disk copy to the specified virtual disk.

Action

No action is required.

HWN023017I Synchronization for virtual disk *vdisk name* has completed *synchronization percent%* and requires about *seconds* to complete *seconds* to complete.

Explanation

The synchronization for the virtual disk is not complete and will need to take the specified amount of time to finish. Keep in mind that the time to complete is only an approximation and competing activity within the virtualizer may either hasten or slow the synchronization. Therefore, the time to complete adjusts as the synchronization of the virtual disk progresses.

Action

No action is required.

HWN023018I Synchronization for virtual disk *vdisk name* has completed.

Explanation

The synchronization for the virtual disk has completed.

Action

No action is required.

HWN023019I Successfully removed a virtual disk copy from virtual disk *vdisk name*.

Explanation

The Recommendation processed successfully removed a virtual disk copy of the specified virtual disk.

Action

No action is required.

HWN023020I Successfully changed the synchronization rate of virtual disk *vdisk name* to *syncrate%*.

Explanation

The Recommendation processed successfully changed the synchronization rate to the specified amount.

Action

No action is required.

HWN023021I Successfully changed the primary copy of virtual disk *vdisk name*.

Explanation

The Recommendation processed successfully changed the primary copy of the virtual disk.

Action

No action is required.

HWN023022E There is no space available on target pool *target pool name* to migrate the virtual disk *vdisk name*.

Explanation

The Recommendation for the virtual disk cannot be migrated due to no available space in the target storage pool.

Action

Make more space available in the target storage pool or re-run the analysis so that a new recommendation with sufficient space can be accomplished.

HWN023023E Unable to submit request to add vdisk copy command for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not submit the request to add a vdisk copy to the specified virtual disk due to an error with the request submission.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023024E Unable to complete request to add vdisk copy command for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not complete the request to add a vdisk copy to the specified virtual disk due to an error with the request completion.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023025E Unable to submit request to get vdisk synchronization progress for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not submit the request to get the vdisk synchronization progress of the specified virtual disk due to an error with the request submission.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023026E Unable to complete request to get vdisk synchronization progress for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not complete the request to get the vdisk synchronization progress of the specified virtual disk due to an error with the request completion.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023027E Unable to submit request to remove vdisk copy command for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not submit the request to remove a vdisk copy to the specified virtual disk due to an error with the request submission.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023028E Unable to complete request to remove vdisk copy command for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not complete the request to remove a vdisk copy to the specified virtual disk due to an error with the request completion.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023029E Unable to submit request to change the synchronization rate for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not submit the request to change the synchronization rate of the specified virtual disk due to an error with the request submission.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023030E Unable to complete request to change the synchronization rate for virtual disk *vdisk name* due

to rc (rc) .

Explanation

Could not complete the request to change the synchronization rate of the specified virtual disk due to an error with the request completion.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023031E Unable to submit request to change the primary copy for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not submit the request to change the primary copy of the specified virtual disk due to an error with the request submission.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023032E Unable to complete request to change the primary copy for virtual disk *vdisk name* due to rc (rc) .

Explanation

Could not complete the request to change the primary copy of the specified virtual disk due to an error with the request completion.

Action

Check subsequent messages for more details and additional log files that may surface communication errors under the device server log directory, otherwise contact IBM support for more assistance.

HWN023033E The request failed. Message from failed request: *message*.

Explanation

The request failed due to an error processing the request.

Action

Contact IBM customer technical support if unable to determine the error from the request error message or the log files under the device server log directory.

HWN023034E The Optimization Automation job completed with errors in the recommendations.

Explanation

The Optimization Automation job failed due to errors with the recommendations.

Action

Investigate the reason for the recommendation errors. This can be done by looking at the messages within the job log and taking the appropriate action where needed.

HWN023035W The Optimization Execution task completed with warnings.

Explanation

The Optimization Execution task encountered errors that were ignored during the processing of the recommendations.

Action

Investigate the reason for the recommendation errors. This can be done by looking at the messages within the job log and taking the appropriate action where needed.

HWN023036E The request failed because there were not enough extents in the storage pool.

Explanation

The request failed due to there not being enough space to satisfy the request.

Action

Make more space available in the target storage pool or re-run the analysis so that a new recommendation with sufficient space can be accomplished.

HWN023037E The request failed because the number of copies of this volume would exceed the limit.

Explanation

The request failed due to there being the expected limit of volume copies for the volume. It is possible that the volume has already been migrated to a new target pool.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer detected by TPC. It would therefore be recommended to resubmit the analysis job to generate a new set of

recommendations that would not contain entities that no longer exist.

HWN023038E The request failed because the copy specified does not exist.

Explanation

The request failed due to the copy specified no longer existing. It is possible that the volume has already been migrated to a new target pool.

Action

If the analysis that generated the recommendation was performed sometime in the past, it is possible that an entity that was part of the recommendation is no longer detected by TPC. It would therefore be recommended to resubmit the analysis job to generate a new set of recommendations that would not contain entities that no longer exist.

HWN023039E The following exception occurred during a migration request: exception

Explanation

The migration request failed due to an exception. The exception is caused by an internal error in the program.

Action

Contact IBM support with all the service log files so that the exception can be investigated further.

HWN023040E The migration request for volume vdisk name is already being processed.

Explanation

The migration request failed for the specified volume because it is already being processed. This could be due to a concurrent job request to perform different migrations on the same volume. The first migration request for the volume will be preferred over any subsequent migration request for the same volume.

Action

Check the job logs for competing migration requests and if the wrong migration was performed, perform the analysis again and resubmit the optimization automation.

HWN023041W The request to migrate the mirrored volume vdisk name is suspended because the secondary volume is offline.

Explanation

To complete the migration request for the mirrored volume, the status of the secondary volume must change from offline to online. The status of the secondary volume is checked at regular intervals. If the status of the secondary volume changes to online, the migration request is resumed.

Action

If the migration request remains suspended, you can either cancel the execution of the recommendation, or open the Storage System GUI to bring the secondary volume back online.

HWN023042E The secondary copy needed for migration does not exist.

Explanation

The secondary copy is needed for volume migration since it is the means by which migration is achieved. Without the secondary copy, the migration cannot complete.

Action

Look at job logs to determine why the volume that was to be added was removed. If an action was taken that removed the new secondary copy before the copy was synchronized, then this error will occur. It is recommended to retry the recommendation and submit it separately from other recommendations.

HWN023043I The mirrored volume migration for volume vdisk name will be ignored.

Explanation

The mirrored volume migration for the specified volume will be ignored because the user specified that it should be ignored.

Action

No action is required.

HWN023044I The mirrored volume migration for volume vdisk name will result in the current secondary volume becoming the primary volume.

Explanation

The mirrored volume migration for the specified volume will result in the current secondary volume to become the primary volume and the new secondary volume will be migrated to the target pool. This is because the user specified this action.

Action

No action is required.

HWN023045I The mirrored volume migration for volume *vdisk name* will result in the primary volume being migrated to the target pool.

Explanation

The mirrored volume migration for the specified volume will result in the primary volume to be migrated to the target pool because the user specified this action.

Action

No action is required.

HWN023046I The Migration of the previously abandoned Optimization Automation job has started.

Explanation

If an optimization automation job was in progress prior to a server shutdown, the job will resume if any migrations are pending. This message is for informational purposes. No further investigation is required.

Action

No action is required.

HWN023047I The Migration of the previously abandoned Optimization Automation job has completed.

Explanation

This message is for informational purposes. No further investigation is required.

Action

No action is required.

HWN023048I The Optimization Automation cancellation job *jobname* has started.

Explanation

This message is for informational purposes. No further investigation is required.

Action

No action is required.

HWN023049E The Optimization Automation cancellation job completed with errors.

Explanation

The cancellation of the Optimization Automation job failed due to an unexpected error.

Action

Contact IBM customer technical support with all related errors.

HWN023050I The Optimization Automation cancellation job *jobname* has completed.

Explanation

This message is for informational purposes. No further investigation is required.

Action

No action is required.

HWN023051I The Optimization Automation job *jobname* will be canceled.

Explanation

The request to cancel an optimization job will commence being canceled.

Action

The result of the cancellation can be located in the job log of the job that is being canceled.

HWN023052W The Optimization Automation job is not in progress.

Explanation

The request to cancel an optimization job could not be canceled because it is not being processed.

Action

Check to see if the optimization job that was to be canceled has completed.

HWN023053I The migration of volume *vdisk name* has been canceled.

Explanation

The migration of the volume was canceled by the user. No further investigation is required.

Action

No action is required.

HWN023054W The Optimization Automation job was canceled.

Explanation

The Optimization Automation job was canceled by the user.

Action

Check if the cancelation was valid, and if so, no action is necessary. If not, look at the cancel request to determine who initiated the cancellation..

HWN023055I The volume that was chosen for transformation, *vdisk name*, is a secondary volume in a mirrored volume relationship. The secondary volume will be migrated to the specified target pool or converted as specified.

Explanation

The secondary volume will be converted or moved as specified.

Action

No action is required.

HWN024000I An optimization analysis task was started.

Explanation

This message is for informational purposes only.

Action

None.

HWN024001I The analysis is completed.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024002W Unable to retrieve any policy for Tier value.

Explanation

No policy was found for this tier. The input storage pool might have moved to another tier.

Action

If there have been changes to the storage pool tier since the analysis job was created, create a new analysis job.

HWN024003I Analyzed *number_of_volumes* volumes on tier *tier_number* for storage virtualizer *subsystem_name*.

Explanation

This message is for informational purposes. No further investigation is required.

Action

No action is required.

HWN024006W No target pools in subsystem *value* were selected.

Explanation

Source pools in the specified subsystem were selected, but no target pools in that subsystem were selected. IBM Spectrum Control will only move volumes across pools in the same subsystem.

Action

Select target pools in the specified subsystem and retry.

HWN024011W Destination storage pool *value* in subsystem *value* was not considered. Reason: *value*.

Explanation

This message is for informational purposes.

Action

None.

HWN024012I It is recommended that *number_of_volumes* volumes on tier *source_tier_number* are moved to tier *target_tier_number*.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024015I The optimization analysis of the *value* subsystem was started.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024016W Volume *value* is already in the destination storage pool *value*. No recommendations will be generated for the volume.

Explanation

The volume is already in the storage pool that was selected as the destination. No recommendations will be generated for the volume.

Action

Select a destination storage pool that is not the same as the source storage pool.

HWN024018W No destination storage pools in Tier *value* have been specified for subsystem *value*.

Explanation

Optimization Analysis cannot balance storage pools when no destination pools have been specified.

Action

Specify destination storage pools for the balance operation.

HWN024019W The following pools on tier *tier_number* on the *storage_system* storage system cannot be balanced by redistributing or re-tiering volumes: *pool_names*.

Explanation

The pools were not balanced either because volumes could not be re-tiered to balance the pools, or an insufficient number of volumes were re-tiered to reduce the activity level of the pools below the specified threshold.

Action

Complete one or more of the following actions, and then rerun the task to balance the pools:

- Select a wider range of pools on the tiers that you want to balance.
- Select a wider range of target pools on tiers that are higher and that are lower than the tiers that you want to balance.
- Increase the value for the activity limit of the pools that you want to balance.

HWN024020I Started analysis to balance pools on tier *value*.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024021W The *pool_name* pool on tier *tier_number* on the *storage_system* storage system cannot be balanced by redistributing the volumes.

Explanation

The pool was not balanced because an insufficient number of volumes could be redistributed across the pools to reduce the activity level of the pool below the specified threshold.

Action

Complete one or more of the following actions, and then rerun the task to balance the pools:

- Select a wider range of pools on the tiers that you want to balance.
- Increase the value for the activity limit of the pools that you want to balance.

Alternatively, run the Analyze Tiering wizard to automatically balance the pools. If the pools cannot be balanced across the tier, the most active volumes are re-tiered to balance the pools.

HWN024027I Storage Pool *pool name* has insufficient available space for volume *volume name* in storage pool *pool name*.

Explanation

The Optimization Balance Analysis determined that the specified volume could not be moved to the specified storage pool due to insufficient space. This does not mean that the specified storage pool is a good candidate in other aspects, just that the storage pool had insufficient space.

Action

If the storage pool activity values can not be reduced sufficiently by the Balance Analysis, consider resolving this issue by either modifying the storage pool or including additional storage pools in the Balance Analysis.

HWN024030W One or more entities specified as input for the analysis could not be found or pools or volumes in some input entities could not be found.

Explanation

The Optimization Analysis task was not able to find all of the input entities specified when the task was created or was not able to find pools or volumes in such entities. The entities may have been deleted or removed.

Action

If all input entities should still exist, check to see if IBM Spectrum Control reports any errors for these entities. If this situation is expected due to intentional environment changes, then no action is necessary.

HWN024031W One or more entities specified as candidate destinations for the analysis could not be found.

Explanation

The Optimization Analysis task was not able to find all of the candidate destination entities specified when the task was created. The entities may have been deleted or removed.

Action

If all candidate destination entities should still exist, check to see if IBM Spectrum Control reports any errors for these entities. If this situation is expected due to intentional environment changes, then no action is necessary.

HWN024032W For one or more mirrored volumes, both the primary and the secondary volume copies were chosen

for transformation. You cannot transform both volume copies in the same transform task. Only the primary volume copies are included for transformation. You can transform the secondary volume copies in a separate transformation.

Explanation

If you are transforming both the primary and secondary copies of a mirrored volume, you must include the volume copies in separate transformations.

Action

On the Volumes page, choose the secondary volume copies that were excluded from this transformation and run the transform storage analysis for those volumes.

HWN024033W The volume *volume name* cannot be analyzed because it is not in a capacity pool.

Explanation

When you restrict optimization to target pools in the same capacity pool, the volumes that you select for analysis must belong to a capacity pool.

Action

Add the volume to a capacity pool and run the Analyze Tiering wizard again. Alternatively, choose another option for selecting target pools such as manual selection.

HWN024034W The pool *pool name* cannot be analyzed because the pool is not in a capacity pool.

Explanation

When you restrict optimization to target pools in the same capacity pool, the pools that you select for analysis must belong to a capacity pool.

Action

Add the pool to a capacity pool and run the Analyze Tiering wizard again. Alternatively, choose another option for selecting target pools such as manual selection.

HWN024035W The storage virtualizer *system name* cannot be analyzed because the storage virtualizer is not in a capacity pool.

Explanation

When you restrict optimization to target pools in the same capacity pool, the storage virtualizer that you select for analysis must belong to a capacity pool.

Action

Add the storage virtualizer to a capacity pool and run the Analyze Tiering wizard again. Alternatively, choose another option for selecting target pools such as manual selection.

HWN024036W The operation to transform the volumes on the subsystem name storage virtualizer cannot be completed because the destination pools were not available.

Explanation

The destination pools that were selected to transform the volumes could not be detected.

Action

Run the Transform Storage wizard again.

HWN024037E An unexpected error occurred. The operation to transform the volumes on the subsystem name storage virtualizer cannot be completed because the destination pools were not identified.

Explanation

The pools that were selected to transform the volumes could not be identified.

Action

If the problem persists, use the Service tool to collect trace data and send it to IBM Software Support.

HWN024043I The capacity pools of the source volumes were selected as the target pools.

Explanation

In the Analyze Tiering wizard, the option to restrict the selection of target pools to target pools in the same capacity pool was selected.

Action

No action is required.

HWN024046I The option that was selected to handle volumes with mirrored volumes is: After optimization, set the copy of the secondary volume in the destination pool as the primary volume. The original secondary volume remains the secondary volume.

Explanation

The option that was selected by the user to include or exclude volumes with mirrored volumes in the analysis.

Action

No action is required.

HWN024047I The number of days for collecting performance data to analyze the volumes is set to performance_data_collection_period.

Explanation

Only the performance data that was collected within the specified period is used to analyze the volumes.

Action

No action is required.

HWN024050I Automatic tiering was selected to tier the volumes.

Explanation

The default option, automatic tiering, was selected by the user in the Analyze Tiering wizard.

Action

No action is required.

HWN024051I The tiering analysis is starting.

Explanation

The source volumes that you selected are analyzed to determine whether they require re-tiering.

Action

No action is required.

HWN024052I Tier *tier#* has an I/O density threshold value of *value* per second per GiB.

Explanation

User-defined values for the I/O density thresholds were specified for the storage tiers.

Action

No action is required.

HWN024053I Tier *tier#*, has a file age threshold value of *value* percent of files last accessed within *time_unit*.

Explanation

User-defined threshold values were specified for file usage for the storage tier.

Action

No action is required.

HWN024054I The real capacity for the thin-provisioned volumes is set to *value unit*.

Explanation

The percentage or amount of the current capacity of the volume that is allocated when the volume is converted to a thin-provisioned volume was specified by the user in the Transform Storage wizard.

Action

No action is required.

HWN024055I The auto expand property of the thin-provisioned volumes is set to yes/no.

Explanation

Whether the auto expand property was enabled or disabled by the user in the Transform Storage wizard.

Action

No action is required.

HWN024056I The warning level for thin-provisioned volumes is set to value %.

Explanation

The warning level threshold that was specified by the user in the Transform Storage wizard for thin-provisioned volumes.

Action

No action is required.

HWN024057I The grain size that was specified for the thin-provisioned volumes is *grain_size* KiB.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024058I The real capacity for the compressed volumes is set to value unit.

Explanation

The percentage or amount of the current capacity of the volume that is allocated when the volume is converted to a compressed volume was specified by the user in the Transform Storage wizard.

Action

No action is required.

HWN024059I The auto expand property for the compressed volumes is set to yes/no.

Explanation

Whether the auto expand property was enabled or disabled by the user in the Transform Storage wizard.

Action

No action is required.

HWN024060I The warning level for the compressed volumes is set to value.

Explanation

The warning level threshold that was specified by the user in the Transform Storage wizard for compressed volumes.

Action

No action is required.

HWN024061I The option that was selected to handle volumes with mirrored volumes is: After optimization, set the secondary volume as the primary volume. The volume in the destination pool is the secondary volume.

Explanation

The option that was selected by the user to include or exclude volumes with mirrored volumes in the analysis.

Action

No action is required.

HWN024062I The option that was selected for mirrored volumes is: Do not optimize volumes with mirrored volumes.

Explanation

The option that was selected by the user to include or exclude volumes with mirrored volumes in the analysis.

Action

No action is required.

HWN024066I Tier tier# has an I/O rate threshold value of value I/O per second.

Explanation

User-defined values for the I/O rate thresholds were specified for the storage tiers. For each tier, the lower threshold value is reported, so the lowest tier is shown with a threshold of 0.0 I/O per second.

Action

No action is required.

HWN024067W Recommendations cannot be generated for *number_of_volumes* volumes because the volumes do not meet the tiering criteria for tier *current_tier_number* or for any lower tier.

Explanation

Based on the tiering criteria that was selected, one or more volumes should be moved to lower tiers. However, recommendations to move the volumes cannot be generated because the volumes do not match the tiering criteria that was selected for the lower tiers.

Action

No action is required.

HWN024068W Recommendations cannot be generated to move *number_of_volumes* volumes from *source_tier* to tier *target_tier_number* due to the pool activity limit value.

Explanation

One or more volumes could not be moved to the specified tier without causing one or more storage pools in the tier to be too active.

Action

No action is required.

HWN024069W Recommendations cannot be generated to move *number_of_volumes* volumes from tier *source_tier* to tier *target_tier_number* because the destination storage pools do not have enough space.

Explanation

The volumes cannot be added to the destination storage pools that were selected because of insufficient available space.

Action

Reduce the allocated capacity in the destination pools or choose destination pools with sufficient available space when you run the Analyze Tiering wizard.

HWN024070I The analysis to optimize subsystem storage_subsystem was completed.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024071I The option that was selected was to restrict the placement of volumes in capacity pools to destination storage pools in the same capacity pool.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024072W No file age information for volume *volume name*.

Explanation

The file age threshold can not be applied to this volume as no file scan information exists.

Action

No action is required. To enable file age threshold analysis of this volume, run a file system scan for any filesystems contained on the volume and rerun the analysis.

HWN024073W Storage pool {0} in tier {1} needs at least one additional storage pool in the same tier for the Balance Analysis to run on this tier.

Explanation

Storage pools are balanced within their tier. An input storage pool can not be balanced if no other input storage pool is of the same tier.

Action

Ensure storage pool tier assignments are correct and that all necessary storage pools are selected as input for the Balance Analysis.

HWN024074W Storage pool {0} in tier {1} and capacity pool {2} needs at least one additional storage pool in the same tier and capacity pool for the Balance Analysis to run within this capacity pool and on this tier.

Explanation

Storage pools are balanced within their tier and capacity pool boundary. An input storage pool can not be balanced if no other input storage pool is of the same tier and capacity pool.

Action

Ensure storage pool tier and capacity pool assignments are correct and that all necessary storage pools are selected as input for the Balance Analysis.

HWN024075W *number_of_volumes* volumes from storage pool *pool* could not be moved to the destination storage pools because the destination storage pools do not have enough space.

Explanation

The volumes cannot be moved to the destination storage pools that were selected because of insufficient available space.

Action

Add more capacity to the destination storage pools or choose destination storage pools with sufficient available space. If there are other reasons why the volumes could not be moved to the destination storage pools, adding more capacity to the destination storage pools or choosing destination storage pools with sufficient available space may still not generate recommendations.

HWN024076W *number_of_volumes* volumes from storage pool *pool* could not be moved to the destination pools because the destination storage pools are not in the same capacity pool.

Explanation

The volumes cannot be moved to the destination storage pools that were selected because the destination storage pools are not in the same capacity pool as the source storage pool.

Action

Choose destination storage pools that are in the same capacity pool as the source storage pool. If there are other reasons why the volumes could not be moved to the destination storage pools, choosing destination storage pools in the same capacity pool as the source storage pool may still not generate recommendations.

HWN024077W *number_of_volumes* volumes from storage pool *pool* could not be moved to the destination storage pools because the destination storage pools would have exceeded the pool activity limit value.

Explanation

The volumes cannot be moved to the destination storage pools that were selected because moving the volumes would have caused the destination storage pools' activity to exceed the activity limit value.

Action

Choose destination storage pools with lower pool activity values. If there are other reasons why the volumes could not be moved to the destination storage pools, choosing destination storage pools with lower activity values may still not generate recommendations.

HWN024078W *number_of_volumes* volumes from storage pool *pool* could not be moved to the destination storage pools because the destination storage pools already have a volume copy.

Explanation

The volumes cannot be moved to the destination storage pools that were selected because a copy of the volume already exists on the destination storage pools.

Action

Choose destination storage pools with do not have volume copies. If there are other reasons why the volumes could not be moved to the destination storage pools, choosing destination storage pools without volume copies may still not generate recommendations.

HWN024079W Because of an internal error, the number of volumes in the *pool* storage pool that could not be moved to destination storage pools is *number_of_volumes*.

Explanation

The selected destination storage pools were not valid destinations for these volumes.

Action

Choose different destination storage pools.

HWN024080W Destination storage pool *pool* already contains a copy of storage volume *volume*.

Explanation

Moving the storage volume to the destination storage pool will result in both the storage volume and its copy being in the same storage pool.

Action

Choose a destination storage pool with no volume copies.

HWN024081W Because the destination storage pool does not have sufficient available space, the volume storage volume in the *source_pool* storage pool cannot be moved to the *destination_pool* destination storage pool.

Explanation

The destination storage pool that was selected does not have sufficient available space.

Action

Allocate more space to the destination storage pool or select a destination storage pool that has sufficient available space.

HWN024082W Because the destination storage pool contains a copy of the mirrored volume, the volume storage volume in the *source_pool* storage pool cannot be moved to the *destination_pool* destination storage pool.

Explanation

The primary volume and the secondary volume of a volume in a mirrored volume relationship cannot be placed in the same storage pool.

Action

Select a destination storage pool that does not contain a copy of the mirrored volume.

HWN024083W Because of an internal error, the volume storage volume in the *spool* storage pool could not be moved to the *destination_pool* destination storage pool.

Explanation

The storage pool is not a valid destination storage pool for the volume.

Action

Choose a different destination storage pool.

HWN024084W Because the destination storage pools contain one or more copies of the mirrored volumes, the number of volumes that could not be moved from tier *source_tier* to tier *target_tier* is *number_of_volumes*.

Explanation

The primary volume and the secondary volume of a volume in a mirrored volume relationship cannot be placed in the same storage pool.

Action

Ensure that one or more of the destination storage pools that are selected do not contain copies of the mirrored volumes.

HWN024085W The *pool_name* storage pool cannot be balanced because the tier level of the pool was reset to none.

Explanation

To balance storage pools, the tier level of each storage pool must be set.

Action

Set the tier level for the storage pool, and then rerun the task that was created to balance the pools.

HWN024086E Recommendations cannot be generated because the tier level of the *destination_pool_name* destination storage pool was reset to none.

Explanation

To analyze the tiering of the volumes, the tier level of both the source and the destination storage pools must be set.

Action

Set the tier level for the storage pool, and then rerun the task to analyze the tiering of the volumes.

HWN024087W Recommendations cannot be generated for one or more of the volumes because collocated volumes cannot be placed in the same destination storage pool.

Explanation

Based on the tiering criteria, the resources, and the options that were selected, all of the collocated volumes cannot be placed in the same destination pool.

Action

To determine whether further action can be taken, check the preceding messages in the log file. If, for example, one of the collocated volumes in the source pool was a mirrored volume, and the option to exclude mirrored volumes was selected, then recommendations to collocate the volumes are not generated. To resolve this particular issue, rerun the analysis and include mirrored volumes in the analysis.

HWN024088I The option to collocate volumes that are assigned to the same server or hypervisor was selected.

Explanation

If one or more of the volumes that are assigned to the same server or hypervisor and in the same source pool require optimization, then recommendations are only generated if all of the related volumes can be placed in the same destination pool.

Action

No action is required.

HWN024089I The option to collocate volumes that are assigned to the same server or hypervisor was not selected.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024090W Because the storage pools do not meet the service class requirements, the number of volumes that cannot be moved is no_volumes.

Explanation

Volumes that are assigned a service class must be placed in pools that meet the service class requirements of the volumes.

Action

Ensure that pools that meet the service class requirements of the volumes are selected when you run the Balance Pools analysis.

HWN024091W If the recommendation to move the *volume_name* volume to the *storage_pool_name* storage pool is implemented, the service class requirements of the *volume_name* volume cannot be met.

Explanation

Volumes that are assigned a service class should be placed in pools that meet the service class requirements of the volumes.

Action

Ensure that the destination pools that you select meet the service class requirements of the volumes in the source pools.

HWN024092W Recommendations cannot be generated to move *number_of_volumes* volumes from tier *source_tier* to tier *target_tier_number* because the destination storage pools do not meet the service class requirements of the volumes.

Explanation

The volumes cannot be added to the destination storage pools that were selected because the storage pools do not meet the service class requirements.

Action

Ensure that pools that meet the service class requirements of the volumes are selected.

HWN024093I The number of volumes on tier *tier_level* that were not analyzed because of the instruction to exclude mirrored volumes from the analysis is *number_of_volumes* volumes.

Explanation

The option to exclude mirrored volumes from the analysis was selected.

Action

No action is required.

HWN024094W valid target pools were not selected for the *subsystem_name* storage virtualizer.

Explanation

When volumes are optimized, they are moved to destination pools in the same storage virtualizer. The destination pool is chosen from the list of target pools that are selected when the analysis is run.

Action

Ensure that target pools for all of the resources that are being analyzed are selected.

HWN024095I The grain size for the thin-provisioned volumes was set to the default value of *grain_size* KiB.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024096W Volumes in the *pool_name* pool on tier *tier_level* cannot be moved to a higher tier to reduce the activity level of the pool to the user-defined level.

Explanation

No suitable target pools were found on higher tiers to relocate the most-active volumes.

Action

No action is required.

HWN024097W Volumes in the *pool_name* pool on tier *tier_level* cannot be moved to a lower tier to reduce the activity level of the pool to the user-defined level.

Explanation

No suitable target pools were found on lower tiers to relocate the most-active volumes.

Action

No action is required.

HWN024098W Cannot generate recommendations to tier volumes from the *storage_system_name* storage system because all of the source volumes are in the selected destination storage pools.

Explanation

To generate recommendations for tiering volumes, there must be at least one destination storage pool that does not include the volumes that are in the source storage pools.

Action

Select at least one destination storage pool that does not include the volumes that are in the source storage pools.

HWN024099I The number of volumes that were excluded from the analysis to plan the tiering of the *storage_system_name* storage system is *vols_count*. The volumes were excluded because performance data is not available for the volumes.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024100I The number of volumes that were excluded from the analysis to plan the tiering of the *storage_system_name* storage system is *vols_count*. The volumes were excluded from the analysis because the capacity of the volumes is zero.

Explanation

The volumes that were excluded from the analysis might be thin-provisioned volumes that are not being used and that have an initial capacity of zero.

Action

No action is required.

HWN024101I The number of volumes that were excluded from the analysis to plan the tiering of the

storage_system_name storage system is *vols_count*. The volumes were excluded from the analysis because the volumes are not assigned to pools that are tiered or the thresholds were not defined for the tiers.

Explanation

To plan tiering, the volumes must belong to pools that are assigned a tier level with defined performance thresholds.

Action

Define the criteria for the tiers in your storage environment and ensure that the pools that you want to include in the analysis are assigned a tier level.

HWN024102W The recommendation to move the *storage_volume_name* volume from the *source_pool_name* storage pool to the *target_pool_name* storage pool was not generated because the status of the destination pool is offline or excluded.

Explanation

The recommendation was not generated and implemented because it would result in the volume becoming offline

Action

Select another destination storage pool or run a probe of the system that contains the destination storage pool. The status of the storage pool might have changed since the last probe.

HWN024103I Reclaiming volumes

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024104I Planning for tiering volumes

Explanation

This message is for informational purposes only.

Action

No action is required.

HWN024105W The recommendation to move the *storage_volume_name* volume from the *source_pool_name* storage pool to the *target_pool_name* storage pool will not be executed because the status of the destination pool is offline or excluded.

Explanation

The recommendation was not implemented because it would result in the volume becoming offline.

Action

No action is required.

HWN024106W The recommendation to move the *storage_volume_name* volume from the *source_pool_name* storage pool was not generated because the status of the volume is offline.

Explanation

An offline volume cannot be moved.

Action

Select another volume or run a probe of the system that contains the selected volume. The status of the volume might have changed since the last probe.

HWN024107W The recommendation to move the *storage_volume_name* volume from the *source_pool_name* storage pool to the *target_pool_name* storage pool will not be executed because the status of the volume is offline.

Explanation

An offline volume cannot be moved.

Action

No action is required.

HWN024108E The recommendations can't be shown because the analysis was not completed.

Explanation

The analysis to generate recommendations was not saved.

Action

Wait for the next data collection to trigger an analysis of the volumes. If you still can't see the recommendations, go to Service Engage support (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWN024109W The data for the previous analysis of the *storage_subsystem* storage system was not deleted.

Explanation

Analysis data was not deleted.

Action

The next time the analysis is run, the old analysis data will be deleted.

HWN024110E Volumes reclamation analysis failed for *storage_subsystem* storage subsystem.

Explanation

Failed to work with database. Received SQL error instead.

Action

Ensure database server is up and running. Check device and data server logs to get error details.

HWN024111W Recommendations cannot be generated to move *number_of_volumes* volumes from tier *source_tier* to tier *target_tier_number* because there is no potential destination pool assigned to the recommended tier.

Explanation

There must be at least one potential destination pool assigned to the recommended tier in order to try a placement analysis.

Action

Select at least one pool assigned to this recommended tier, as potential destination, when you run the Analyze Tiering wizard.

HWN024112W Cannot generate recommendations to tier volumes from the *storage_system_name* storage system because the source storage pools and the selected destination storage pools are assigned to the same tier.

Explanation

To generate recommendations for tiering volumes, there must be at least one destination storage pool that is not assigned to the same tier as the source storage pools.

Action

Select at least one destination storage pool that does not belong to the same tier as the source storage pools.

HWN024200I The days of the week to include in the analysis: *days_of_week*.

Explanation

Only the performance data that was collected during the specified days of the week is used to analyze the volumes.

Action

No action is required.

HWN024201I The time window for the performance data to include in the analysis is set to *start_time - end_time*.

Explanation

Only the performance data that was collected during the specified time window is used to analyze the volumes.

Action

No action is required.

HWN024202I The time window for the performance data to include in the analysis is set to *start_time - end_time*. The *end_time* occurs on the next day.

Explanation

Only the performance data that was collected during the specified time window is used to analyze the volumes.

Action

No action is required.

HWN024203W The volume *storage_volume_name* cannot be converted or moved because the target pools do not have sufficient available space or the target pool types are incorrect for the operation.

Explanation

The volumes cannot be converted or moved because there is not enough space in the target pools or the target pool types are not allowed for the operation.

Action

Add more capacity to the target pools or choose target pools with sufficient available space.

HWN025000I Storage pool *value* in storage system *value* has storage from different types of back-end storage systems. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from different types of storage systems, back-end disk data like the disk type, raid type and number of disks cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025001I Storage pool *value* in storage system *value* has storage from unknown back-end storage system(s). Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from storage system(s) unknown to IBM Spectrum Control, back-end disk data like the disk type, raid type and number of disks cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025002I Storage pool value in storage system value has storage from multiple back-end storage systems or from multiple pools in a single storage system. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from multiple storage systems or multiple pools in a single storage system, back-end disk data like the disk type, raid type and number of disks cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025003I Storage pool value in storage system value has storage from a back-end storage pool with multiple disk types. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from a storage pool with multiple disk types, back-end disk data like the raid type cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025004I Storage pool value in storage system value has storage from a back-end storage pool with a mixed raid type. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from a storage pool with a mixed raid type, back-end disk data like the raid type cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025005I Storage pool value in storage system value has storage from a back-end storage pool with multiple raid types. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from a storage pool with multiple raid types, back-end disk data like the raid type cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025006I Storage pool value in storage system value has storage from back-end disks of unknown type. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from disks of unknown type, back-end disk data cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025007I Storage pool value in storage system value has storage from unknown number of back-end disks. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from unknown number of disks, back-end disk data cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025008I Storage pool value in storage system value has storage from back-end disks with unknown raid type. Back-end disk data cannot be determined.

Explanation

Since the back-end storage is from disks with unknown raid type, back-end disk data cannot be determined for the storage pool.

Action

Back-end storage details for the storage pool can be set by editing the data in the Back-end Storage tab of the storage pool properties panel in the IBM Spectrum Control Web-based GUI.

HWN025009E Connection to Data Server failed. Make sure Data Server is up.

Explanation

Connection to Data Server cannot be established.

Action

If Data Server is down, start the Data Server. If it is up, make sure you can connect to the Data Server through other operations. If the problem persists, please contact IBM Software Support.

HWN025011W All of the target ports for the storage system are used for the provisioning request. The request might take a long amount of time.

Explanation

Target port information was not supplied and the Device Server attempted to limit provisioning to the target ports that are on the same fabric as the host. The Device Server cannot determine which target ports are on the same fabric with the host.

Action

The provisioning tasks can complete faster if the fabrics are managed by IBM Spectrum Control. Add the fabrics to IBM Spectrum Control. If the fabrics are already managed by IBM Spectrum Control, check that data collection for the fabrics completed successfully.

HWN025010I Collecting parent pool volumes for storage system: storage system identification.

Explanation

The probe is collecting data to gather the relationships of the parent pool volumes to the thin-provisioned volumes.

Action

No action is required.

HWN025011E The port the target port ID has a usage restriction which prevents it from being used as a target port for volume assignment.

Explanation

The target port has a usage restriction that does not allow it to be used for volume assignment to initiators. The usage restriction may be in place if the storage system is a virtualizer and the storage system port is dedicated to be used as an initiator for backend storage.

Action

Specify storage system ports that do not have usage restrictions.

HWN025012E The invocation of CIM method `ExposePaths` failed on SMI-S provider *Name of SMI-S provider*. The return code is *Return code of method*.

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed. The standard return codes are as follows:

- 1 - Not Supported
- 2 - Unspecified Error
- 3 - Timeout
- 4 - Failed
- 5 - Invalid Parameter
- 4097 - Invalid logical unit ID
- 4098 - Invalid initiator port ID
- 4099 - Invalid target port ID
- 4100 - Invalid permission
- 4101 - Target/initiator combination already exposed
- 4102 - Requested logical unit number in use
- 4103 - Maximum Map Count Exceeded

Action

Check the details of the request to ensure that there is no problematic input. Otherwise contact IBM support for more assistance.

HWN025013E The invocation of CIM method `HidePaths` failed on SMI-S provider *Name of SMI-S provider*. The return code is *Return code of method*.

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed. The standard return codes are as follows:

- 1 - Not Supported
- 2 - Unspecified Error
- 3 - Timeout
- 4 - Failed
- 5 - Invalid Parameter
- 4097 - Invalid logical unit ID
- 4098 - Invalid initiator port ID

4099 - Invalid target port ID

4100 - Target/initiator combination not exposed

Action

Check the details of the request to ensure that there is no problematic input. Otherwise contact IBM support for more assistance.

HWN025014E The invocation of CIM method CreateOrModifyElementFromStoragePool failed on SMI-S provider *Name of SMI-S provider* . The return code is *Return code of method*.

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed. The standard return codes are as follows:

- 1 - Not Supported
 - 2 - Unknown
 - 3 - Timeout
 - 4 - Failed
 - 5 - Invalid Parameter
 - 6 - In Use
- 4097 - Size Not Supported

Action

Check the details of the request to ensure that there is no problematic input. Otherwise contact IBM support for more assistance.

HWN025015E The invocation of CIM method ReturnToStoragePool failed on SMI-S provider *Name of SMI-S provider* . The return code is *Return code of method*.

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed. The standard return codes are as follows:

- 1 - Not Supported
- 2 - Unknown
- 3 - Timeout
- 4 - Failed
- 5 - Invalid Parameter
- 6 - In Use

Action

Return code 5 can also indicate that the volume is already removed. Check the details of the request to ensure that there is no problematic input. Otherwise contact IBM support for more assistance.

HWN025016E The invocation of CIM method `DeleteStorageHardwareID` failed on SMI-S provider *Name of SMI-S provider*. The return code is *Return code of method*.

Explanation

The extrinsic CIM method that was invoked on the given SMI-S provider failed. The standard return codes are as follows:

- 1 - Not Supported
- 2 - Unspecified Error
- 3 - Timeout
- 4 - Failed
- 5 - Invalid Parameter
- 4096 - Specified instance not found

Action

Check the details of the request to ensure that there is no problematic input. Otherwise contact IBM support for more assistance.

HWN025017E A CLI command failed. Check the logs from *EP working dir*.

Explanation

A command issued to CLI failed.

Action

Check the logs from the specified location.

HWN025018E An error occurred when attempting to parse the file *File name*.

Explanation

An error occurred when attempting to parse the specified file.

Action

Verify the correct file was specified or the file is in the correct format.

HWN025019E The requested operation failed. Check the logs from *EP working dir.*

Explanation

The requested operation failed.

Action

Check the logs from the specified location.

HWN025020E The volume cannot be created. The volume of size *Size* in pool *Pool* on storage system *Subsystem* cannot be created. The pool might already have the maximum number of volumes allowed.

Explanation

The volume cannot be created. This pool might have already reached the maximum number of volumes allowed.

Action

Change the provisioning request to make use of pools that have not reached the maximum number of volumes allowed.

HWN025021E Unable to resolve the address for the device because the request was not processed by the data collector.

Explanation

The data collector did not respond to the server in the allotted time. The data collector might not be running or it might not be able to connect to the server.

Action

Verify that the data collector is running and that it can connect to the server.

HWN025022E The data collection detected storage system *New Subsystem* with serial number *new serial number* instead of expected serial number *expected serial number*.

Explanation

The data source reported data for a different storage system as expected, because the a new serial number of the device was returned.

This can happen when a storage system is replaced by a new one with same ip address and credentials.

The new storage system is added and the storage system that was managed previously is shown as undetectable.

Action

Please verify status and the data source information of the storage systems and update them accordingly.

For the new storage system create data collection and performance data collection schedules as needed.

HWN025025I Starting the task to send the report for schedule Schedule Id by email.

Explanation

The task to send the report by email at the frequency configured in the report is being created.

HWN025026I The report title report is being created.

Explanation

Based on the settings that were configured, the report is being created.

HWN025027I The report title report with ID report id is being sent by email to the reports recipients.

Explanation

The report that was created is being sent to the recipients.

HWN025028I The report title report with ID report id was sent by email to the reports recipients.

Explanation

The task that was created to send the report by email was completed successfully.

HWN025029E Can't retrieve the configured settings of the report for schedule Schedule Id .

Explanation

The settings that were used to configure the report were deleted.

Action

To generate the report, a new report must be created and configured.

HWN025030E The report can't be sent because the email server was not configured.

Explanation

The email server was not set up or was not set up correctly.

Action

Go to your Product and services page (<https://myibm.ibm.com/products-services/>)on IBM Marketplace, click the down-arrow for the Storage Insights offering, click Support and then choose an option.

HWN025031E Can't send the *report title* report with ID *report id* by email because of the following error: *reported_error*.

Explanation

The task failed because an error was generated.

Action

Go to your Product and services page (<https://myibm.ibm.com/products-services/>)on IBM Marketplace, click the down-arrow for the Storage Insights offering, click Support and then choose an option.

HWN025031I To view the report, choose HTML as the message format or use an email application that supports HTML message formats.

Explanation

The report contained in the e-mail can only displayed if the e-mail application supports HTML and has HTML support enabled.

Action

Enable HTML support in your the e-mail client you are using to view this report.

HWN025032E Job failed during post processing of collected data from the data source.

Explanation

The probe returned as failure because of a fatal error during post processing.

Action

Check the logs for more details about the error.

HWN025033E Failed to send the *report name* report for schedule *Schedule Id*.

Explanation

Failed to send the report by e-mail.

HWN025034I Created *number_of_servers* agentless servers automatically.

Explanation

The probe of the storage system discovered one or more host connections for which no corresponding agentless server was defined. The agentless servers for those host connections were created automatically during probe post-processing.

Action

No action is required.

HWN025035I Removed *number_of_servers* agentless servers automatically.

Explanation

The probe of the storage system discovered that one or more agentless servers were no longer associated with any storage system host connections. These agentless servers are obsolete and were removed automatically during probe post-processing.

Action

No action is required.

HWN025036E Can't save the report in the directory.

Explanation

Write access is required to save reports in the directory.

Action

Check that the access permissions for the directory are set correctly .

HWN025037E Can't save the report because the path specifies a file name instead of a directory name.

Explanation

The path must specify the name of the directory that is to be used to save the reports.

Action

Enter the path to a valid directory.

HWN025038E Can't save the report, because the directory doesn't exist.

Explanation

The report can't be saved in the directory that was specified.

Action

Check that the correct path to the directory was specified and that the access permissions for all of the directories in the path are set correctly.

HWN025039E Can't save the report because the directory doesn't have enough disk space.

Explanation

The directory that was specified doesn't have enough available space for saving the report.

Action

Allocate more space to the directory or specify a directory with sufficient space to save the reports in.

HWN025040I The report title report with ID *report id* is being saved as *report file name* in the full path directory.

Explanation

The report is being saved in the directory that was specified by the user.

HWN025041I The report title report with ID *report id* was saved as *report file name* in the full path directory.

Explanation

The report was saved in the directory that was specified by the user.

HWN099990I *The method name of the Device Server method of the device server returned return value @ (execution context information).*

Explanation

This is a device server informational trace message, intended for IBM development and support purposes.

Action

No action is required.

HWN099991I *info trace message@ (execution context information)*

Explanation

This is a device server informational trace message, intended for IBM development and support purposes.

Action

No action is required.

HWN099992W *warning trace message@ (execution context information)*

Explanation

This is a device server warning trace message, intended for IBM development and support purposes.

Action

No action is required.

HWN099993E *error/exception trace message @ (execution context information)*

Explanation

This is a device server error/exception trace message, intended for IBM development and support purposes.

Action

No action is required.

HWN099994I An object of class *name of the class* has been instantiated @(*execution context information*) .

Explanation

This is a device server informational trace message, intended for IBM development and support purposes. It indicates the creation of a Java object.

Action

No action is required.

HWN099995I |==| *class name.method name entry, parameter(s) : parameter value(s)* @(*execution context information*) .

Explanation

This is a device server informational trace message, intended for IBM development and support purposes. It reports a Java method entry.

Action

No action is required.

HWN099996I ==| *class name.method name exit, return value: method return value (execution time in milliseconds)* @(*execution context information*) .

Explanation

This is a device server informational trace message, intended for IBM development and support purposes. It reports a Java method completion.

Action

No action is required.

HWN099997I External service *name of the (DM) external service* will be invoked with parameter(s) *parameter value(s)*@(*execution context information*) .

Explanation

This is a device server informational trace message, intended for IBM development and support purposes. It reports invocation of an service outside of DM, for example a CIMClient call.

Action

No action is required.

HWN099998I *Invocation of external service name of the (DM) external service returned result invocation result@(execution context information).*

Explanation

This is a device server informational trace message, intended for IBM development and support purposes. It reports the result of the invocation of an service outside of DM, for example a CIMClient call.

Action

No action is required.

HWN099999I *The method name of the device server method of the device server was invoked with parameters invocation parameters@(execution context information).*

Explanation

This is a device server informational trace message, intended for IBM development and support purposes.

Action

No action is required.

HWN6001I *Operation operation completed successfully.*

Explanation

The operation completed successfully.

Action

No response is necessary. This message is informational only.

HWN6002I *Unable to set up NLS message file processing.*

Explanation

The system was unable to set up message file processing for other languages.

Action

No response is necessary. This message is informational only.

HWN6003E Unable to set up tracing.

Explanation

The agent was unable to set up tracing.

Action

Try the same operation again. If the problem persists, contact IBM service.

HWN6004E Operation *operation* failed.

Explanation

The operation specified failed.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6005E Unknown operation *operation*.

Explanation

An unknown operation was attempted.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6006E Could not initialize connection, rc is *rc*

Explanation

A connection could not be initialized. Return code from the subsystem was *rc*.

Action

Try the same operation again. Verify connectivity with the subsystem. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6007E Could not parse command arguments: *arg*

Explanation

The command arguments were not parsed successfully.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6008E Error processing command: *command*

Explanation

There was an error processing the command.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6009E Missing 'operation' property in input file

Explanation

The input specified was missing an input property.

Action

Specify the missing property and try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6010I Task *arg* completed successfully

Explanation

The specified task completed successfully.

Action

No response is necessary. This message is informational only.

HWN6011E Task *arg* failed

Explanation

The specified task failed.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6012E Cannot connect to this IP, switching to IP

Explanation

The current IP did not allow connection. The task will switch to the one specified.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6013E An IBM XIV CLI command failed. The error is arg.

Explanation

The command issued to the XIV CLI failed with the error specified.

Action

Try the same operation again. If the problem persists, look up the XIV error. Contact IBM service if the issue cannot be resolved.

HWN6014I Command arg completed successfully

Explanation

A method was called with wrong attributes.

Action

No response is necessary. This message is informational only.

HWN6015E Command command failed.

Explanation

The specified command failed.

Action

Try the same operation again. If the problem persists, enable high level tracing as explained in the Installation and Configuration Guide and contact IBM service.

HWN6016I Connected with IP address IP

Explanation

Connected with the XIV at the specified IP address

Action

No response is necessary. This message is informational only.

HWN6017I Started creation of volume with size *size* in pool *pool*.

Explanation

A method was called with wrong attributes.

Action

No response is necessary. This message is informational only.

HWN6018I Volume creation completed successfully. New volume *volume* created with size *size* in pool *pool*.

Explanation

A method was called with wrong attributes.

Action

No response is necessary. This message is informational only.

HWN6019I Started deletion of volume *volume* in pool *pool*.

Explanation

Deletion of the specified volume started.

Action

No response is necessary. This message is informational only.

HWN6020I Volume deletion completed successfully. Volume *volume* deleted in pool *pool*

Explanation

Volume deletion completed successfully. The specified volume was deleted from the specified pool.

Action

No response is necessary. This message is informational only.

HWN6021I Started creation of host *host* with initiator ports *ports*

Explanation

Started host creation.

Action

No response is necessary. This message is informational only.

HWN6022I Finished creation of host *host* with initiator ports *ports*

Explanation

Finished host creation.

Action

No response is necessary. This message is informational only.

HWN6023I Started assignment of volume *volume* to host *host*.

Explanation

Started assignment of the volume to the host.

Action

No response is necessary. This message is informational only.

HWN6024I Finished assignment of volume *volume* to host *host*.

Explanation

Completed assignment of volume to host.

Action

No response is necessary. This message is informational only.

HWN6025I Started unassignment of volume *volume* from host *host*.

Explanation

Started removing volume from host.

Action

No response is necessary. This message is informational only.

HWN6026I Finished unassignment of volume *volume* from host *host*

Explanation

Volume removal completed.

Action

No response is necessary. This message is informational only.

HWNEP0001I Successfully persisted *number of count instances*.

Explanation

A Native API action has been executed successfully. No error condition has been encountered.

Action

No action is required.

HWNEP0002E The probe failed as the data collector couldn't write to its output file, *value*.

Explanation

Information couldn't be collected about the resource as the output file for the data collector was missing or couldn't be accessed.

Action

Restart the data collection. If the problem persists, go to the IBM support portal and open a case against IBM Storage Insights or IBM Storage Insights Pro. To help us troubleshoot, include the URL of your product's instance in the problem description.

Related reference

- [IBM Support Portal](#)
-

HWNEP0003E A DS8000 ESSNI command failed. The error code is error_code.

Explanation

An ESSNI command failed. No subsequent ESSNI commands were issued, but any commands issued previously were successful. Please check the DS8000 Information Center for more information on the ESSNI error.

Action

Check the DS8000 Information Center for details on the cause and recommended response. Some additional detail may be available in the IBM Spectrum Control message and trace logs. Next, try running the IBM Spectrum Control operation again. Should the problem persist, contact IBM support.

HWNEP0004I Started creation of volume group volume_group.

Explanation

Volume Group creation has started. The log will provide information about the subsequent result.

Action

No action is required.

HWNEP0005I Finished creation of volume group volume_group with subsystem volume group number number.

Explanation

The task succeeded.

Action

No action is required.

HWNEP0006I Started adding volumes, with serial numbers volume_list, to subsystem volume group volume_group_number .

Explanation

Volumes specified will be added to the specified volume group. The log will provide information about the subsequent result.

Action

No action is required.

HWNEP0007I Finished adding volumes to volume group.

Explanation

The task succeeded.

Action

No action is required.

HWNEP0008I Started assignment of host *host* on subsystem *subsystem* to volume group *volume_group*.

Explanation

The host will be associated with the specified volume group, providing it with access to all volumes within the volume group.

Action

No action is required.

HWNEP0009I Finished assigning host on subsystem *subsystem* to volume group *volume_group*.

Explanation

The task succeeded.

Action

No action is required.

HWNEP0010I Started removing volumes, with serial numbers *volume_list*, from subsystem volume group *volume_group_number* .

Explanation

Volumes specified will be removed from the specified volume group. The log will provide information about the subsequent result.

Action

No action is required.

HWNEP0011I Finished removing volumes, with serial numbers *volume_list*, from subsystem volume group *volume_group_number* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0012I Increased virtual capacity of storage pool *storage_pool* on subsystem *subsystem* to size *size* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0013I Collecting pools for storage system *storage_system* identification.

Explanation

The probe is currently querying the ESSNI server for the extent pools of the storage system.

Action

No action is required.

HWNEP0014I Collecting volumes for lss logical subsystems on storage system *storage_system* identification.

Explanation

The probe is currently querying the ESSNI server for information regarding logical subsystems and their volumes.

Action

No action is required.

HWNEP0015I Collecting volume groups on storage system storage system identification.

Explanation

The probe is currently querying the ESSNI server for the subsystem's volume groups.

Action

No action is required.

HWNEP0016I Collecting hosts on storage system storage system identification.

Explanation

The probe is currently querying the ESSNI server for the subsystem's hosts and the volume group to which they are assigned.

Action

No action is required.

HWNEP0017I value Hosts Found.

Explanation

This status message is to inform you of the total number of hosts found for this storage system.

Action

No action is required.

HWNEP0018I Launching external process for devices devices.

Explanation

An external process has been started for the devices specified. The log will provide information about the subsequent result.

Action

No action is required.

HWNEP0019I External process for devices devices completed successfully.

Explanation

An external process has for the devices specified has completed successfully.

Action

No action required.

HWNEP0020E Could not create connection to NAPI The IP for the NAPI..

Explanation

No connection to the NAPI could be established.

Action

Check the External Process logs for further details.

HWNEP0021E ESSNI API query for Space Efficient Volume failed with ESSNI code *ESSNI Code*. Data from ESSNI is considered suspect.

Explanation

The ESSNI API was unable to successfully complete the requested query. This indicates a problem within the subsystem and thus the probe will terminate as any data received may be unreliable.

Action

This is usually due to an issue within the NI Services or the LPARs themselves. If the DS gives no indication as to the failure, try restarting one and then the other to see if the problem is resolved.

HWNEP0022I Started deletion of volume group with number *volume_group_number*.

Explanation

Volume group deletion was started. The log will provide information about the subsequent result.

Action

No action is required.

HWNEP0023I Finished deletion of volume group with number *volume_group_number*.

Explanation

The volume group was successfully deleted.

Action

No action is required.

HWNEP0100I Probing Volumes for Storage System: *value*

Explanation

The probe is finding the volumes (VDisks) for this storage system.

Action

No action is required.

HWNEP0101I Number of Volumes currently found: *value*. Continuing to probe Volumes.

Explanation

The probe is finding the volumes (VDisks). This status update is to inform of the number of volumes (VDisks) that have been processed at this point during the probe.

Action

No action is required.

HWNEP0102I *value* Volumes found.

Explanation

This is the total number of Volumes (VDisks) found on the storage system.

Action

No action is required.

HWNEP0103I Probing Configured Disks for Storage System: *value*.

Explanation

The probe is finding the configured disks (MDisks) for this storage system.

Action

No action is required.

HWNEP0104I Number of Configured Disks Found Currently: value. Continuing to Probe Disks.

Explanation

The probe is finding the configured disks (MDisks). This status update is to inform how many configured disks (MDisks) have been processed at this point during the probe.

Action

No action is required.

HWNEP0105I value Configured Disks Found.

Explanation

This status message to inform you of the total number of configured disks (MDisks) found for this storage system or storage pool.

Action

No action is required.

HWNEP0106I Probing Views of Host Initiator access to Volumes .

Explanation

The probe is finding the Host Initiator access to Volumes.

Action

Check logs for SQLExceptions logged for ServiceUtils.getConnection().

HWNEP0107I Finished probing Views .

Explanation

The probe for finding the Host Initiator access to Volumes is complete.

Action

Check logs for SQLExceptions logged for ServiceUtils.getConnection().

HWNEP0108I Initializing Probe for storage system storage system identification.

Explanation

Probe is being initialized.

Action

No Action is required

HWNEP0109I Probe for storage system storage system identification completed.

Explanation

Probe is completed.

Action

No action is required.

HWNEP0110I Collecting Nodes and fibre channel ports for storage system storage system identification.

Explanation

The probe is currently collection the Nodes and fibre channel ports of the storage system.

Action

No action is required.

HWNEP0111E The connection to the storage device failed. The error code is `error_code`.

Explanation

The External Process connection to the storage device failed with the specified error code. Please check the log details for more info.

Error codes :

- 0 : There is no connection for the specified device
- 2 : No SSH server found on the device
- 3 : Unsupported version
- 4 : The connection to the device failed
- 5 : Authentication failed
- 6 : Unknown host
- 7 : The passphrase is wrong

- 8 : The passphrase is missing
- 9 : Unknown error
- 10: ESSNI not available
- 11: Private key not found
- 12: Invalid format for the private key
- 49: Unable to establish a connection to the device through http port 80

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP0113E The cluster IP address is not specified in the configuration file.

Explanation

The cluster IP address is not specified in the configuration file.

Action

Run the job again. Should the problem persist, contact IBM support.

HWNEP0114E The trustore location is not specified in the configuration file.

Explanation

The trustore location is not specified in the configuration file.

Action

Run the job again. Should the problem persist, contact IBM support.

HWNEP0115E The IBM Spectrum Control data is out of synch with the device configuration and a re-probe is required for device *device name* .

Explanation

The IBM Spectrum Control data is out of synch with the device configuration and a re-probe is required for this device.

Action

Run the probe again. After probe has completed successful run the command again. Ensure that no other configuration changes are performed on the device. If the problem persists, please contact IBM support.

HWNEP0116E The user configured for the subsystem *subsystem name* is not permitted to perform the

requested action.

Explanation

The user configured for the current subsystem is not permitted to perform the requested action.

Action

The user that is configured in IBM Spectrum Control to manage the subsystem or is authenticated using the keyfile does not have the proper rights to perform the requested action. This has to be corrected in the subsystem configuration.

HWNEP0117E The virtual disk (VDisk)-to-host mapping was not created because the volume *vdiskName* is already mapped to the *hostName* host for the Device *deviceName*

Explanation

The virtual disk (VDisk)-to-host mapping could not be created because this VDisk is already mapped to this host.

Action

Run the discovery or probe again. Check the message and trace logs to get to the root cause. If the problem persists, contact IBM support.

HWNEP0115I Starting Control Process for storage system storage system identification.

Explanation

The specified control process has been started.

Action

No Action is required

HWNEP0116I Started deletion of volume *VolumeID* on subsystem *Subsystem* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0117I Volume deletion completed successfully.
Volume *VolumeID* on subsystem *Subsystem* was deleted.

Explanation

The task succeeded.

Action

No action is required.

HWNEP0118I Started adding Managed Disk(s) *Managed Disk ID* to Managed-disk group *Managed Disk group name* on subsystem *Subsystem*.

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0119I Finished adding Managed Disk(s) *Managed Disk ID* to Managed-disk group *Managed Disk group name* on subsystem *Subsystem*.

Explanation

The task succeeded.

Action

No action is required.

HWNEP0120I Started creation of volume with size *Size* in pool *Pool* on subsystem *Subsystem*

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0121I Volume creation completed successfully. New volume *VolumeID* created with size *Size* in pool *Pool* on subsystem *Subsystem* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0122I Started assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *Initiator Port* on host *Host* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0123I Finished assignment of volume *VolumeID* on subsystem *Subsystem* to initiator port *Initiator Port* on host *Host Name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0124I Started unassignment of volume *VolumeID* on subsystem *Subsystem* from initiator port *Initiator Port* on host *Host Name* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0125I Finished unassignment of volume *VolumeID* on subsystem *Subsystem* from initiator port *Initiator Port* on host *Host Name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0126I Started creation of host *host name* on subsystem *Subsystem* with initiator ports *WWPNs* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0127I Finished creation of host *host name* on subsystem *Subsystem* with initiator ports *WWPNs* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0128I Host name *hostName* already exists for the *WWPNs wwpns* on the device *Subsystem*

Explanation

The host name already exists on the device

Action

Run the discovery or probe again. Check the message and trace logs to get to the root cause. If the problem persists, contact IBM support.

HWNEP0129E The operation failed because the device returned unexpected values.

Explanation

Check configuration and connection to the device interface and make sure the device is up and running properly.

Action

An unexpected error occur in the communication with the storage device. Ensure that the device and connection to the device is working properly. Check the message and trace logs to get to the root cause. Run the operation again. If the problem persists, contact IBM support.

HWNEP0130E A IBM XIV CLI command failed. The error is `error_code`.

Explanation

A IBM XIV Command Line Interface command failed. None of the operations that are part of this request were processed successfully. Please check the detailed error messages..

Action

Check the message and trace logs to get to the root cause. Lookup the device specific error code in the device documentation. Run the operation again. Should the problem persist, contact IBM support.

HWNEP0131I The host definition for host `host name` on subsystem `Subsystem` contains additional Hostports `WWPNs` that will also be assigned to Volume `VolumeID` .

Explanation

The selected hostport is part of a host definition on the subsystem that contains additional hostports. These additional hostports will also be assigned to the volume and can access the volume.

Action

If the volume must not be accessible through the additional hostports use the subsystem element manager and change create separate host definitions for the hostports.

HWNEP0132E The unassignment of Volume `VolumeID` from hostport `WWPN` failed because the definition for host `host name` on subsystem `Subsystem` contains additional hostports `WWPNs` .

Explanation

The hostport is part of a host definition on the subsystem that contains additional hostports. Unassigning the additional hostports could cause access loss to the volume .

Action

Either specify all hostports of the host definition for unassignment command or change the host definition on the subsystem using the device's element manager.

HWNEP0133E Error invoking the external process for device *device name* .

Explanation

There was an error invoking the external process.

Action

Check the logs for errors and retry the operation.

HWNEP0134E Following exception occurred: *exception* .

Explanation

There was an unknown error occurred during processing of the function.

Action

Check the logs for errors and retry the operation.

HWNEP0135E External process failed with error code *error code* .

Explanation

The external process failed.

Action

Check the logs for errors and retry the operation.

HWNEP0136E Error connecting to IP address with user ID *user ID* .

Explanation

There was an unknown error connecting to a device like subsystem, server, switch, etc..

Action

Make sure the device is up and running.

HWNEP0137I Job *job ID* submitted for device *device name*

.

Explanation

A new job was submitted for the device.

Action

None.

HWNEP0138I External process was successfully executed for device *device name* .

Explanation

A job was successfully executed.

Action

None.

HWNEP0139I An instruction was issued to add a copy of the *volume_name* *volume_size*-byte volume in the *pool_name* pool on the *storage_system_name* storage system.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0140I The copy of the *volume_name* *volume_size*-byte volume with the copy ID of *VolumeID* in the *pool_name* pool on the *storage_system_name* storage system was added successfully.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0141I Probing Internal Drives for Storage System: value.

Explanation

The probe is finding the internal drives for this storage system.

Action

No action is required.

HWNEP0142I Number of Internal Drives Found Currently: value. Continuing to Probe Internal Drives.

Explanation

The probe is finding the internal drives. This status update is to inform how many internal drives have been processed at this point during the probe.

Action

No action is required.

HWNEP0143I value Internal Drives Found.

Explanation

This status message to inform you of the total number of internal drives found for this storage system.

Action

No action is required.

HWNEP0144I Probing Pools for Storage System: value.

Explanation

The probe is finding the pools (MDisk groups) for this storage system.

Action

No action is required.

HWNEP0145I Number of Pools Found Currently: *value*.
Continuing to Probe Pools.

Explanation

The probe is finding the pools (MDisk groups). This status update is to inform how many pools (MDisk groups) have been processed at this point during the probe.

Action

No action is required.

HWNEP0146I *value* Pools Found.

Explanation

This status message to inform you of the total number of pools (MDisk groups) found for this storage system.

Action

No action is required.

HWNEP0147I Collecting asset and status information about *storage_system_id* storage system.

Explanation

The data collection schedule is starting.

Action

No action is required.

HWNEP0148I Collecting cluster information for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about clusters.

Action

No action is required.

HWNEP0149I Collecting file system exports for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about file system exports.

Action

No action is required.

HWNEP0150I Collecting nodes for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about nodes.

Action

No action is required.

HWNEP0151I Collecting file systems for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about file systems.

Action

No action is required.

HWNEP0152I Collecting pools for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about storage pools.

Action

No action is required.

HWNEP0153I Collecting file system storage for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about file system storage.

Action

No action is required.

HWNEP0154I Collecting filesets for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about filesets.

Action

No action is required.

HWNEP0155I Collecting links between file systems and nodes for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for links between file systems and nodes.

Action

No action is required.

HWNEP0156I Collecting quotas for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about quotas.

Action

No action is required.

HWNEP0157I Collecting file system snapshots for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about file system snapshots.

Action

No action is required.

HWNEP0158I Collecting capacity for *file_system_id* file system.

Explanation

The data collection schedule is querying the storage system for information about file system capacity.

Action

No action is required.

HWNEP0159I Creating the export *export name* on cluster *cluster name*.

Explanation

The export is being created. Check the log file for status.

HWNEP0160I The export *export name* on cluster *cluster name* with path *export path* was created.

Explanation

The export was created.

HWNEP0161I The export *export name* on cluster *cluster name* is being changed.

Explanation

The export is being changed. Check the log file for status.

HWNEP0162I The export *export name* on cluster *cluster name* was changed.

Explanation

The export was changed.

HWNEP0163I Setting quota *quota type - quota name* on file system *file system name*.

Explanation

The set quota task has started. The log file will contain information on progress.

Action

No action is required.

HWNEP0164I Quota *quota type - quota name* on file system *file system name* has been created.

Explanation

The set quota task has completed.

Action

No action is required.

HWNEP0165I Checking quota on file system *file system name*.

Explanation

The check quota task has started. The log file will contain information on progress.

Action

No action is required.

HWNEP0166I Quota on file system *file system name* has been checked.

Explanation

The check quota task has completed.

Action

No action is required.

HWNEP0167I The export *export name* on cluster *cluster name* is being removed.

Explanation

The export is being removed. Check the log file for status.

HWNEP0168I The export *export name* on cluster *cluster name* was removed.

Explanation

The export was removed. Check the log file for status.

HWNEP0169E Command: *command* did not complete. IBM SONAS CLI message

Explanation

The IBM SONAS CLI command did not complete.

Action

Verify the IBM SONAS CLI command syntax is valid.

HWNEP0170I Creating fileset *fileset name* on file system *files system name* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0171I Successfully created fileset *fileset name* on file system *file system name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0172I Removing fileset *fileset name* on file system *files system name* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0173I Successfully removed fileset *fileset name* on file system *file system name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0174I Modifying fileset *fileset name* on file system *file system name* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0175I Successfully modified fileset *fileset name* on file system *file system name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0176I Creating file system *file system* on cluster *cluster name* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0177I Successfully created file system *file system* on cluster *cluster name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0178I Changing file system *file system* on cluster *cluster name* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0179I Successfully changed file system *file system* on cluster *cluster name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0180I Removing file system *file system* on cluster *cluster name* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0181I Successfully removed file system *file system* on cluster *cluster name* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0182I Mounting file system *file system* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0183I Successfully mounted file system *file system* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0184I Unmounting file system *file system* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0185I Successfully unmounted file system *file system* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0186I Linking fileset *fileset* on file system *file system* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0187I Successfully linked fileset *fileset* on file system *file system* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0188I Unlinking fileset *fileset* on file system *file system* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0189I Successfully unlinked fileset *fileset* on file system *file system* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0190E The IBM Spectrum Control server could not connect to *IP address* using the SSH protocol.

Explanation

The IBM Spectrum Control server could not create a network connection to the specified IBM Storwize V7000 Unified/IBM SONAS device using the SSH protocol.

Action

Verify that the IBM Storwize V7000 Unified/IBM SONAS device is running and that the connection is not being blocked by a firewall.

HWNEP0191E The IBM Spectrum Control server could not authenticate with *IP address* using the SSH protocol.

Explanation

The IBM Spectrum Control server could not create an SSH connection to the specified IBM Storwize V7000 Unified/IBM SONAS device due to an authentication failure.

Action

Verify that the IBM Spectrum Control server is configured with the correct credentials for the IBM Storwize V7000 Unified/IBM SONAS device.

HWNEP0192E The IBM Spectrum Control server could not execute a command on the IBM Storwize V7000 Unified/IBM SONAS device at *IP address*.

Explanation

The IBM Spectrum Control server could not remotely execute a command on the specified IBM Storwize V7000 Unified/IBM SONAS device using the SSH protocol.

Action

Check the log files for additional details.

HWNEP0193E The *command name* command failed because the following command executed on the NAS device failed with the return code *return code* : *command returned: command output*

Explanation

The IBM Spectrum Control command failed because the command that was executed on the NAS device failed.

Action

Check the diagnostics section of the manpage of the failed command for additional details.

HWNEP0195I modify fileset

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0196I change export

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0197I create export

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0198I remove export

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0199I create fileset

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0200I link fileset

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0201I remove fileset

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0202I unlink fileset

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0203I change filesystem

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0204I create filesystem

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0205I mount filesystem

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0206I remove filesystem

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0207I unmount filesystem

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0208I check quota

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0209I set quota

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0210I probe

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0211W The *command name* command completed, however during post-processing the following command executed on the NAS device failed with the return code *return code : command returned: command output* As a result, the IBM Spectrum Control database is now out of sync with the current state of the NAS device.

Explanation

The requested command completed, but during post-processing one of the commands executed on the NAS device failed. Post-processing commands are used to update the IBM Spectrum Control database so this failure has caused the IBM Spectrum Control database to be out of sync with the current state of the device.

Action

Probe the device to update the IBM Spectrum Control database and check the diagnostics section of the manpage of the failed command for additional details on why the post-processing command failed.

HWNEP0212I create disk in modifying file system

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0213I Started deletion of host *host name* on subsystem *Subsystem* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0214I Finished deletion of host *host name* on subsystem *Subsystem* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0215I Collecting cache information for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for cache information.

Action

No action is required.

HWNEP0216I remove cached source

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0217I create cached node

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0218I remove cached node

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0219I create cache

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0220I remove cache

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0221I modify cache source

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0222I Creating cache source *cache_source_name* on cluster *file_system_name*.

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0223I Created cache source *cache_source_name* on cluster *file_system_name*.

Explanation

The task completed.

Action

No action is required.

HWNEP0224I Removing cache source *cache_source_name* on cluster *file_system_name*.

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0225I Removed cache source *cache_source_name* on cluster *file_system_name*.

Explanation

The task completed.

Action

No action is required.

HWNEP0226I Modifying cache source *cache_source_name* on cluster *file_system_name*.

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0227I Modified cache source *cache_source_name* on cluster *file_system_name*.

Explanation

The task completed.

Action

No action is required.

HWNEP0228I Creating cache *cache_name* on file system *file_system_name*.

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0229I Created cache *cache_name* on file system *file_system_name*.

Explanation

The task completed.

Action

No action is required.

HWNEP0230I Removing cache *cache_name* on file system *file_system_name*.

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0231I Removed cache *cache_name* on file system *file_system_name*.

Explanation

The task completed.

Action

No action is required.

HWNEP0232I Modifying cache *cache_name* on file system *file_system_name*.

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0233I Modified cache *cache_name* on file system *file_system_name*.

Explanation

The task completed.

Action

No action is required.

HWNEP0234I modify cache

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0235I create cached source

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0236I Configuring nodes *node_names* as cached nodes .

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0237I Configured nodes *node_names* as cached nodes .

Explanation

The task completed.

Action

No action is required.

HWNEP0238I Unconfiguring cached nodes *node_names* .

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0239I Unconfigured cached nodes *node_names* .

Explanation

The task completed.

Action

No action is required.

**HWNEP0240I Executed control operation on cache
cache_name on filesystem file_system_name .**

Explanation

The task completed.

Action

No action is required.

HWNEP0241I control cache

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0242I run prepop

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0243I list prepop

Explanation

Name of the command which will be used as an insert to messages HWNEP0193E and HWNEP0211W

Action

None.

HWNEP0244I Retrieving cache prepopulation status for file system *file system name* .

Explanation

The list prepop task has started. The log file will contain information on progress.

Action

No action is required.

HWNEP0245I Cache prepopulation status for file system *file system name* has been retrieved.

Explanation

The check list prepop has completed.

Action

No action is required.

HWNEP0246I Prepopulate cache data for fileset *fileset_name* on file system *file_system_name* using policy *policy_name*.

Explanation

The task was started. Consult the log for details on the task's progress.

Action

No action is required.

HWNEP0247I Command to pre populate cached data for fileset *fileset_name* was successful.

Explanation

The task completed.

Action

No action is required.

HWNEP0248W An error was encountered while parsing protocol options for export *export_name*. The options were not persisted, the probe will continue.

Explanation

Export protocol options are not in the expected format.

Action

Check the message and trace logs to get to the root cause.

HWNEP0249W The connection to the storage device failed. The error code is *error_code*.

Explanation

The External Process connection to the storage device failed with the specified error code. Please check the log details for more info.

Error codes :

- 0 : There is no connection for the specified device
- 2 : No SSH server found on the device
- 3 : Unsupported version
- 4 : The connection to the device failed
- 5 : Authentication failed
- 6 : Unknown host
- 7 : The passphrase is wrong
- 8 : The passphrase is missing
- 9 : Unknown error
- 10: ESSNI not available
- 11: Private key not found
- 12: Invalid format for the private key

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP0250I Started adding initiator port(s) *initiator_ports* to host *host_name* on subsystem *subsystem* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0251I Finished adding initiator port(s) *initiator ports* to host *host name* on subsystem *subsystem* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0252W A CLI command completed with warning. The warning message is : *warning_message*

Explanation

A Command Line Interface command completed with a warning message. Even if the operation completed, it might be possible to encounter problems when using the results of the operation. Please check the detailed warning message which can be shown in a different language since storage device might not be set to or support the same language as IBM Spectrum Control does.

Action

Check the warning message to see what the problem was.

HWNEP0253W Volume creation completed with warning. New volume *VolumeID* created with size *Size* in pool *Pool* on subsystem *Subsystem* .

Explanation

The operation completed with warning.

Action

Check the log files for details.

HWNEP0254W Volume deletion completed with warning. Volume *VolumeID* on subsystem *Subsystem* was deleted.

Explanation

The operation completed with warning.

Action

Check the log files for details.

HWNEP0255I The task to execute the recommendations for optimizing the volumes on the storage system with an ID of *storage_system_id* was paused.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0256I The task for optimizing the volumes on the storage system with an ID of *storage_system_id* was canceled.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0257I The task for optimizing the volumes on the storage system with an ID of *storage_system_id* was resumed.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0258E The optimization task cannot be paused because the synchronization rate for the volume cannot be reset. The ID of the volume is *volume_id* and the ID of the storage system is *storage_system_id*.

Explanation

The command that was issued to the storage virtualizer to set the synchronization rate of the volume did not complete.

Action

See the log file in the device/log directory for more information about the problem.

HWNEP0259E The optimization task cannot be resumed because the synchronization rate for the volume cannot be reset. The ID of the volume is *volume_id* and the ID of the storage system is *storage_system_id*.

Explanation

The command that was issued to the storage virtualizer to set the synchronization rate of the volume did not complete.

Action

See the log file in the device/log directory for more information about the problem.

HWNEP0260I Started creation of host port *host_port_name* on storage system *Storage System* with initiator port *WWPN* .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0261I Finished creation of host port *host_port_name* on storage system *Storage System* with initiator port *WWPN* .

Explanation

The task succeeded.

Action

No action is required.

HWNEP0262E The recommendation for the *volume_name* volume was not implemented because the command that was issued by the storage virtualizer returned the following error: *error_message*

Explanation

To determine the cause of the error, read the error message that was generated by the storage virtualizer. If the storage virtualizer does not support the same language that IBM Spectrum Control supports, the error message might be shown in a different language.

Action

Rerun the task to implement the recommendations. If an error is still generated, complete the following actions:

- To learn more about the error, check the documentation for the storage resource .
- To resolve the issue, complete the recommended actions.
- To generate new recommendations, probe the storage resource and rerun the wizard to optimize the volumes.

If you cannot resolve the issue, contact IBM Support.

HWNEP0263I The synchronization of the *volume_name* volume with the volume copy was successful.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0264E The synchronization of the *volume_name* volume with the volume copy was unsuccessful.

Explanation

The instruction to synchronize the volume with the volume copy failed.

Action

Check the log messages and the status of the storage resource to resolve the issues that you identify. Manual cleanup might be required to restore the volume.

HWNEP0265E The CLI command that was issued for the *storage_system_name* storage system failed and generated the following error: *error_message*

Explanation

To determine the cause of the error, read the error message that was generated by the storage system. If the storage system does not support the same language that IBM Spectrum Control supports, the error message might be shown in a different language.

Action

Rerun the task to implement the recommendations. If an error is still generated, complete the following actions:

- To learn more about the error, check the documentation for the storage resource .
- To resolve the issue, complete the recommended actions.
- To generate new recommendations, probe the storage resource and rerun the wizard to optimize the volumes.

If you cannot resolve the issue, contact IBM Support.

HWNEP0266I Started expanding the capacity of volume *volume* on subsystem *subsystem* from *oldsize* to *newsize* bytes .

Explanation

The task was started. The log will contain information about the task progress.

Action

No action is required.

HWNEP0267I Finished expanding the capacity of volume *volume* on subsystem *subsystem* to *newsize* bytes .

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0268E The server operating system or version is not supported by IBM Spectrum Control for IBM Spectrum Scale .

Explanation

The server operating systems and versions that are supported by IBM Spectrum Control for IBM Spectrum Scale are listed in the interoperability matrix document.

Action

See the IBM Spectrum Control interoperability matrix at the following URL: <http://www.ibm.com/support/docview.wss?uid=swg21386446>. Go to the Storage section and search for IBM Spectrum Scale.

HWNEP0269E The IBM Spectrum Scale cluster information cannot be displayed. All the nodes in the cluster are down or cannot be contacted.

Explanation

An operation was attempted on a remote cluster node. However, none of the nodes in the cluster are reachable or IBM Spectrum Scale is not accepting commands on any of the nodes.

Action

Ensure that the cluster nodes are available and that the storage product user has sufficient authority to complete the required commands on the nodes. Try the operation again.

HWNEP0270E The switch cannot respond to SNMP queries because of an authentication error.

Explanation

The IBM Spectrum Control server could not create a connection to the switch because of an authentication failure.

Action

Make sure authentication info provided was correct and retry. If problem persists, check the log files for details.

HWNEP0271E The following password decryption exception occurred: *exception*

Explanation

The IBM Spectrum Control server could not decrypt the password.

Action

Resolve the issue that is indicated by the exception.

HWNEP0272E The switch cannot respond to SNMP queries because of the following exception: *exception*

Explanation

This exception might occur for any of the following reasons:

- SNMP is not enabled in the device.
- The given SNMP community string is incorrect.
- Access restrictions.

Action

Resolve the issue that is indicated by the exception.

HWNEP0273E The following exception occurred because the OID format is incorrect: *exception*

Explanation

The OID string was sent in the wrong format.

Action

Resolve the issue that is indicated by the exception.

HWNEP0274E The switch cannot respond to SNMP queries because of a timeout problem.

Explanation

A timeout can occur as a result of throttling enhancements or incorrect authentication parameters.

Action

Ensure that the following conditions are true:

- SNMP is enabled on the switch./
- For SNMPv1, the community string is correct.
- For SNMPv3:
 - The username/password authentication and private protocols are correct.
 - The user is not set on the switch by using one of unsupported encryption types: Triple DES, AES 192 or AES 256.
- There are no network access restrictions.

HWNEP0270I Retrieved the file module address file_module_address.

Explanation

The file module address was retrieved from the device.

Action

No action is required.

HWNEP0271I No quota data was collected. Quota limits are not activated for the file systems that are associated with the IBM Spectrum Scale cluster.

Explanation

Information about inode and space usage is collected only for file systems on which quota limits are activated.

Action

No action is required.

HWNEP0272I Collecting file systems that are mounted on the nodes of storage system *storage_system_id*.

Explanation

The data collection schedule is querying the IBM Spectrum Scale cluster for information about file systems that are mounted at the nodes of the cluster.

Action

No action is required.

HWNEP0275W One or more operations failed for the CLI command that was issued for the storage system. The following error was generated: *errorMsg* .

Explanation

The CLI command completed but some errors occurred.

Action

Review the error message that was generated by the storage system. To learn more about the cause of the error and the recommended actions, search the IBM Knowledge Center using the storage system name and version. Check the message and trace logs for more information.

HWNEP0276E Command execution failed because sudo is not installed.

Explanation

For users other than root, 'sudo' must be installed and configured to allow command execution on behalf of root.

Action

Install and configure 'sudo' for the user that connects to the system.

HWNEP0277I Commands are executed through 'sudo' .

Explanation

A user other than root is used, so commands are executed through 'sudo' with root authority.

Action

No action is required.

HWNEP0278E User can not execute command through sudo.

Explanation

For users other than root, 'sudo' must be configured to allow command execution on behalf of root.

Action

Add the user to the sudoers list and allow all necessary commands to be executed through sudo.

HWNEP0279I Collecting remote file systems for storage_system_id storage system.

Explanation

The data collection schedule is querying the storage system for information about remote file systems.

Action

No action is required.

HWNEP0280I Collecting remote file systems that are mounted on the nodes of storage system storage_system_id.

Explanation

The data collection schedule is querying the IBM Spectrum Scale cluster for information about remote file systems that are mounted at the nodes of the cluster.

Action

No action is required.

HWNEP0281E The switch is returning corrupted data.

Explanation

The server could not use data from the switch.

Action

Review recent configuration changes and try to run the probe again.

HWNEP0282E Zoning data cannot be collected because there is a transaction in progress on the switch

Explanation

The server could not use data from the switch.

Action

None.

HWNEP0283E vsan *vsan_name* was not found.

Explanation

The VSAN specified as a parameter can not be found in the switch.

Action

Retry the operation with other VSAN name.

HWNEP0284E No zoning data collected from the switch.

Explanation

Zoning data not retrieved from the switch.

Action

Review recent configuration changes and try to run the probe again.

HWNEP0285E Cannot authenticate to the object storage using the specified user credentials.

Explanation

The IBM Spectrum Control server failed to authenticate to the Keystone identity service using the specified user credentials.

Action

Check the user credentials. If the user credentials for the object storage are different from the user credentials for the GPFS cluster, you must enter both sets of user credentials. Try the operation again.

HWNEP0286E An object storage request failed on the GPFS cluster.

Explanation

The IBM Spectrum Control server cannot connect to the object storage on the GPFS cluster. This error might occur because the object service is disabled or stopped or because the user credentials are invalid.

Action

Verify that the object service is configured correctly and is enabled and started. For more information about configuring the object service for IBM Spectrum Scale, go to the IBM Knowledge Center (<http://www.ibm.com/support/knowledgecenter>).

Verify the user credentials and privileges.

Try the operation again. If the problem persists, contact IBM Software Support.

HWNEP0287E Error when collecting Accounts information from Object Storage Service using REST protocol.

Explanation

The probe failed for an IBM Spectrum Scale storage system that is configured for object storage. This issue might occur if the server that hosts the data collector cannot connect to the OpenStack Swift and Keystone endpoints that are used to access object services.

Action

Complete the following steps to verify that the OpenStack Keystone and Swift services are running and correctly configured:

1. To list the URLs for the Keystone and Swift services, run the following commands as user root on one of the GPFS cluster nodes that are configured for object storage. . ~/openrc openstack endpoint list
2. Ensure that the server that hosts the data collector can connect to the IP addresses and host names that are included in the URLs for the Keystone and Swift services. For example, the URL for the Keystone service might be <http://gpfss420proto1:5000/v3>. In this case, the server that hosts the data collector must be able to connect to the gpfss420proto1 host name.

If the problem persists, go to Service Engage support (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNEP0288E Error when collecting Containers information from Object Storage Service using REST protocol.

Explanation

Failed when attempting to retrieve Swift Containers from Object Storage service.

Action

Review error messages from External Probe log files of Device Server. Verify OpenStack Swift services are running and correctly configured.

HWNEP0281I Collecting object storage accounts for storage_system_id storage system.

Explanation

The data collection schedule is querying the GPFS cluster for information about object storage accounts.

Action

No action is required.

HWNEP0282I Collecting object storage containers for storage_system_id storage system.

Explanation

The data collection schedule is querying the GPFS cluster for information about object storage containers.

Action

No action is required.

HWNEP0289E Failed to retrieve container information because the number of containers now exceeds the maximum number of containers that can currently be collected for an account (MAX Containers).

Explanation

To prevent probes of GPFS clusters that are configured with object storage from taking an excessive amount of time, the number of containers which can be collected for each account during a probe is limited. This limit can be configured by adjusting the Probe.ObjectContainerMaxPages property.

Action

Use the "tpctool getdscfg" command to retrieve the current value for the Probe.ObjectContainerMaxPages property. Archive or delete any unused containers so that the number of containers for the account no longer exceeds the time limit. Try the operation again.

Alternatively, use the "tpctool setdscfg" command to increase the value for the Probe.ObjectContainerMaxPages property. Then, restart the Device server service and try the operation again.

For more information about using the tpctool command, go to the IBM Knowledge Center (<http://www.ibm.com/support/knowledgecenter>).

HWNEP0290E The probe failed to retrieve object storage account information from the storage system storage_system_id because the userid user does not have the required authority.

Explanation

The user that is configured to monitor the object storage system does not have authority to retrieve information about accounts.

Action

Check the credentials for the user that is configured to monitor the object storage system. In Keystone, the OpenStack identity service, ensure that the user is assigned the required role and has the authority to retrieve object storage account information. Try the operation again.

HWNEP0291E The probe failed to retrieve object storage container information from the storage system *storage_system_id* because the *userid* user does not have the required authority.

Explanation

The user that is configured to monitor the object storage system does not have authority to retrieve information about containers.

Action

Check the credentials for the user that is configured to monitor the object storage system. In Keystone, the OpenStack identity service, ensure that the user is assigned the required role and has the authority to retrieve object storage container information. Try the operation again.

HWNEP0292E Cannot query the object service for information about accounts and containers as the specified user does not have admin privileges.

Explanation

To query account and container information from the object service, the user must be assigned the admin role in Keystone, the OpenStack identity service. To monitor all accounts and containers, the user must also be assigned the role that is defined in the reseller_admin_role configuration option in the Swift proxy server. The default value for the reseller_admin_role option is ResellerAdmin.

Action

Check the credentials for the user. In Keystone, the OpenStack identity service, ensure that the user is assigned the required role and has the authority to retrieve object storage account and container information. Try the operation again.

HWNEP0293W The probe did not collect information about all the object accounts for the storage system *storage_system_id* as the *userid* user does not have sufficient authority on the storage system.

Explanation

The role assigned to the user that is configured to monitor the storage system does not have sufficient privileges to collect information about all accounts and their associated containers. To monitor all accounts on the object storage system, the user must be configured with the ResellerAdmin role.

Action

Check the role that is assigned to the user that is used to monitor the storage system. To monitor all accounts, assign the ResellerAdmin role to the user in Keystone, the OpenStack Identity service. Try the operation again.

HWNEP0294W An authentication error prevented the switch from responding to SNMP queries regarding the ability of the switch to perform zone control.

Explanation

The IBM Spectrum Control server could not create a connection to the switch when checking the ability to perform zone control because of an authentication failure.

Zone control during provisioning Tasks might not be possible until this is resolved.

Action

Make sure that the switch authentication information is correct and then try the action again. If problem persists, contact IBM Software Support.

HWNEP0295W A timeout prevented the switch from responding to SNMP queries regarding the ability of the switch to perform zone control.

Explanation

A timeout can occur as a result of throttling enhancements or incorrect authentication parameters.

Zone control during provisioning Tasks might not be possible until this is resolved.

Action

Using the switch management application, ensure that the following conditions are true:

- SNMP is enabled on the switch./
- For SNMPv1, the read and write community strings are correct.
- For SNMPv3:
 - The username/password authentication and private protocols are correct.
 - The user is not set on the switch by using one of unsupported encryption types: Triple DES, AES 192 or AES 256.
- There are no network access restrictions.

Try the action again.

HWNEP0296W The switch cannot respond to SNMP queries to check the ability of the switch to perform zone control because of the following exception: exception

Explanation

This exception might occur for any of the following reasons:

- SNMP is not enabled in the device.
- The SNMP read or write community strings are incorrect.
- Access restrictions.

Action

Use the switch management application to resolve the issue that is indicated by the exception and try the action again.

HWNEP0297W The switch cannot respond to SNMP queries to check the ability of the switch to perform zone control because of the following exception: exception

Explanation

This exception might occur for any of the following reasons:

- SNMP is not enabled in the device.
- The SNMP read or write community strings are incorrect.
- Access restrictions have been defined for the switch.

Action

Use the switch management application to resolve the issue that is indicated by the exception and try the action again.

HWNEP0298I Collecting IBM Cloud Object Storage configuration.

Explanation

The data collection schedule is querying IBM Cloud Object Storage for information about system configuration.

Action

No action is required.

HWNEP0299I Collecting IBM Cloud Object Storage vaults.

Explanation

The data collection schedule is querying IBM Cloud Object Storage for information about vaults.

Action

No action is required.

HWNEP0300I Collecting detailed IBM Cloud Object Storage status.

Explanation

The data collection schedule is querying IBM Cloud Object Storage for information about the health and status of its components.

Action

No action is required.

HWNEP0301W The IP address *ip_address* for the FlashSystem storage system is not the management IP address.

Explanation

The IP address for the FlashSystem storage system that you added is not the management IP address. If you do not use the management IP address, the storage system might be managed incorrectly.

Action

To change the current IP address to the management IP address, right-click the FlashSystem storage system on the Block Storage Systems page and select Connections > Modify Connection.

HWNEP0302I Collecting Transparent Cloud Tiering information for *storage_system_id* storage system.

Explanation

The data collection schedule is querying the storage system for information about its Transparent Cloud Tiering configuration.

Action

No action is required.

HWNEP0303I No Transparent Cloud Tiering configuration was detected on the IBM Spectrum Scale cluster.

Explanation

This problem might occur when Transparent Cloud Tiering is not configured on the IBM Spectrum Scale cluster, or the mmcloudgateway command is not installed on node that is used by IBM Spectrum Control to connect to the cluster.

Action

Verify that Transparent Cloud Tiering is configured on the IBM Spectrum Scale cluster. If Transparent Cloud Tiering is configured but is not detected by IBM Spectrum Control, ensure that the mmcloudgateway command is installed on the cluster node that is used to connect to IBM Spectrum Scale.

HWNEP0304E Cannot connect to IBM Cloud Object Storage.

Explanation

This error might occur because the object service is disabled or stopped or because the user credentials for logging in to IBM Cloud Object Storage are invalid.

Action

To resolve the issue, try the following actions:

- Verify that the object service is configured correctly and is enabled and started.
- Verify that the user credentials and privileges are valid.

Try the action again. If the problem persists, contact IBM Software Support.

HWNEP0305I Collecting disk controllers for storage system storage system identification.

Explanation

The probe is currently collecting data for the disk controllers of the storage system.

Action

No action is required.

HWNEP0306I Collecting disks for storage system storage system identification.

Explanation

The probe is currently collecting data for the disks of the storage system.

Action

No action is required.

HWNEP0307I Collecting CIFS shares for storage system storage system identification.

Explanation

The probe is currently collecting data for the CIFS shares of the storage system.

Action

No action is required.

HWNEP0308I Collecting NFS exports for storage system storage system identification.

Explanation

The probe is currently collecting data for the NFS exports of the storage system.

Action

No action is required.

HWNEP0309I The data is being collected by the data collector: *data collector host*.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNEP0310I Discovery found *number* storage systems.

Explanation

The discovery task completed and found the specified number of storage systems that are managed by the SMI-S provider.

Action

No action is required.

HWNEP0311I Probing nodes or directors for *storage system name* storage system.

Explanation

The probe is querying the SMI-S provider for information about nodes or directors on the storage system.

Action

No action is required.

HWNEP0312I Probe found *number* nodes or directors.

Explanation

The probe found the specified number of nodes or directors on the storage system.

Action

No action is required.

HWNEP0313I Probing pools for storage system name storage system.

Explanation

The probe is querying the SMI-S provider for information about pools on the storage system.

Action

No action is required.

HWNEP0314I Probe found *number* pools.

Explanation

The probe found the specified number of pools on the storage system.

Action

No action is required.

HWNEP0315I Probing disk groups for storage system name storage system.

Explanation

The probe is querying the SMI-S provider for information about disk groups on the storage system.

Action

No action is required.

HWNEP0316I Probe found *number* disk groups.

Explanation

The probe found the specified number of disk groups on the storage system.

Action

No action is required.

HWNEP0317I Probing disks for storage system name storage system.

Explanation

The probe is querying the SMI-S provider for information about disks on the storage system.

Action

No action is required.

HWNEP0318I Probe found *number* disks.

Explanation

The probe found the specified number of disks on the storage system.

Action

No action is required.

HWNEP0319I Probing host connections for *storage system name* storage system.

Explanation

The probe is querying the SMI-S provider for information about host connections on the storage system.

Action

No action is required.

HWNEP0320I Probing ports for *storage system name* storage system.

Explanation

The probe is querying the SMI-S provider for information about the fibre channel and ethernet ports on the storage system.

Action

No action is required.

HWNEP0321I Probing volumes for *storage system name* storage system.

Explanation

The probe is querying the SMI-S provider for information about volumes on the storage system.

Action

No action is required.

HWNEP0322I Probe found *number* volumes. Continuing to probe volumes.

Explanation

The probe is querying the SMI-S provider for information about volumes on the storage system. So far, the probe found the specified number of volumes.

Action

No action is required.

HWNEP0323I Probe found *number* volumes for storage system *name* storage system.

Explanation

The probe found the specified number of volumes on the storage system.

Action

No action is required.

HWNEP0324I Probing NAS nodes for storage system *name* storage system.

Explanation

The probe is querying the SMI-S provider for information about NAS nodes on the storage system.

Action

No action is required.

HWNEP0325I Probe found *number* NAS nodes.

Explanation

The probe found the specified number of NAS nodes on the storage system.

Action

No action is required.

HWNEP0326I Probing file systems that are mounted on the NAS nodes of *storage system name* storage system.

Explanation

The probe is querying the SMI-S provider for information about file systems that are mounted on the NAS nodes of the storage system.

Action

No action is required.

HWNEP0327I Probe found *number* file systems.

Explanation

The probe found the specified number of file systems on all of the NAS nodes on the storage system.

Action

No action is required.

HWNEP0328I Probing file system exports for *storage system name* storage system.

Explanation

The probe is querying the SMI-S provider for information about file system exports on the storage system.

Action

No action is required.

HWNEP0329W *profile name* version *version number* SMI-S Profile is not supported.

Explanation

The minimum required version for the specified SMI-S profile is not supported by the SMI-S provider used. The job now running might fail to collect some information.

Action

Upgrade the SMI-S provider to one that supports the minimum required version. See the IBM Spectrum Control interoperability matrix at the following URL: <https://www.ibm.com/support/pages/node/6249369>. Search for the supported agent or provider for your resource.

HWNEP0330E Unable to find minimum required SMI-S profile to proceed with requested task.

Explanation

The SMI-S provider does not support the minimum required version of at least one of the following SMI-S profiles: Array, NAS Head, or Storage Virtualizer.

Action

Upgrade the SMI-S provider to one that supports the minimum required version. See the IBM Spectrum Control interoperability matrix at the following URL: <https://www.ibm.com/support/pages/node/6249369>. Search for the supported agent or provider for your resource.

HWNEP0331I Probing copy pair relationships for storage system name storage system.

Explanation

The probe is querying the SMI-S provider for information about copy pair relationships on the storage system.

Action

No action is required.

HWNEP0332I Probe found number copy pairs .

Explanation

The probe found the specified number of copy pairs on the storage system.

Action

No action is required.

HWNEP1111E There is no connection for the specified device .

Explanation

The External Process connection to the storage device failed because there is no connection for the specified device.

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1112E No SSH server found on the device .

Explanation

The External Process connection to the storage device failed because the SSH server was not found on the device

Action

Verify the ssh server on the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1113E Unsupported version.

Explanation

The External Process connection to the storage device failed because the SSH version is not supported.

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1114E The connection to the device failed.

Explanation

The External Process connection to the storage device failed.

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1115E Authentication failed.

Explanation

The External Process connection to the storage device failed because authentication failed.

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1116E Unknown host.

Explanation

The External Process connection to the storage device failed due to unknown host.

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1117E The passphrase is wrong.

Explanation

The External Process connection to the storage device failed because the passphrase used is wrong.

Action

Verify the connection to the storage device and the passphrase used. Check the message and trace logs to get to the root cause.

HWNEP1118E The passphrase is missing.

Explanation

The External Process connection to the storage device failed because the passphrase is missing.

Action

Verify the connection to the storage device and the passphrase used. Check the message and trace logs to get to the root cause.

HWNEP1119E Unknown error.

Explanation

The External Process connection to the storage device failed because an unknown error occurred.

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1120E ESSNI not available.

Explanation

The External Process connection to the storage device failed because ESSNI not available.

Action

Verify the connection to the storage device and the user credentials. Check the message and trace logs to get to the root cause.

HWNEP1121E Private key not found.

Explanation

The External Process connection to the storage device failed because the private key used was not found.

Action

Verify the connection to the storage device and the private key used. Check the message and trace logs to get to the root cause.

HWNEP1122E Invalid format for the private key.

Explanation

The External Process connection to the storage device failed because the format for the private key is invalid.

Action

Verify the connection to the storage device and the private key used. Check the message and trace logs to get to the root cause.

HWNEP1123E Unable to establish a connection to the device through http port 80.

Explanation

The External Process connection to the storage device failed because we were unable to establish a connection to the device through http port 80.

Action

Verify the connection to the storage device . Check the message and trace logs to get to the root cause.

HWNEP1124I Log collection successfully started for storage system name storage system.

Explanation

The collection of support logs has successfully started for the storage system

Action

No action is required.

HWNEP1125E The activity requested is already in progress on storage system name storage system.

Explanation

The requested activity is already in progress on this subsystem.

Action

Wait until the currently running activity completes before making this request.

HWNEP1126I The support log activity has started successfully *storage system name storage system*.

Explanation

The requested activity has started successfully.

Action

No action is required.

HWNEP0112E The CLI command that was issued for the storage system failed and generated the following error: [error_message](#)

Explanation

To determine the cause of the error, read the error message that was generated by the storage system. If the storage system does not support the same language that IBM Spectrum Control supports, the error message might be shown in a different language.

Action

Rerun the task to implement the recommendations. If an error is still generated, complete the following actions:

- To learn more about the error, check the documentation for the storage resource .
- To resolve the issue, complete the recommended actions.
- To generate new recommendations, probe the storage resource and rerun the wizard to optimize the volumes.

If you cannot resolve the issue, contact IBM Support.

HWNPM5412E The process failed because it was unable to find the Export Tool. Expected location was *loc of tool*

Explanation

The Hitachi Export Tool is required to collect Performance data for Hitachi systems. The tool was not found at the location specified.

Action

Check that the tool exists and confirm that the location is correct in the Data Collector setup.properties file. Try the operation again.

NAD0001I Connecting to *hostname* using *protocol protocol*.

Explanation

The server is connecting to the Storage Resource Agent at the specified hostname using the specified communication protocol.

NAD0002W Connection to *hostname* failed using *protocol* protocol: *error*.

Explanation

The server failed to connect to the Storage Resource Agent at the specified hostname using the specified communication protocol.

NAD0003I Connected to *hostname* using *protocol* protocol.

Explanation

The server connected to the Storage Resource Agent at the specified hostname using the specified communication protocol.

NAD0005E Connection to *hostname* failed using *protocol* protocol: *error message*.

Explanation

The server failed to connect to the Storage Resource Agent at the specified hostname using the specified communication protocol.

NAD0006E Exception thrown for method *method name*: *error message*.

Explanation

An error occurred while processing the specified method.

NAD0007I Closing connection to *hostname*.

Explanation

Closing the connection to the Storage Resource Agent at the specified hostname.

NAD0008E Invalid protocol *protocol* passed to *method name*.

Explanation

The method does not support this protocol.

NAD0010E Invalid parameter(s) *parameter name* passed to *method name*.

Explanation

Invalid input to the specified method.

NAD0013I Installing GUID on remote machine: *hostname*.

Explanation

Installing the unique identifier on the specified machine.

NAD0014I GUID successfully installed on remote machine: *hostname*.

Explanation

Unique identifier installed on the specified machine.

NAD0018E Command on remote machine: *host name* failed.
Error code = *value* executing command *value*.

Explanation

The installation on the remote machine failed.

NAD0019E Parameter *parameter* passed to *method* is null or 0 length.

Explanation

Invalid input to the specified method.

NAD0055E Failed to connect to remote host *host*.

Explanation

The specified host is down or not reachable via network.

NAD0097I Opening connection to *hostname*.

Explanation

Opening the connection to the Storage Resource Agent at the specified hostname.

NAD0180I Installing re-distributable package on .

Explanation

Updating remote machine with Visual Studio re-distributable dll package.

NAD0181I Install of re-distributable package on succeeded.

Explanation

Update of Visual studio 2008 Dll's on remote machine succeeded.

NAD0182E Failed to install re-distributable package on .

Explanation

Failed to update remote machine with Visual Studio dll's.

NAD0186I Trying to locate package TIVguid using pkginfo

...

Explanation

Trying to locate installation folder of package TIVguid using pkginfo.

NAD0187I Package TIVguid is not installed.

Explanation

Package TIVguid is not installed on the system.

NAD0188I Checking TIVguid default install path : path

...

Explanation

Trying to detect existing installation of package TIVguid using the default install path : /opt/tivoli/guid.

NAD0259W Unable to determine Storage Resource Agent version on host . Fabric Discovery will not be invoked.

Explanation

Storage Resource Agent version could not be obtained. Since Fabric Discovery is not supported on some early versions of Storage Resource Agent, it will not be invoked.

Action

Check if there are any connectivity issues with the Storage Resource Agent. Also, check the device server message and trace log for more detail. If the problem continues, contact IBM support.

NAD0145E Cannot get version information from agent on host .

Explanation

Storage Resource Agent version could not be obtained.

Action

Check if there are any connectivity issues with the Storage Resource Agent. If the problem continues, contact IBM support.

NAD0146E The connection to *remote machine* failed because the Remote Execution and Access component was unable to create a temporary directory on the remote machine. Remove unneeded ~CSRI* directories in the remote machine's temporary directory.

Explanation

The connection to the remote machine failed.

Action

Remove unneeded ~CSRI* directories in the remote machine's temporary directory.

NAD0156E The server *host_address* cannot be reached because the host name or IP address is not recognized.

Explanation

The host cannot be contacted because the host is unreachable.

Action

Check the host name specified for the target host. Check if the host name can resolve to an IP address from a command line by using commands such as nslookup or ping.

NAD0157E The server *host_name* cannot be contacted. The server might be down, unreachable due to network problems, or the SSH credentials might be invalid.

Explanation

The server cannot be contacted. The server might be down or unreachable due to other connection failures or the server cannot be contacted using the credentials that are provided.

Action

Check the host name that is specified for the server. Check whether the host name can resolve to an IP address from a command line by using commands such as nslookup or ping. Check whether the user and password that are specified are valid. If SSH certificates are used for authentication, check whether the certificate and the passphrase are valid.

NAD0260I Agent is active.

Explanation

The check to ensure that communication with the agent has completed with success.

NAD0272W The connection to the Storage Resource Agent on *host_name* was not established. Retrying using the IP address.

Explanation

The Storage Resource Agent specified on this computer could not be connected using the fully qualified computer name. Connection is retried using the ip address.

Action

Check if the fully qualified computer name can be resolved through the network using network commands.

NAD0274E An SSH certificate *certificate_name* already exist.

Explanation

The SSH certificate could not be copied on IBM Spectrum Control server directory as there is another certificate with this name.

Action

Rename the SSH certificate name and try again.

NAD0275E Failed to connect to remote host *hostname* and *port*. Failed to establish a secure connection.

Explanation

The SSH connection failed due to an unknown SSL error.

Action

Verify the connection is not blocked by a firewall and retry the connection.

NAD0276E Failed to connect to remote host *hostname* and *port*. Failed to establish a secure connection because the SSL handshake failed.

Explanation

The SSL connection failed because the IBM Spectrum Control server and the storage resource agent could not negotiate the desired level of security. This could happen if the IBM Spectrum Control server or storage resource agent certificate is not trusted, not valid, or expired.

Action

If you have recently updated the certificate on the IBM Spectrum Control server then make sure you have also replaced the certificate on the storage resource agent. Make sure that the system date on both the IBM Spectrum Control server and storage resource agent machine is within validity date range of both certificates.

NAD0277E Failed to connect to remote host *hostname* and *port*. Failed to establish a secure connection because of an invalid SSL key.

Explanation

The SSL connection failed because of a bad SSL key. This is normally caused by a misconfiguration of the SSL certificate and private key.

Action

Verify that the certificates and private keys on the IBM Spectrum Control server and storage resource agent have been configured correctly.

NAD0278E Failed to connect to remote host *hostname* and *port*. Failed to establish a secure connection because the identity of the peer could not be verified.

Explanation

The SSL connection failed because the peer was not able to identify itself. This could happen if no certificate is available or the configured cipher suite does not support authorization.

Action

Verify that the certificates on the IBM Spectrum Control server and storage resource agent have been configured correctly. There is no need to investigate the cipher suite because IBM Spectrum Control does not allow this to be configured.

NAD0279E Failed to connect to remote host *hostname* and *port*. Failed to establish a secure connection because of an SSL protocol error.

Explanation

The SSL connection failed because of an error in the SSL protocol.

Action

Contact IBM support.

NAD0281E The Storage Resource agent cannot be deployed because of insufficient space or other issues on the target system. The error is: *error message*.

Explanation

This problem might occur when there is insufficient space on the target system, or the target file is read-only or is being used by another application.

Action

Ensure that the target file is not open or in read-only mode, and that enough space is available on the target system. Try the action again.

BTAVM2272W Unsupported virtual disk backing info for disk "*Disk name*" of hypervisor *Hypervisor name*, virtual machine "*VM name*": *Virtual disk type*.

Explanation

Currently Spectrum Control supports only the following types of ESX virtual disks: VirtualDiskFlatVer2BackingInfo, VirtualDiskSparseVer2BackingInfo, and VirtualDiskRawDiskMappingVer1BackingInfo.

Action

Contact IBM support.

BTAVM2273W Unable to find file "*File name*" which is the backing device of the virtual disk "*Disk name*" of hypervisor *Hypervisor name*, virtual machine "*VM name*".

Explanation

The backing info of the virtual disk was not found by the ESX probe. This happens when either the virtual disk was created after the latest datastore scan or VM was probed while its snapshots were being deleted.

Because the virtual disk could not be correlated to its backing device, the capacity of the VM will be reported wrong in Spectrum Control.

Action

Rerun the hypervisor probe.

BTAVM2274W Probe of hypervisor *Name of the Hypervisor* completed with warnings.

Explanation

The probe of the hypervisor completed with warnings.

Action

Check the message log to find the warnings reason.

HWNAS - Agentless Server messages

- [HWNAS0001I Successfully created server server.](#)
- [HWNAS0002I Successfully deleted server server.](#)
- [HWNAS0003E The host name or IP address {0} is not valid.](#)
- [HWNAS0004E Cannot add port portWWPN because it belongs to server serverName.](#)
- [HWNAS0005E Cannot add port portWWPN because it belongs to switch switchName.](#)
- [HWNAS0006E Cannot add port portWWPN because it belongs to storage system storageSystemName.](#)
- [HWNAS0007W Server serverName was not created because it exists already.](#)
- [HWNAS0008I Successfully created mergeServerName server by merging numberOfServers servers.](#)
- [HWNAS0009I Successfully separated serverName server into numberOfServers individual servers.](#)
- [HWNAS0010E The serverId agentless server that you selected does not exist.](#)
- [HWNAS0011I You cannot separate the serverName agentless server because it is not based on storage system host connections.](#)
- [HWNAS0012I You cannot separate the serverName agentless server because it is already defined on the smallest possible separation boundary.](#)
- [HWNAS0013I You cannot merge the selected agentless servers into the serverName agentless server because they are not all based on storage system host connections.](#)

HWNAS0001I Successfully created server server.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNAS0002I Successfully deleted server *server*.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNAS0003E The host name or IP address {0} is not valid.

Explanation

The IP address or host name that was entered for the device is not valid.

Action

Make sure that the IP address and host name are valid for the device that is being added. Reenter the IP address or host name and click Add again.

HWNAS0004E Cannot add port *portWWPN* because it belongs to server *serverName*.

Explanation

The specified port WWPN belongs to another server and cannot be added to the server.

Action

Enter a port WWPN that does not belong to another server.

HWNAS0005E Cannot add port *portWWPN* because it belongs to switch *switchName*.

Explanation

The specified port WWPN is a switch port and cannot be added to the server.

Action

Enter a port WWPN that does not belong to a switch.

HWNAS0006E Cannot add port *portWWPN* because it belongs to storage system *storageSystemName*.

Explanation

The specified port WWPN is a storage system port and cannot be added to the server.

Action

Enter a port WWPN that does not belong to a storage system.

HWNAS0007W Server *serverName* was not created because it exists already.

Explanation

The server was not created because a server with the same host name or IP address exists already.

Action

Enter a host name or IP address for a server that is not already monitored.

HWNAS0008I Successfully created *mergeServerName* server by merging *numberOfServers* servers.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNAS0009I Successfully separated *serverName* server into *numberOfServers* individual servers.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNAS0010E The *serverId* agentless server that you selected does not exist.

Explanation

Either the server ID is invalid or it refers to a resource that is not an agentless server. For example the server might be a server with a Storage Resource agent deployed.

Action

Select a valid agentless server.

HWNAS0011I You cannot separate the *serverName* agentless server because it is not based on storage system host connections.

Explanation

The agentless server has no assigned WWPNs, or the assigned WWPNs are not associated with any storage system host connections. For example, the agentless server might represent a virtual machine that was discovered during a hypervisor probe. You cannot separate these agentless servers into multiple individual servers.

Action

Select an agentless server that represents two or more storage system host connections.

HWNAS0012I You cannot separate the *serverName* agentless server because it is already defined on the smallest possible separation boundary.

Explanation

The separation of an agentless server occurs on boundaries that are identified by storage system host connections that have sets of WWPNs that do not overlap. The agentless server that you selected is either based on a single host connection and therefore cannot be further subdivided, or the agentless server is based on multiple host connections that all have overlapping sets of WWPNs assigned.

Action

If the agentless server is based on multiple host connections and you want to separate it, use the GUI or CLI for the storage system to modify the host connection definitions. Remove any unintended overlap between sets of WWPNs for the storage system host connections. After you remove the overlap, rerun the probe on those storage systems. After the probes complete, try to separate the agentless server again.

You cannot eliminate any overlap that is caused by HBAs. HBAs are discovered during the fabric probe, and identify which WWPNs cannot be separated. That is, the HBAs identify which WWPNs are known to belong to the same interface card in a server computer.

HWNAS0013I You cannot merge the selected agentless servers into the *serverName* agentless server because they are not all based on storage system host connections.

Explanation

One or more of the agentless servers is not associated with any storage system host connections. For example, the agentless server might represent a virtual machine that was discovered during a hypervisor probe. You cannot merge these agentless servers into a single server.

Action

Select agentless servers that are based on storage system host connections.

HWNDA - Data Manager API messages

- [HWNDA0001I Operation Name of the operation processed successfully.](#)
- [HWNDA0002E Mandatory parameter Name of the mandatory parameter which is missing missing](#)
- [HWNDA0003E Invalid parameter Name of the parameter which was invalid](#)
- [HWNDA0004E An internal error occurred.](#)
- [HWNDA0005E The server encountered an error when it was accessing the database.](#)
- [HWNDA0006E The name provided while creating a new group is already in use.](#)
- [HWNDA0007E An external key could not be identified for the provided type The constant integer type of the Group element and id The unique integer database ID of the Group element.](#)
- [HWNDA0008E The specified attribute invalid attribute name is not a valid attribute.](#)
- [HWNDA0009E An internal ID could not be identified for the provided type The constant integer type of the Group element and external key The unique external key of the Group element.](#)
- [HWNDA0010I The following elements are already members of the group The group: The keys of the elements.](#)
- [HWNDA0011I The following elements are not members of the The group Group and cannot be removed: The element key.](#)
- [HWNDA0012E Adding a Group with the name Name of the proposed new member to the Name of the parent group Group would create a circular relationship that is not allowed.](#)
- [HWNDA0013E The input parameter value input parameter value for input input parameter name exceeds the maximum allowable length of number of allowable characters characters.](#)
- [HWNDA0014E The provided Group attribute value Group attribute value for the Group attribute name Group attribute contains invalid characters. The following characters are not allowed, \/:*?><|."](#)
- [HWNDA0015E You are not the original creator of the provided Group name Group name.](#)
- [HWNDA0016E The provided Tiering Policy name Tiering Policy name is not unique.](#)
- [HWNDA0017E The provided Group Group name or ID does not exist.](#)
- [HWNDA0018E The provided Tiering Policy name Tiering Policy name does not exist.](#)
- [HWNDA0019E The provided candidate and destination Group names, Group name, cannot be the same.](#)
- [HWNDA0020E The provided condition condition type is not valid.](#)
- [HWNDA0021E The provided operand operand type is not valid.](#)
- [HWNDA0022E The provided condition condition type is either already applied to this tiering policy or conflicts with an existing condition, existing condition type.](#)
- [HWNDA0023E The requested priority value priority value is invalid.](#)
- [HWNDA0024E The specified Group name Group name is not unique.](#)
- [HWNDA0025E Cannot add the specified resource because the resource type,element type, is not supported as a child of the group.](#)
- [HWNDA0026E Cannot add the specified group, Group name, because the group type, type, is not supported as a child of the application.](#)
- [HWNDA0027E The first option specified in the file must be -appgroupname.](#)
- [HWNDA0028E The argument of the option option is missing at or before line Line Number : Line](#)
- [HWNDA0029E Both option1 and option2 were specified at or before line Line Number : Line](#)
- [HWNDA0030E The option option is missing at or before line Line Number : Line](#)
- [HWNDA0031E Neither option1 nor option2 was specified at or before line Line Number : Line](#)
- [HWNDA0032E Invalid number of parameters for option option at or before line Line Number : Line](#)
- [HWNDA0033E Incomplete options sequence before end of file.](#)
- [HWNDA0034E Invalid option option at line Line Number : Line](#)
- [HWNDA0035E Invalid resource type type at line Line Number : Line](#)
- [HWNDA0036E Invalid sequence of options at or before line Line Number : Line](#)
- [HWNDA0037E Syntax error, quote sequence not properly closed at line Line Number : Line](#)
- [HWNDA0038E Option option is not allowed for resource type type at or before line Line Number : Line](#)
- [HWNDA0039E The input data for modifying the application groups is missing.](#)
- [HWNDA0040E An invalid element was encountered in the input data.](#)
- [HWNDA0041E The application group name is missing from the input data.](#)
- [HWNDA0042E The operation is missing from the input data.](#)
- [HWNDA0043E The resource type is missing from the input data.](#)
- [HWNDA0044E The server name is missing from the input data.](#)
- [HWNDA0045E The device name is missing from the input data.](#)

- [HWNDA0046E Invalid values were specified for the server, device or cluster names in the input data.](#)
- [HWNDA0047E Member names and the tags were specified for the same operation.](#)
- [HWNDA0048W The following entities were not found: Entities.](#)
- [HWNDA0049W No entities were found for the tags: Tags](#)
- [HWNDA0050E The member names or tags were not specified for the operation.](#)
- [HWNDA0051W The group Name of the proposed new member cannot be added to itself.](#)
- [HWNDA0052W The group Name of the proposed new member cannot be added to the Name of the parent group group because it creates a circular relationship that is not allowed.](#)
- [HWNDA0053W The group Name of the group contains child groups and cannot be deleted. The child groups must be deleted before the parent group can be deleted.](#)
- [HWNDA0054E The filter mask that was used to create or edit a group filter is currently being used.](#)
- [HWNDA0055E The argument argument for the parameter parameter on line Line Number : Line is invalid.](#)
- [HWNDA0056E The first option specified in the file must be -id.](#)
- [HWNDA0057E The specified Group Group name is not of type type.](#)
- [HWNDA0058W These groups have same names as existing members of the group The group: The keys of the elements. They were not added to the group.](#)
- [HWNDA0059E The specified tag key Tag key is not valid.](#)
- [HWNDA0060W These group members are also members of another group: The groups. They are not deleted.](#)
- [HWNDA0061W These group members cannot be moved up one level in hierarchy due to name conflicts: The groups. The group is not deleted.](#)
- [HWNDA0062E The specified Group Group name is not a department group.](#)
- [HWNDA0063W These group members cannot be moved as top level groups in hierarchy due to name conflicts: The groups. No group members were removed from the group.](#)
- [HWNDA0064E An application with the same name already exists.](#)
- [HWNDA0065E A department with the same name already exists.](#)
- [HWNDA0066E Invalid values were specified for the device, cluster or file system names in the input data.](#)
- [HWNDA0067E Resources of type Type of resource cannot be added to an application or removed from an application using tags.](#)
- [HWNDA0068E The application cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.](#)
- [HWNDA0069E The department cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.](#)
- [HWNDA0070W The File Systems: {0} were not added to the application {1} because they are NAS file systems.](#)
- [HWNDA0071E Member IDs and the tags were specified for the same operation.](#)
- [HWNDA0072E Member IDs should be specified in the input data for resources of type appgroup.](#)
- [HWNDA0073E A general group with the same name already exists.](#)
- [HWNDA0074E The general group cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.](#)
- [HWNDA0075E A dashboard with the same name already exists.](#)
- [HWNDA0076E The dashboard group cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.](#)
- [HWNDA0077E A policy group with the same name already exists.](#)
- [HWNDA0078I The Name of the policy group policy group was removed.](#)

HWNDA0001I Operation Name of the operation processed successfully.

Explanation

A request was run successfully. No error condition was encountered.

Action

No action is required.

HWNDA0002E Mandatory parameter Name of the mandatory parameter which is missing missing

Explanation

Mandatory parameter {0} is missing.

Action

Contact IBM Support.

HWNDA0003E Invalid parameter *Name of the parameter which was invalid*

Explanation

Invalid parameter {0} was encountered while processing an API request.

Action

Contact IBM Support.

HWNDA0004E An internal error occurred.

Explanation

An internal error occurred during execution.

Action

Check the logs for an indication of an error or exception and contact IBM customer support.

HWNDA0005E The server encountered an error when it was accessing the database.

Explanation

The server cannot access data that is stored in the database.

Action

Check the status of the database. Also, check the logs for an indication of an error or exception and contact IBM customer support.

HWNDA0006E The name provided while creating a new group is already in use.

Explanation

The name of a new group must be unique.

Action

Choose a unique name for the group and try again.

HWNDA0007E An external key could not be identified for the provided type *The constant integer type of the Group element* and id *The unique integer database ID of the Group element*.

Explanation

The element that is a member of a Group could not be found in the database and indicates some form of database inconsistency.

Action

Contact IBM customer support.

HWNDA0008E The specified attribute *invalid attribute name* is not a valid attribute.

Explanation

The attribute that is specified is not in the list of usable attributes for the method that is being invoked.

Action

Contact IBM customer support.

HWNDA0009E An internal ID could not be identified for the provided type *The constant integer type of the Group element* and external key *The unique external key of the Group element*.

Explanation

The provided external key could not be translated into an internal database ID.

Action

Verify the validity of the external key.

HWNDA0010I The following elements are already members of the group *The group: The keys of the elements*.

Explanation

The groups cannot contain the same member more than once.

Action

Verify the current contents of the group.

HWNDA0011I The following elements are not members of the *The group* Group and cannot be removed: *The element key*.

Explanation

The element that was requested to be removed is not currently a member of the Group.

Action

Verify that the current contents of the Group are correct.

HWNDA0012E Adding a Group with the name *Name of the proposed new member* to the *Name of the parent group* Group would create a circular relationship that is not allowed.

Explanation

A Group may not be a member of its children.

Action

Verify that the Group is not being added to any of its children groups.

HWNDA0013E The input parameter value *input parameter value* for input *input parameter name* exceeds the maximum allowable length of *number of allowable characters* characters.

Explanation

The provided input is too long.

Action

Shorten the provided input and try again.

HWNDA0014E The provided Group attribute value *Group attribute value* for the *Group attribute name* Group

attribute contains invalid characters. The following characters are not allowed, \\/*?><|."

Explanation

The proposed Group attribute contained an invalid character.

Action

Remove the invalid character or characters and try the action again.

HWNDA0015E You are not the original creator of the provided Group name *Group name*.

Explanation

You must be the original creator of the Group in order to update its properties.

Action

None.

HWNDA0016E The provided Tiering Policy name *Tiering Policy name* is not unique.

Explanation

The proposed Tiering Policy name is already in use.

Action

Either specify a new name or delete the current Tiering Policy with this name and rerun this command.

HWNDA0017E The provided Group *Group name* or ID does not exist.

Explanation

The Data server could not find a Group with the specified name or ID.

Action

Verify that the required Group exists. If it does not, specify a different Group.

HWNDA0018E The provided Tiering Policy name *Tiering Policy name* does not exist.

Explanation

The Data server could not find a Tiering Policy with the name specified.

Action

Verify that the required Tiering Policy exists. If it does not, create a Tiering Policy with the required name or specify a different Tiering Policy.

HWNDA0019E The provided candidate and destination Group names, *Group name*, cannot be the same.

Explanation

The Tiering Policy cannot have the same Group for both its candidate and destination.

Action

Choose a different Group for either the candidate or destination for this Tiering Policy.

HWNDA0020E The provided condition *condition type* is not valid.

Explanation

Only valid condition types may be specified when adding a new condition to a tiering policy.

Action

Specify a valid condition type to add to the tiering policy.

HWNDA0021E The provided operand *operand type* is not valid.

Explanation

Only valid operands may be specified when adding a new condition to a tiering policy.

Action

Specify a valid operand for the condition being added to the tiering policy.

HWNDA0022E The provided condition *condition type* is either already applied to this tiering policy or conflicts with an existing condition, *existing condition type*.

Explanation

Tiering policies may only contain one condition. The exception is that an AGE and an IODENSITY conditions may exist for the same tiering policy.

Action

Remove the existing condition from the tiering policy before adding the new condition.

HWNDA0023E The requested priority value *priority value* is invalid.

Explanation

Tiering policy priorities range from 1 (highest priority) to the current number of policies.

Action

Try the command again, specifying a valid priority value.

HWNDA0024E The specified Group name *Group name* is not unique.

Explanation

The specified Group name is not unique and none of these Groups are owned by the current user.

Action

Try the command again, specifying the full Group name in "user"."name" format.

HWNDA0025E Cannot add the specified resource because the resource type, *element type*, is not supported as a child of the group.

Explanation

The specified resource type is not supported as a child of the group.

Action

Check the resource types that you are allowed to add as a child for this group. Try the operation again, using a supported resource type.

HWNDA0026E Cannot add the specified group, *Group name*, because the group type, *type*, is not supported as a child of the application.

Explanation

The specified group is not supported as a child of an application.

Action

Check the group types that you are allowed to add as a child of an application. Try the operation again, using a supported group type.

HWNDA0027E The first option specified in the file must be -appgroupname.

Explanation

The first option specified in the file must be -appgroupname.

Action

Edit the file appropriately.

HWNDA0028E The argument of the option *option* is missing at or before line *Line Number : Line*

Explanation

The option argument was not specified.

Action

Edit the file appropriately.

HWNDA0029E Both *option1* and *option2* were specified at or before line *Line Number : Line*

Explanation

Both options were specified.

Action

Edit the file appropriately.

HWNDA0030E The option *option* is missing at or before line *Line Number : Line*

Explanation

An option was not specified.

Action

Edit the file appropriately.

HWNDA0031E Neither option1 nor option2 was specified at or before line Line Number : Line

Explanation

Action

Edit the file appropriately.

HWNDA0032E Invalid number of parameters for option option at or before line Line Number : Line

Explanation

An Invalid number of parameters were specified for an option.

Action

Edit the file appropriately.

HWNDA0033E Incomplete options sequence before end of file.

Explanation

An incomplete options sequence was detected.

Action

Edit the file appropriately.

HWNDA0034E Invalid option option at line Line Number : Line

Explanation

An Invalid option was specified.

Action

Edit the file appropriately.

HWNDA0035E Invalid resource type *type* at line *Line Number* : *Line***Explanation**

An invalid resource type was specified.

Action

Edit the file appropriately.

HWNDA0036E Invalid sequence of options at or before line *Line Number* : *Line***Explanation**

An invalid sequence of options was specified.

Action

Edit the file appropriately.

HWNDA0037E Syntax error, quote sequence not properly closed at line *Line Number* : *Line***Explanation**

The quote sequence was not properly closed.

Action

Edit the file appropriately.

HWNDA0038E Option *option* is not allowed for resource type *type* at or before line *Line Number* : *Line***Explanation**

The option and the resource type are not compatible.

Action

Edit the file appropriately.

HWNDA0039E The input data for modifying the application groups is missing.

Explanation

No input data was specified to modify the application groups.

Action

Specify the necessary input data.

HWNDA0040E An invalid element was encountered in the input data.

Explanation

An invalid element was encountered while processing an API request for modifying the application groups.

Action

Specify a correct element.

HWNDA0041E The application group name is missing from the input data.

Explanation

An application group name was not specified.

Action

Specify a correct application group name.

HWNDA0042E The operation is missing from the input data.

Explanation

An operation was not specified.

Action

Specify a correct operation.

HWNDA0043E The resource type is missing from the input data.

Explanation

A resource type was not specified.

Action

Specify a correct resource type.

HWNDA0044E The server name is missing from the input data.

Explanation

A server name was missing while processing an API for modifying the application groups.

Action

Specify a correct server name.

HWNDA0045E The device name is missing from the input data.

Explanation

A device name was missing while processing an API for modifying the application groups.

Action

Specify a correct device name.

HWNDA0046E Invalid values were specified for the server, device or cluster names in the input data.

Explanation

Invalid values were specified for the server, device or cluster names in the input data that is used to modify the applications.

Action

Specify valid values for the server, device and cluster names.

HWNDA0047E Member names and the tags were specified for the same operation.

Explanation

Both the member names and tags were specified for the same operation.

Action

Specify either member names or tags for an operation.

**HWNDA0048W The following entities were not found:
Entities.**

Explanation

The entities were not found in the database.

Action

Try the command again and specify the correct names for the entities.

HWNDA0049W No entities were found for the tags: Tags

Explanation

The entities were not found in the database.

Action

Try the command again and specify the correct tag keys and values.

**HWNDA0050E The member names or tags were not specified
for the operation.**

Explanation

The members need to be specified using the individual names or the tag pairs.

Action

Specify either member names or tags for an operation.

**HWNDA0051W The group *Name of the proposed new member*
cannot be added to itself.**

Explanation

You cannot add a group to itself. Your request to add a group to itself is ignored.

Action

Verify the user defined properties of the group.

**HWNDA0052W The group *Name of the proposed new member*
cannot be added to the *Name of the parent group* group**

because it creates a circular relationship that is not allowed.

Explanation

Groups cannot be used in a circular relationship with their parent and child groups.

Action

Verify the current contents of the group are correct.

HWNDA0053W The group *Name of the group* contains child groups and cannot be deleted. The child groups must be deleted before the parent group can be deleted.

Explanation

A Storage Resource Group, Reporting Group or Application Group that has child groups cannot be deleted.

Action

Delete the child groups before you delete any parent group.

HWNDA0054E The filter mask that was used to create or edit a group filter is currently being used.

Explanation

The filter mask must be unique for each group.

Action

Use a unique filter mask for the group filter and try to create or edit the group again.

HWNDA0055E The argument *argument* for the parameter *parameter* on line *Line Number* : *Line* is invalid.

Explanation

The argument for the parameter is not valid.

Action

Refer to the command help for valid arguments for the parameter and edit the input file to specify a valid argument.

HWNDA0056E The first option specified in the file must be -id.

Explanation

The first option specified in the file must be -id.

Action

Edit the file appropriately.

HWNDA0057E The specified Group *Group name* is not of type *type*.

Explanation

The specified Group is not of the specified type.

Action

Try the command again, specifying the correct type.

HWNDA0058W These groups have same names as existing members of the group *The group*: *The keys of the elements*. They were not added to the group.

Explanation

The group members must have unique names in order to be added to the group.

Action

Rename the group member you are trying to add or remove the group member with the same name that already exists.

HWNDA0059E The specified tag key *Tag key* is not valid.

Explanation

The tag key that you specified does not exist.

Action

Specify a valid tag key or use the -key parameter when you modify an application group, or the -memberid parameter when you modify a department group.

HWNDA0060W These group members are also members of another group: *The groups*. They are not deleted.

Explanation

Even though you specified the -rmchildren parameter, the group members are not deleted because they also belong to another group.

Action

Remove the group member from each group that it belongs to using the modifydeptgroup command.

HWNDA0061W These group members cannot be moved up one level in hierarchy due to name conflicts: *The groups*. The group is not deleted.

Explanation

When you do not specify the -rmchildren parameter, the group members are moved up one level in hierarchy. The specified group members have the same name as the existing groups in the higher hierarchical level.

Action

Rename the specified groups and try the command again.

HWNDA0062E The specified Group *Group name* is not a department group.

Explanation

The specified group is not of type department.

Action

Specify a valid department group and try the command again.

HWNDA0063W These group members cannot be moved as top level groups in hierarchy due to name conflicts: *The groups*. No group members were removed from the group.

Explanation

When you remove group members from a group of the same type, and that group is their only single parent, the group members must become the top level groups in the hierarchy. The specified group members have the same name as the existing top level groups in hierarchy.

Action

Rename the specified groups and try the command again.

HWNDA0064E An application with the same name already exists.

Explanation

The specified application name already exists and cannot be duplicated.

Action

Enter a unique name for the application.

HWNDA0065E A department with the same name already exists.

Explanation

The specified department name already exists and cannot be duplicated.

Action

Enter a unique name for the department.

HWNDA0066E Invalid values were specified for the device, cluster or file system names in the input data.

Explanation

Invalid values were specified for the device, cluster or file system names in the input data that is used to modify the applications.

Action

Specify valid values for the device, cluster and file system names.

HWNDA0067E Resources of type *Type of resource* cannot be added to an application or removed from an application using tags.

Explanation

Resources of this type can only be added to an application or removed from an application by specifying the resource key.

Action

Retry adding or removing the resource by specifying the resource key.

HWNDA0068E The application cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.

Explanation

When you added a new subcomponent for the application, the maximum number of levels that are allowed in the hierarchy was exceeded.

Action

Review the application hierarchy. Add the application as a child of an application that is at a higher level in the hierarchy. Alternatively, add the application as a top-level application.

HWNDA0069E The department cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.

Explanation

When you created a new subdepartment for the department, the maximum number of levels that are allowed in the hierarchy was exceeded.

Action

Review the department hierarchy. Add the department as a child of a department that is at a higher level in the hierarchy. Alternatively, add the department as a top-level department.

HWNDA0070W The File Systems: {0} were not added to the application {1} because they are NAS file systems.

Explanation

A NAS file system is not a supported type to add to an application. Only server file systems are supported.

Action

Add a supported type of file system to the application.

HWNDA0071E Member IDs and the tags were specified for the same operation.

Explanation

Both the member IDs and tags were specified for the same operation.

Action

Specify either member IDs or tags for an operation.

HWNDA0072E Member IDs should be specified in the input data for resources of type appgroup .

Explanation

Member IDs of the resources of type appgroup were not specified in the input data that is used to modify the applications.

Action

Specify valid member IDs.

HWNDA0073E A general group with the same name already exists .

Explanation

The specified general group name already exists and cannot be duplicated.

Action

Enter a unique name for the general group.

HWNDA0074E The general group cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels .

Explanation

When you added a new subcomponent for the general group, the maximum number of levels that are allowed in the hierarchy was exceeded.

Action

Review the general group hierarchy. Add the general group as a child of a group that is at a higher level in the hierarchy. Alternatively, add the general group as a top-level group.

HWNDA0075E A dashboard with the same name already exists .

Explanation

The specified dashboard name already exists and cannot be duplicated.

Action

Enter a unique name for the dashboard.

HWNDA0076E The dashboard group cannot be added because the number of levels in the group hierarchy exceeds the maximum of five levels.

Explanation

When you added a new subcomponent for the dashboard group, the maximum number of levels that are allowed in the hierarchy was exceeded.

Action

Review the dashboard group hierarchy. Add the dashboard group as a child of a group that is at a higher level in the hierarchy. Alternatively, add the dashboard group as a top-level group.

HWNDA0077E A policy group with the same name already exists.

Explanation

The specified policy group name already exists and cannot be duplicated.

Action

Enter a unique name for the policy group.

HWNDA0078I The *Name of the policy group* policy group was removed.

Explanation

This message is for informational purposes only.

Action

No further action is required.

HWNPM - Performance manager messages

- [HWNPM0001E](#) The specified summarization level (*level*) is invalid. It must be an integer value between minimum and maximum, inclusive.
- [HWNPM0002E](#) The specified device category (*category*) is invalid. It must be an integer value between minimum and maximum, inclusive.
- [HWNPM0003E](#) The specified device type (*type*) is invalid. It must be an integer value between minimum and maximum, inclusive.

- [HWNPM0004E](#) The specified component type (type) is invalid. It must be an integer value between minimum and maximum, inclusive.
- [HWNPM0006E](#) The string specified as parameter (string) exceeded its allowed length (maximum length).
- [HWNPM0007E](#) The value specified as parameter (value) is invalid.
- [HWNPM0008E](#) A required parameter is missing (null).
- [HWNPM0010E](#) The specified device ID (device ID) is invalid. It must conform to the pattern 'name+nameFormat'.
- [HWNPM0011E](#) The specified component ID (component ID) is invalid. It must be a simple WWN (16 hexadecimal characters).
- [HWNPM0012E](#) The specified component ID (component ID) was not found or is not unique in the IBM Spectrum Control database.
- [HWNPM0013E](#) The specified component ID (component ID) is invalid.
- [HWNPM0015E](#) Failed to retrieve the requested data because the service is unavailable.
- [HWNPM0021E](#) The device identifier specified as parameter (device ID) is invalid.
- [HWNPM0090E](#) Failed to retrieve the requested data because the service is unavailable.
- [HWNPM0099E](#) The requested operation failed because of an internal error.
- [HWNPM0101E](#) Unable to create the specified performance service instance ({0}).
- [HWNPM0200I](#) This operation (operation name)on Performance Manager was successful.
- [HWNPM0201E](#) The device (device_id) that was passed to the method is invalid.
- [HWNPM0202E](#) The device category (device_category) that was passed to the method is invalid.
- [HWNPM0203E](#) The device type received (device_type) is invalid.
- [HWNPM0204E](#) The device type - HOST - that was passed to the method is not supported.
- [HWNPM0205E](#) The specified performance collection policy is invalid.
- [HWNPM0209I](#) The device type and device category are valid.
- [HWNPM0210E](#) Collector failed to start due to system failure.
- [HWNPM0220E](#) Collector failed to stop due to system failure.
- [HWNPM0230E](#) One or more of the specified performance collection policies are invalid.
- [HWNPM0231W](#) The specified performance collection policy is ignored because it conflicts with another policy in the same parameter list.
- [HWNPM0232E](#) The specified performance collection policy contains an unsupported interval length.
- [HWNPM0233E](#) The specified performance collection policy contains an unsupported frequency.
- [HWNPM0234E](#) The specified performance collection policy contains an unsupported duration.
- [HWNPM0240E](#) The attempt to update the specified performance collection policies has failed.
- [HWNPM0241E](#) The attempt to reset the specified performance collection policies has failed.
- [HWNPM0242E](#) The attempt to remove the specified performance collection policies has failed.
- [HWNPM0249W](#) An attempt to dynamically update one or more running performance collectors with a new performance collection policy has failed.
- [HWNPM0250E](#) One or more default performance collection policies are missing from the database.
- [HWNPM0281I](#) Performance monitoring is unavailable for resource resource_name because an agent for monitoring the resource was not defined. For IBM Spectrum Scale, the problem might occur because the data collection service cannot connect to port 9084 on the node where the collector component of the IBM Spectrum Scale performance monitoring tool is running.
- [HWNPM0282I](#) Performance monitoring is unavailable for resource resource_name because the associated data sources are unable to collect performance data from the resource.
- [HWNPM0283I](#) Performance monitoring is unavailable for resource_name because this resource does not support performance monitoring.
- [HWNPM0284I](#) Performance monitoring is unavailable for resource resource_name because the associated agent does not have the required level of software agent_level.
- [HWNPM0285I](#) Performance monitoring is unavailable for resource resource_name because the associated agent is unable to fully monitor the resource.
- [HWNPM0286I](#) Performance monitoring is unavailable for resource resource_name because the associated SMI-S provider does not have the required SMI-S support.
- [HWNPM0287I](#) Performance monitoring is unavailable for resource resource_name because the resource or the associated agent does not support performance monitoring.
- [HWNPM0288I](#) Performance monitoring is unavailable for resource resource_name because the resource was not probed.
- [HWNPM0289W](#) Performance monitoring is unavailable for resource resource_name because no agents are available.
- [HWNPM0290E](#) Performance monitoring is unavailable for resource resource_name because the associated agent was could not be selected.
- [HWNPM0291I](#) Performance monitoring is unavailable for switch resource_name because the switch has no ports.
- [HWNPM0292I](#) Performance monitoring is unavailable for switch resource_name because the switch was not probed using the correct agent.
- [HWNPM0293I](#) Performance monitoring is unavailable for FlashSystem resource_name because its SNMP agent is disabled. You can enable SNMP for FlashSystem storage systems in the FlashSystem GUI.
- [HWNPM0300E](#) There is an exception for each device processed in a multiple devices call.
- [HWNPM0390E](#) A system failure occurred.
- [HWNPM0400I](#) This operation (operation name)on Threshold Service was successful.
- [HWNPM0401E](#) The device (device_id) that was passed to the method is invalid.
- [HWNPM0410E](#) The Performance threshold policy that was passed to the method (threshold policy)is null.

- [HWNPM0411E](#) The Performance threshold that was passed to the method (threshold)is null.
- [HWNPM0412E](#) The Performance threshold filter that was passed to the method (filter)is null.
- [HWNPM0420E](#) The device type received (device_type) is invalid.
- [HWNPM0421E](#) There is no default performance threshold policy or default threshold filter for this device.
- [HWNPM0425E](#) There is an exception for each device processed in a multiple devices threshold call.
- [HWNPM0590E](#) Performance Manager failed due to system failure.
- [HWNPM0600E](#) Parameter number a number of the call made to the IBM Spectrum Control Performance Manager reporting API method name of the api is invalid. The invalid value is the invalid value of parameter descriptive name of the parameter.
- [HWNPM0601E](#) A request to continue the data retrieval can not be performed. Information for continuing the data retrieval does not exist.
- [HWNPM0602E](#) Support for the device type device type name is not available in the Performance Manager reporting API function method name.
- [HWNPM0603E](#) The performance reporting API method_name failed at time_of_failure as a result of an internal processing exception. The Performance Manager logs contain message message_ID that describes the internal processing exception.
- [HWNPM0604E](#) The sort order parameter of a call to the performance reporting API method_name contains a value not included in the report columns list, at position list_item in the sort order list.
- [HWNPM0605E](#) The report columns parameter of a call to the performance reporting API method_name contains a metric or counter type that is not available for a specified device of type device_type and specified component with type code component_type. The metric or counter type code is type_code.
- [HWNPM0606E](#) Unable to instantiate performance reporting service service class name.
- [HWNPM0607E](#) An error occurred while the performance data was being retrieved.
- [HWNPM0630E](#) An invalid operator (operator identifier) was specified for the filter expression.
- [HWNPM0631E](#) An invalid first operand (operand class) was specified for the filter expression. It must be a operand class class.
- [HWNPM0632E](#) An invalid first operand was specified for the filter expression. The data type of the operand (data type) is invalid or unsupported.
- [HWNPM0633E](#) An invalid second operand (operand class) was specified for the filter expression. It must be a operand class class.
- [HWNPM0650E](#) The IBM Spectrum Control Performance Manager reporting API method name failed as a result of exception the related exception from a call to method method name, of the lower-level service name internal service.
- [HWNPM0651E](#) The configuration data needed to generate the affected volumes and hosts report for the device device name was not found in the IBM Spectrum Control database.
- [HWNPM2000I](#) Performance monitoring is enabled.
- [HWNPM2001E](#) The IBM Spectrum Control Performance Manager is not operational.
- [HWNPM2002E](#) An initialization error occurred.
- [HWNPM2003E](#) Initialization of the Device server event service failed. No performance threshold exception alerts will be generated.
- [HWNPM2004E](#) Initialization of the product scheduler status service failed. The status of performance monitors will not be updated in the GUI.
- [HWNPM2005E](#) Initialization of the product configuration data service failed. Performance monitors cannot be started without this service.
- [HWNPM2006E](#) Initialization of the product configuration data service failed. Performance monitors cannot be started without this service.
- [HWNPM2007E](#) Initialization of the product counter data service failed for device type using agent type. Performance monitors will not be able to collect performance data from devices of this type.
- [HWNPM2008E](#) Initialization of the product metadata service failed. Performance monitors cannot be started without this service.
- [HWNPM2009E](#) Unable to instantiate lower level service service_class_name.
- [HWNPM2010E](#) Unable to instantiate the collection logic implementation service class name.
- [HWNPM2011E](#) Unable to instantiate the performance statistics data class class name.
- [HWNPM2012I](#) The product is using trace log directory log directory name.
- [HWNPM2020W](#) The performance monitor for device device name is not currently active, so a dynamic update of its monitor policy is not necessary.
- [HWNPM2021W](#) The performance monitor for device device name is not currently active, so a dynamic update of its threshold policy is not necessary.
- [HWNPM2022E](#) A performance monitor for device device name is already active. A new monitor for the same device cannot be started until the previous monitor completes or is cancelled.
- [HWNPM2023W](#) The performance monitor for device device_name is not currently active.
- [HWNPM2024E](#) Unable to find a monitor policy applicable to resource resource name.
- [HWNPM2025E](#) Unable to find a threshold policy applicable to resource resource_name.
- [HWNPM2026I](#) The performance monitor's primary process has failed unexpectedly. Attempting to recover from the failure.
- [HWNPM2027I](#) The performance monitor threshold checker has failed unexpectedly. Attempting to recover from the failure.
- [HWNPM2028I](#) The performance monitor purge process has failed unexpectedly. Attempting to recover from the failure.
- [HWNPM2029I](#) Successfully recovered from the performance monitor failure.
- [HWNPM2030E](#) Unable to recover from the performance monitor failure. The performance monitor for the storage resource will be shut down.

- [HWNPM2031E](#) The performance monitor failed due to an internal error.
- [HWNPM2032W](#) The performance monitor for device device name is not currently using the default monitor policy, so a dynamic update of the policy is not necessary.
- [HWNPM2033W](#) The performance monitor for device device name is not currently using the default threshold policy, so a dynamic update of the policy is not necessary.
- [HWNPM2040E](#) The device key specified for the snapshot vote (key) was not found in the database. The device does not exist.
- [HWNPM2050E](#) Failed to get the latest configuration data for device device name.
- [HWNPM2051E](#) No performance data was collected from device device name for the current collection interval (time_stamp) because the performance monitor was stopped.
- [HWNPM2052E](#) No performance data was collected from device device name for the current collection interval due to an error. Data was last collected at time_stamp.
- [HWNPM2053E](#) The new performance data collected from device device name could not be saved in the database. Increase the size of the transaction log.
- [HWNPM2054E](#) The new performance data collected from device device name could not be saved in the database. Increase the size of the database lock list.
- [HWNPM2055E](#) The new performance data collected from resource device name could not be saved.
- [HWNPM2056E](#) No performance data was collected from device device name for the current performance monitor job duration. The performance monitor job status is set to 'failed'.
- [HWNPM2057E](#) No performance data was collected from device device name for the current collection interval because the performance monitor was stopped.
- [HWNPM2058E](#) No performance data was collected from device device name for the current collection interval due to an error.
- [HWNPM2060W](#) The device does not support performance management for segment pool pool ID. Only incomplete performance data can be collected for array array ID.
- [HWNPM2061W](#) The device does not support performance management for segment pool pool ID. Only incomplete performance data can be collected for device adapter DA ID.
- [HWNPM2062W](#) Invalid error message saved in database
- [HWNPM2100E](#) The performance monitor for resource device name cannot be started because configuration data for the resource is not available.
- [HWNPM2101E](#) All agents that can collect performance data for resource device name are currently non-operational.
- [HWNPM2102E](#) The performance monitor for resource device name cannot be started because the resource might not support the collection of performance data.
- [HWNPM2103W](#) Agent agent name is non-operational. Attempting to find an alternative agent.
- [HWNPM2104I](#) The performance monitor policy was adjusted due to agent limitations. Current values in effect are: interval-length=interval-length, frequency=frequency.
- [HWNPM2105E](#) The performance monitor for resource resource name failed because the resource for enabling performance data collection cannot be reached.
- [HWNPM2106E](#) The performance monitor for device device name failed because of errors trying to enable performance data collection on the device or device agent: error description
- [HWNPM2107E](#) The performance monitor for device device name failed because of unrecognized errors trying to enable performance data collection on the device or device agent: error description
- [HWNPM2108E](#) The performance monitor for resource resource name failed during shutdown because the resource cannot be reached for terminating data collection.
- [HWNPM2109E](#) The performance monitor for resource resource name failed during shutdown because of errors during termination of performance data collection: error description
- [HWNPM2110E](#) The performance monitor for resource resource name failed during shutdown because of unrecognized errors during termination of performance data collection: error description
- [HWNPM2111E](#) The performance monitor for resource resource name failed because of errors retrieving the most recent configuration data for the resource.
- [HWNPM2112I](#) Agent agent name was selected for performance data collection from resource resource name.
- [HWNPM2113I](#) The performance monitor for resource resource name is starting in an active state.
- [HWNPM2114I](#) The performance monitor for resource resource name is starting in a dormant state.
- [HWNPM2115I](#) Monitor Policy: name="policy name", creator="policy creator", description="policy description"
- [HWNPM2116I](#) Monitor Policy: retention period: sample data=length in days days, hourly data=length in days days, daily data=length in days days.
- [HWNPM2117I](#) Monitor Policy: interval length=length in seconds secs, frequency=length in seconds secs, duration=length in hours hours.
- [HWNPM2118I](#) Threshold Policy: name="policy name", creator="policy creator", description="policy description"
- [HWNPM2119I](#) Threshold Policy: retention period: exception data=length in days days.
- [HWNPM2120I](#) Threshold Policy: threshold name=name, component=component type, enabled=Yes or No, boundaries=critical stress boundary,warning stress boundary,warning idle boundary,critical idle boundary units.
- [HWNPM2121I](#) Monitor Policy: interval length=length in seconds secs, frequency=length in seconds secs, duration=continue indefinitely.
- [HWNPM2122W](#) No valid performance data was provided by the monitored resource. No performance data records were inserted into the database.
- [HWNPM2123I](#) Performance data for resource timestamp date and time was collected and processed successfully. record count performance data records were inserted into the database repository.

- [HWNPM2124W Performance data continuity is broken. The device was possibly reset or rebooted, record count performance data records were discarded.](#)
- [HWNPM2125W Aggregated performance values have been computed from the remaining data records, but their accuracy cannot be guaranteed.](#)
- [HWNPM2126I The performance monitor for device device name is stopping because its intended duration has elapsed.](#)
- [HWNPM2127I The performance monitor for device device name is stopping due to a user request.](#)
- [HWNPM2128E The performance monitor for device device name is stopping due to an unexpected failure.](#)
- [HWNPM2129I The performance monitor for device device name is stopping because of a shutdown request.](#)
- [HWNPM2130W Failed to retrieve the latest configuration data for device device name.](#)
- [HWNPM2131W Performance data could not be collected for device device name, because the device or data source cannot be reached \(reason reason code\). The current samples are skipped.](#)
- [HWNPM2132W Performance data could not be collected for device device name. The current samples are skipped. \(error description\)](#)
- [HWNPM2133W Performance data could not be collected for device device name due to an unknown error. The current samples are skipped.](#)
- [HWNPM2134W The state of the performance monitor for resource resource name started, but the status of the performance monitor was not updated.](#)
- [HWNPM2135W The state of the performance monitor for device device name has changed to 'active', but could not be recorded appropriately.](#)
- [HWNPM2136W The performance monitor for the resource resource name generated a warning, but the status of the performance monitor was not updated.](#)
- [HWNPM2137W The performance monitor for the resource resource name stopped, but the status of the performance monitor was not updated.](#)
- [HWNPM2138W The performance monitor for the resource resource name completed the collection of data, but the status of the performance monitor was not updated.](#)
- [HWNPM2139W The performance monitor for the resource resource name failed, but the status of the performance monitor was not updated.](#)
- [HWNPM2140W The status of the performance monitor for the resource resource name was not updated.](#)
- [HWNPM2141E The service is unavailable because an unexpected error occurred.](#)
- [HWNPM2142E Performance data can't be collected for the resource resource name because the performance monitor was disabled.](#)
- [HWNPM2143E The performance monitor for the resource resource name was started, but the status of the performance monitor was not updated and might not be shown in the GUI.](#)
- [HWNPM2144W The performance data cannot be checked against the alert conditions, so no alerts can be generated.](#)
- [HWNPM2145I The data is being collected by the data collector: data collector host.](#)
- [HWNPM2146W Performance data could not be collected for device device name, the exact reason for the failure could not be determined. The current samples are skipped.](#)
- [HWNPM2147W Performance data could not be collected for device device name, because of a bad target \(device or agent\) address. The current samples are skipped.](#)
- [HWNPM2148W Performance data could not be collected for device device name, because of an unknown target address. The current samples are skipped.](#)
- [HWNPM2149W Performance data could not be collected for device device name, because of an unreachable target address. The current samples are skipped.](#)
- [HWNPM2150W Performance data could not be collected for device device name, because of an unresponsive target. The current samples are skipped.](#)
- [HWNPM2151W Performance data could not be collected for device device name, because a communication time-out for communication that uses UDP rather than TCP. The current samples are skipped.](#)
- [HWNPM2200I The performance monitor successfully collected the configuration data for the storage system with the following internal resources: number_of_pools pools, number_of_controllers controllers, number_of_device_adapters device adapters, number_of_ports ports, number_of_host_connections host connections, number_of_ranks ranks, number_of_arrays arrays, and number_of_volumes volumes.](#)
- [HWNPM2201I The performance monitor successfully collected the configuration data for the storage system with the following internal resources: number_of_io_groups I/O Groups, number_of_nodes nodes, number_of_ports ports, number_of_host_connections host connections, number_of_pools pools, number_of_managed_disks managed disks, number_of_local_disks local disks, number_of_volumes volumes, and number_of_volume_copies volume copies.](#)
- [HWNPM2202I The performance monitor successfully retrieved the configuration data for the switch. The following internal resources were found: number_of_trunks trunks, and number_of_ports ports.](#)
- [HWNPM2203I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: number_of_host_connections host connections, number_of_modules modules, number_of_ports ports, number_of_pools pools, and number_of_volumes volumes.](#)
- [HWNPM2204I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: number_of_nodes nodes, number_of_ports ports, and number_of_modules flash modules.](#)
- [HWNPM2205I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: number_of_ports ports, number_of_controllers controllers, number_of_volumes volumes, and number_of_disks disks.](#)
- [HWNPM3000E There was a problem establishing the database connection.](#)

- [HWNPM3001E An unexpected null row was returned from a database cursor.](#)
- [HWNPM3002E An unexpected database exception occurred.](#)
- [HWNPM3003E An unexpected database exception occurred on the snapshot database tables.](#)
- [HWNPM3004E The snapshot ID could not be found.](#)
- [HWNPM3500E The current transaction has been rolled back because of a deadlock.](#)
- [HWNPM3501E The current transaction has been rolled back because of a timeout.](#)
- [HWNPM3502E The current transaction has been rolled back because the database transaction log has been exhausted.](#)
- [HWNPM3503E The current transaction has been rolled back because the database disk space has been exhausted.](#)
- [HWNPM3600E The threshold identifier parameter value : threshold ID is not valid.](#)
- [HWNPM3601E The target component type parameter value : component type is not valid for the threshold identifier : threshold ID passed to the affected volumes and hosts reporting function.](#)
- [HWNPM3602E There was a problem retrieving the performance data needed to generate the affected volumes and hosts report for the device device name.](#)
- [HWNPM3603E The sample volume performance data needed to generate the affected volumes and hosts report for the device device name was not found in the IBM Spectrum Control database.](#)
- [HWNPM3604E There are no volumes associated with the specified target component, component name, in the IBM Spectrum Control database. Therefore, the resulting Affected Volumes and Hosts report will be empty.](#)
- [HWNPM4000E Unable to retrieve the device agent that managed this device: device identifier.](#)
- [HWNPM4001E Timeout while starting performance data collection for this device: device identifier.](#)
- [HWNPM4002E Unable to start performance data collection for this device: device identifier.](#)
- [HWNPM4003E Performance data collection has already been enabled for this device: device identifier.](#)
- [HWNPM4004E Failed to enable performance data collection for this device: device identifier.](#)
- [HWNPM4005I Successfully enabled performance data collection on the storage subsystem, using device access point SMI-S provider address.](#)
- [HWNPM4006E An exception occurred while starting performance data collection for this device: device identifier.](#)
- [HWNPM4007E A timeout occurred while stopping performance data collection for this device: device identifier.](#)
- [HWNPM4008E Unable to stop performance data collection for this device: device identifier.](#)
- [HWNPM4009E Performance data collection is not enabled for this device: device identifier.](#)
- [HWNPM4010E Failed to disable performance data collection for this device: device identifier.](#)
- [HWNPM4011I Successfully disabled performance data collection on the storage subsystem, using device access point SMI-S provider address.](#)
- [HWNPM4012E An exception occurred while stopping performance data collection for this device: device identifier.](#)
- [HWNPM4013E A timeout occurred while retrieving the status of the performance data collection for this device: device identifier.](#)
- [HWNPM4014E Unable to retrieve the status of the performance data collection for this device: device identifier.](#)
- [HWNPM4015I Performance data collection is not enabled for this device: device identifier.](#)
- [HWNPM4016I Performance data collection is enabled for this device: device identifier.](#)
- [HWNPM4017E Unable to determine the status of the performance data collection for this device: device identifier.](#)
- [HWNPM4018E Failed to retrieve the status of the performance data collection for this device: device identifier.](#)
- [HWNPM4019E A timeout occurred while polling the performance statistics for this device: device identifier.](#)
- [HWNPM4020E Unable to retrieve the performance statistics for this device: device identifier.](#)
- [HWNPM4021E No performance statistics available at the current time for this device: device identifier.](#)
- [HWNPM4022E Failed to disable performance data collection for this device: device identifier.](#)
- [HWNPM4023W A set of performance statistics data was empty for this device: device identifier.](#)
- [HWNPM4024E An exception occurred while stopping performance data collection for this device: device identifier.](#)
- [HWNPM4025E Unable to retrieve storage subsystem for this device: device identifier.](#)
- [HWNPM4026E Failed to retrieve storage subsystem for this device: device identifier.](#)
- [HWNPM4027E Failed to properly initialize counter data service for this device: device identifier.](#)
- [HWNPM4028W Performance data cannot be collected because the security role authority of the user account user name for accessing device identifier is not sufficient.](#)
- [HWNPM4051E Failed to obtain a reference to the Performance Manager Configuration Data Service for this device: device name.](#)
- [HWNPM4052E Error occurred in trying to retrieve a device agent for this device: device name.](#)
- [HWNPM4053E Unable to locate or retrieve the device agent that manages this device: device name.](#)
- [HWNPM4054E Error occurred in trying to construct the poll state information for this device: device name.](#)
- [HWNPM4055E Unable to construct the poll state information for this device: device name.](#)
- [HWNPM4056E SMI-S provider operation triggered a timeout \(step timeout= step timeout value seconds, operation timeout= total timeout value seconds,\).](#)
- [HWNPM4057E Mismatch in device identifier for this device: device name.](#)
- [HWNPM4058E Failed to build the parameter Map for this device: device name.](#)
- [HWNPM4059I Performance data collection has already been enabled for this device: device name.](#)
- [HWNPM4060I Performance data collection was successfully started for this device: device name.](#)
- [HWNPM4061E Performance data collection could not be started for this device: device name.](#)
- [HWNPM4062I Performance data collection successfully stopped for this device: device name.](#)
- [HWNPM4063W Parse exception in performance data collected this device: device name.](#)
- [HWNPM4064E Wrong format in performance data collected for this device: device name.](#)

- [HWNPM4065W number of null time stamps null time stamp\(s\)for performance data collected from the device were substituted by server time stamp\(s\).](#)
- [HWNPM4066W count of null operational status null Port Operational Status value\(s\) for performance data collected from the device was/were substituted by default value\(s\).](#)
- [HWNPM4081E A database cursor operation failed.](#)
- [HWNPM4082E A database connect operation failed.](#)
- [HWNPM4083E A database retrieve operation failed.](#)
- [HWNPM4084E A database operation failed.](#)
- [HWNPM4085E A database query operation failed.](#)
- [HWNPM4086W A database query gave no result rows.](#)
- [HWNPM4087W Missing or invalid association between SMI-S provider SMI-S provider URL and device device name. The configured SMI-S provider is inoperative, or may no longer be managing the specified device.](#)
- [HWNPM4091E Encountered an error during execution of a discover service process.](#)
- [HWNPM4092E Encountered exception during execution of a discover service process.](#)
- [HWNPM4093E An input business object could not be converted to a CIMInstance.](#)
- [HWNPM4100E Failed to initialize SVC counter data service discover service reference.](#)
- [HWNPM4101E Failed to initialize SVC counter data service configuration service reference.](#)
- [HWNPM4102E Failed to parse performance data file time stamp suffix: filename.](#)
- [HWNPM4103E SMI-S provider operation timeout \(timeout value seconds\) expired.](#)
- [HWNPM4104E Failed to retrieve SMI-S provider password for SVC counter data service access point: access point.](#)
- [HWNPM4105E Encountered an error when communicating with the device agent.](#)
- [HWNPM4106E Encountered invalid SVC component type: component type.](#)
- [HWNPM4107E Failed to create performance data object: performance data object class.](#)
- [HWNPM4108E TimeZone property is not defined for SVC cluster: cluster identifier.](#)
- [HWNPM4109E SVC cluster TimeZone property is set to unrecognized value: timezone id and name.](#)
- [HWNPM4110E StatisticsStatus property is not defined for SVC cluster: cluster identifier.](#)
- [HWNPM4111E Failed to retrieve dump filename dump from SVC node node identifier \(return code = return code\).](#)
- [HWNPM4112E IsConfigNode property is not defined for SVC node: node identifier.](#)
- [HWNPM4113E Caught exception while processing SVC XML performance data.](#)
- [HWNPM4114E SVC cluster cluster identifier has more than one configuration node.](#)
- [HWNPM4115E SVC cluster cluster identifier does not have a configuration node.](#)
- [HWNPM4116W Failed to associate SVC performance data from non-configuration node with SVC performance data from configuration node.](#)
- [HWNPM4117W Encountered incomplete SVC performance data sample.](#)
- [HWNPM4118E Firmware version information is not available for storage subsystem subsystem name. Performance data collection cannot proceed.](#)
- [HWNPM4119E The firmware installed on storage subsystem subsystem name \(firmware version\) is not supported for performance data collection. The minimum level of firmware supported for performance data collection is firmware version.](#)
- [HWNPM4150E Unable to retrieve storage subsystem for this device: device identifier.](#)
- [HWNPM4151E Unable to determine the status of any performance data collection for this device: device identifier.](#)
- [HWNPM4152E Performance data collection has already been enabled for this device: device identifier.](#)
- [HWNPM4153E Performance data collection is not enabled for this device: device identifier.](#)
- [HWNPM4154E Unable to start performance data collection for this device: device identifier.](#)
- [HWNPM4155E Failed to enable performance data collection for this device: device identifier.](#)
- [HWNPM4156E Unable to stop performance data collection for this device: device identifier.](#)
- [HWNPM4157E Failed to disable performance data collection for this device: device identifier.](#)
- [HWNPM4158E Unable to complete start performance data collection task for this device: device identifier.](#)
- [HWNPM4159E Unable to complete stop performance data collection task for this device: device identifier.](#)
- [HWNPM4160E Unable to complete performance data collection status query task for this device: device identifier.](#)
- [HWNPM4161E Performance data collection is not enabled for this device: device identifier.](#)
- [HWNPM4162E Unable to retrieve port performance statistics data for this device: device identifier.](#)
- [HWNPM4163E Unable to retrieve volume performance statistics data for this device: device identifier.](#)
- [HWNPM4164E Unable to retrieve rank performance statistics data for this device: device identifier.](#)
- [HWNPM4165E Unable to retrieve performance statistics data for this device: device identifier.](#)
- [HWNPM4166E Unable to complete polling for performance data collection task for this device: device identifier.](#)
- [HWNPM4167E Unable to retrieve a device agent for this device: device identifier.](#)
- [HWNPM4168E Failed attempt to use device device identifier counter data service with device different device identifier.](#)
- [HWNPM4169E An invalid access point of device agent URL was used to acquire the agent for this device: device identifier.](#)
- [HWNPM4170E The device agent's configuration for device identifier has changed from the given access point, device agent URL.](#)
- [HWNPM4171E Performance data collection start task timed out after time seconds for device: device identifier.](#)
- [HWNPM4172E Performance data collection stop task timed out after time seconds for device: device identifier.](#)
- [HWNPM4173E Performance data collection check status task timed out after time seconds for device: device identifier.](#)
- [HWNPM4174E Performance data collection poll task timed out after time seconds for device: device identifier.](#)
- [HWNPM4175W An error occurred while parsing statistics for port port identifier. Its statistics will be excluded.](#)
- [HWNPM4176W An error occurred while parsing statistics for volume volume identifier. Its statistics will be excluded.](#)

- [HWNPM4177W An error occurred while parsing statistics for rank rank identifier. Its statistics will be excluded.](#)
- [HWNPM4178E Failed to decrypt the device agent's password for device device identifier.](#)
- [HWNPM4179W Performance data collection is currently enabled with errors for device device identifier.](#)
- [HWNPM4180E Unable to retrieve key identifier value from the internal discover process.](#)
- [HWNPM4181W number of ports of the port statistics from the device agent were unrecognized and were not included in this sample interval.](#)
- [HWNPM4182W number of volumes of the volume statistics from the device agent were unrecognized and were not included in this sample interval.](#)
- [HWNPM4183W number of ranks of the rank statistics from the device agent were unrecognized and were not included in this sample interval.](#)
- [HWNPM4184E The device agent configured for this storage subsystem is not supported for this task. The current version, version number, is downlevel from from the minimum required, version number.](#)
- [HWNPM4185W The device agent did not return all performance statistics data for this time interval. The incomplete data is being processed.](#)
- [HWNPM4186W The ESS SMI-S provider did not return performance statistics data for both clusters for this time interval. The incomplete data is being processed.](#)
- [HWNPM4187W The device does not support performance management for pool pool ID because it contains Space Efficient Volumes. Only incomplete performance data can be collected for array array ID.](#)
- [HWNPM4188W The performance monitor was unable to collect performance statistics data from the device agent for the following component types: component list.](#)
- [HWNPM4189W number of MDisks of the MDisk statistics from the device agent were unrecognized and were not included in this data collection interval.](#)
- [HWNPM4190W number of nodes of the node statistics from the resource agent were unrecognized and were not included in this data collection interval.](#)
- [HWNPM4191W number of modules out of total number of modules module statistics could not be retrieved from the device agent due to errors, and were not included in this data collection interval.](#)
- [HWNPM4192W number of Drives of the drive statistics from the device agent were unrecognized and were not included in this data collection interval.](#)
- [HWNPM4193W number of Volume-copies of the volume-copy statistics from the device agent were unrecognized and were not included in this data collection interval.](#)
- [HWNPM4194W number of partitions of the partition statistics from the device agent were unrecognized and were not included in this data collection interval.](#)
- [HWNPM4195W number of file systems of the file system statistics from the device agent were unrecognized and were not included in this data collection interval.](#)
- [HWNPM4250E Failed to start the discover service for the SMI-S counter data service.](#)
- [HWNPM4251E Failed to start the configuration service for the SMI-S counter data service.](#)
- [HWNPM4252I Successfully returned access point device namer for device device name.](#)
- [HWNPM4253I Successfully stopped SMI-S counter data service on access point access point for device device name.](#)
- [HWNPM4254I The SMI-S counter data service is active on access point access point for device device name.](#)
- [HWNPM4255I The SMI-S counter data service is inactive on access point access point for device device name.](#)
- [HWNPM4256I Performance statistics successfully returned on access point access point for device device name.](#)
- [HWNPM4257W Performance statistics not returned on access point access point for device device name.](#)
- [HWNPM4258E No SMI-S providers found for device device name.](#)
- [HWNPM4259E No storage subsystem found for device device name.](#)
- [HWNPM4260E Failed to initialize the polling context for device device name.](#)
- [HWNPM4261E Failed to retrieve the device capabilities for device device name.](#)
- [HWNPM4262E A database exception occurred trying to retrieve the device capabilities for device device name.](#)
- [HWNPM4263E A database exception occurred trying to retrieve the storage subsystem for device device name.](#)
- [HWNPM4264W Failed to retrieve manifest for component type.](#)
- [HWNPM4265E A database exception occurred trying to retrieve the Manifests for device device name.](#)
- [HWNPM4266E No manifests found for device device name.](#)
- [HWNPM4267E A database exception occurred trying to retrieve the discovery parameters for device device name.](#)
- [HWNPM4268E Statistics record not correctly formatted due to exception local exception string.](#)
- [HWNPM4269E Statistics record not correctly parsed due to exception local exception string.](#)
- [HWNPM4270W The block storage statistics is not formatted for device device name.](#)
- [HWNPM4271E The SMI-S provider found for device device name is not valid.](#)
- [HWNPM4272E The storage subsystem found for device device name is not valid.](#)
- [HWNPM4273W Discarding the stale performance statistics returned on access point access point for device device name.](#)
- [HWNPM4274E The SMI-S provider found for this device has changed. Please re-run SMI-S provider discovery and probe.](#)
- [HWNPM4300E Access to the agent or device has been denied. Ensure that valid credentials have been specified for agent agent name.](#)
- [HWNPM4301E The device or device agent did not respond within the allotted time \(timeout value seconds\).](#)
- [HWNPM4302E New performance data is not yet available for the device. Statistics with time stamps later than time_stamp could not be found.](#)
- [HWNPM4303E An agent API call \(API name\) failed while attempting to retrieve performance data for the device.](#)

- [HWNPM4304E The request for performance data could not be retrieved from the queue by the data collector, probably this one is down or encountered problems connecting to the server.](#)
- [HWNPM4502E Attempt to delete a default policy.](#)
- [HWNPM4503E A database update operation failed.](#)
- [HWNPM4504E A database insert operation failed.](#)
- [HWNPM4505E A database delete operation failed.](#)
- [HWNPM4506E A database cursor operation failed.](#)
- [HWNPM4507E A database connect operation failed.](#)
- [HWNPM4508E A database retrieve operation failed.](#)
- [HWNPM4509E A database operation failed.](#)
- [HWNPM4510E A database query operation failed.](#)
- [HWNPM4511E A database commit operation failed.](#)
- [HWNPM5200E The performance manager failed to publish event even name due to exception exception.](#)
- [HWNPM5210E The performance manager failed to receive event from other modules.](#)
- [HWNPM5211E The first parameter passed to this method is null.](#)
- [HWNPM5212E The second parameter passed to this method is invalid.](#)
- [HWNPM5400E The performance data collection identifiers are not valid integers: schedule ID {0}, schedule run number {1}, job run number {2}.](#)
- [HWNPM5401E There was a problem establishing the database connection: {0}.](#)
- [HWNPM5402E There was a problem creating the new run job entry: {0}.](#)
- [HWNPM5403E There was a problem updating the run job entry {0}: {1}.](#)
- [HWNPM5404E There was a problem closing the database connection: {0}.](#)
- [HWNPM5405E There was a problem inserting a new run job into the database: {0}.](#)
- [HWNPM5406E There was a problem executing an update for run job number {0} in the database.](#)
- [HWNPM5407E There was a problem executing an update for run job number {0} in the database.](#)
- [HWNPM5408E There was a problem executing an update for run number {0} in the database.](#)
- [HWNPM5409I Successfully retrieved the configuration data for the elastic device. Found number of nodes Nodes and number of file systems File systems.](#)
- [HWNPM5410W The performance monitor could not collect performance data for the following cluster nodes: nodes names.](#)
- [HWNPM5411W The performance monitor could not collect performance data for the following filesystems: filesystem names.](#)
- [HWNPM5413E The process failed because the userid or password provided failed to connect to the Export Tool.](#)
- [HWNPM5414E The process failed because the Hitachi SVP was busy and did not return data or timed out.](#)

HWNPM0001E The specified summarization level (*level*) is invalid. It must be an integer value between *minimum* and *maximum*, inclusive.

Explanation

The summarization level that was passed as argument on the Performance Manager API call is invalid. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid summarization level as parameter. The valid levels are enumerated via the summtyp_* constants in the com.ibm.tpc.perf.api.ApiConstants interface.

HWNPM0002E The specified device category (*category*) is invalid. It must be an integer value between *minimum* and *maximum*, inclusive.

Explanation

The device category that was passed as argument on the Performance Manager API call is invalid. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid device category as parameter. The valid categories are enumerated via the devcat_* constants in the com.ibm.tpc.perf.api.ApiConstants interface.

HWNPM0003E The specified device type (*type*) is invalid. It must be an integer value between *minimum* and *maximum*, inclusive.

Explanation

The device type that was passed as argument on the Performance Manager API call is invalid. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid device type as parameter. The valid types are enumerated via the devtype_* constants in the com.ibm.tpc.perf.api.ApiConstants interface.

HWNPM0004E The specified component type (*type*) is invalid. It must be an integer value between *minimum* and *maximum*, inclusive.

Explanation

The component type that was passed as argument on the Performance Manager API call is invalid. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid component type as parameter. The valid types are enumerated via the comptype_* constants in the com.ibm.tpc.perf.api.ApiConstants interface.

HWNPM0006E The string specified as parameter (*string*) exceeded its allowed length (*maximum length*).

Explanation

The string parameter that was passed as argument on the Performance Manager API call is too long. The method that was called returns this error indicator.

Action

Length limitations usually arise due to the need for saving the given string into a fixed length database column. Modify the caller of this method to pass a shorter string as parameter.

HWNPM0007E The value specified as parameter (*value*) is invalid.

Explanation

The parameter value that was passed as argument on the Performance Manager API call is invalid. The method that was called returns this error indicator.

Action

Refer to the method or class documentation to determine the allowed values for the particular parameter. Modify the caller of this method to pass a valid value to the API.

HWNPM0008E A required parameter is missing (null) .

Explanation

The parameter value that was passed as argument on the Performance Manager API call is NULL, but the parameter is required. The method that was called returns this error indicator.

Action

Refer to the method or class documentation to determine the allowed values for the particular parameter. Modify the caller of this method to pass a valid value to the API.

HWNPM0010E The specified device ID (*device ID*) is invalid. It must conform to the pattern 'name+nameFormat' .

Explanation

The device identifier string that was passed as argument on the Performance Manager API call is invalid. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid device ID as parameter.

HWNPM0011E The specified component ID (*component ID*) is invalid. It must be a simple WWN (16 hexadecimal characters) .

Explanation

The component identifier string that was passed as argument on the Performance Manager API call is invalid. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid component ID as parameter.

HWNPM0012E The specified component ID (*component ID*) was not found or is not unique in the IBM Spectrum Control database.

Explanation

The component identifier string that was passed as argument on the Performance Manager API call does not correspond to a device known to IBM Spectrum Control. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid component ID as parameter. The parameter string must uniquely identify the required component.

HWNPM0013E The specified component ID (*component ID*) is invalid.

Explanation

The component identifier string that was passed as argument on the Performance Manager API call is invalid. It must conform to the pattern 'compName+deviceName+deviceNameFormat'. The method that was called returns this error indicator.

Action

Modify the caller of this method to pass a valid component ID as parameter.

HWNPM0015E Failed to retrieve the requested data because the service is unavailable.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM0021E The device identifier specified as parameter (*device ID*) is invalid.

Explanation

The device identifier that was passed as an argument for the product API is invalid. The device identifier was either not found or is not unique in the database.

Action

Modify the caller of this method to pass a valid device identifier as a parameter. The parameter must uniquely identify the required device.

HWNPM0090E Failed to retrieve the requested data because the service is unavailable.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM0099E The requested operation failed because of an internal error.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM0101E Unable to create the specified performance service instance ({0}).

Explanation

The Performance Manager failed trying to create a service instance (performance collection, performance threshold, or performance reporting service). The accompanying exception object should give more clues as to the exact problem.

Action

If you have made changes to the PM configuration file, reverse those changes. Try to restart the IBM Spectrum Control Device Server service.

If you are overriding the default instantiation class by specifying the associated property as argument to the factory class, ensure that the specified instantiation class exists and is accessible by the JVM.

HWNPM0200I This operation (*operation name*) on Performance Manager was successful.

Explanation

None.

Action

None.

HWNPM0201E The device (*device_id*) that was passed to the method is invalid.

Explanation

The device is null or is not supported.

Action

Provide the correct device to the method.

HWNPM0202E The device category (*device_category*) that was passed to the method is invalid.

Explanation

The device category is null or not supported.

Action

Provide the correct device category to the method.

HWNPM0203E The device type received (*device_type*) is invalid.

Explanation

The device type is null or not supported.

Action

Provide the correct device type to the method.

HWNPM0204E The device type - HOST - that was passed to the method is not supported.

Explanation

The HOST device type is not supported for performance data collection.

Action

None.

HWNPM0205E The specified performance collection policy is invalid.

Explanation

The specified policy is invalid and could not be successfully set into effect. The previous performance collection policy remains in effect for the associated device(s).

Action

Please ensure that all performance collection rules were followed when the new policy was created.

HWNPM0209I The device type and device category are valid.

Explanation

None.

Action

None.

HWNPM0210E Collector failed to start due to system failure.

Explanation

A system failure caused a collector not to start.

Action

None.

HWNPM0220E Collector failed to stop due to system failure.

Explanation

A system failure caused a running collector to fail.

Action

None.

HWNPM0230E One or more of the specified performance collection policies are invalid.

Explanation

A performance collection policy object that was specified as an argument for the product API call is invalid. The called method could not process the policy object.

Action

Modify the caller of this method to pass valid performance collection policy objects as arguments. One common cause of problems is the specification of an invalid device identifier for custom policies. Ensure that the policy device ID field corresponds to a device that is valid and known to the product.

HWNPM0231W The specified performance collection policy is ignored because it conflicts with another policy in the same parameter list.

Explanation

The performance collection policy object that was specified as argument on the Performance Manager API call is ignored, because another policy specified in the same call is effectively equivalent to this policy. Equivalent policies have the same device type and device ID. The other policy has been used for the purpose of this call, and this policy has been ignored.

Action

Modify the caller of this method to remove any conflicting or duplicate policy objects.

HWNPM0232E The specified performance collection policy contains an unsupported interval length.

Explanation

The performance collection policy object that was specified as argument on the Performance Manager API call is invalid because it contains an unsupported interval length attribute. The supported interval lengths can vary for individual devices, and for individual device types.

Action

Consult the performance collection rules to determine the supported interval lengths for devices of the desired type, and/or the particular device in question. Then modify the caller of this method to specify a valid interval length attribute in the passed policy object.

HWNPM0233E The specified performance collection policy contains an unsupported frequency.

Explanation

The performance collection policy object that was specified as argument on the Performance Manager API call is invalid because it contains an unsupported frequency attribute. The supported frequencies can vary for individual devices, and for individual device types.

Action

Consult the performance collection rules to determine the supported frequencies for devices of the desired type, and/or the particular device in question. Then modify the caller of this method to specify a valid frequency attribute in the passed policy object.

HWNPM0234E The specified performance collection policy contains an unsupported duration.

Explanation

The performance collection policy object that was specified as argument on the Performance Manager API call is invalid because it contains an unsupported duration attribute. The supported durations can vary for individual devices, and for individual device types.

Action

Consult the performance collection rules to determine the supported durations for devices of the desired type, and/or the particular device in question. Then modify the caller of this method to specify a valid duration attribute in the passed policy object.

HWNPM0240E The attempt to update the specified performance collection policies has failed.

Explanation

An internal error occurred while performing the requested IBM Spectrum Control Performance Manager API operation. Internal errors can be caused by a database inconsistency or corruption, or can be due to a programming error.

Action

Please retry the failing operation. If the failure persists, please contact IBM software support. More details about the exact failure will be available in the Performance Manager trace logs in the device server log directory.

HWNPM0241E The attempt to reset the specified performance collection policies has failed.

Explanation

An internal error occurred while performing the requested IBM Spectrum Control Performance Manager API operation. Internal errors can be caused by a database inconsistency or corruption, or can be due to a programming error.

Action

Please retry the failing operation. If the failure persists, please contact IBM software support. More details about the exact failure will be available in the Performance Manager trace logs in the device server log directory.

HWNPM0242E The attempt to remove the specified performance collection policies has failed.

Explanation

An internal error occurred while performing the requested IBM Spectrum Control Performance Manager API operation. Internal errors can be caused by a database inconsistency or corruption, or can be due to a programming error.

Action

Please retry the failing operation. If the failure persists, please contact IBM software support. More details about the exact failure will be available in the Performance Manager trace logs in the device server log directory.

HWNPM0249W An attempt to dynamically update one or more running performance collectors with a new performance collection policy has failed.

Explanation

When a new performance collection policy is set into effect, any running performance collectors using that policy must be must dynamically updated, for the new settings to take effect. This dynamic update failed for one or more of the running collectors associated with a particular policy.

Action

The policy has been successfully saved in the database, so the operation does not need to be repeated. However the running performance collector needs to be manually stopped and restarted for the new settings to take effect.

HWNPM0250E One or more default performance collection policies are missing from the database.

Explanation

One default performance collection policy must exist in the database for each supported device type. The IBM Spectrum Control Performance Manager will not function properly without these default policies. The fact that they are missing from the database indicates a database corruption of some kind.

Action

Please retry the failing operation. If the failure persists, please contact IBM software support. If a database corruption seems plausible, and you have a recent backup of the IBM Spectrum Control database, you can also try shutting down IBM Spectrum Control and restoring the old database. However remember that you will lose all information that has been added to the database since the backup was made.

HWNPM0281I Performance monitoring is unavailable for resource resource_name because an agent for monitoring

the resource was not defined. For IBM Spectrum Scale, the problem might occur because the data collection service cannot connect to port 9084 on the node where the collector component of the IBM Spectrum Scale performance monitoring tool is running.

Explanation

For the product to collect performance statistics and other necessary information to monitor a resource, an agent that manages the resource must be defined. An agent can be an SMI-S provider, ZiMon agent for IBM Spectrum Scale, or a native API for a resource.

Action

Define a data source for the resource, such as an SMI-S provider, a ZiMon agent for IBM Spectrum Scale, or a resource-specific service.

Before you can collect performance data for IBM Spectrum Scale, the server that hosts the data collector must be able to connect to port 9084 on the node where the collector component of the IBM Spectrum Scale performance monitoring tool is running.

To ensure that the server that hosts the data collector can connect to the collector node, complete the following steps:

1. Determine the node that is configured as the collector node by viewing the /opt/IBM/zimon/ZIMonSensors.cfg file on one of the sensor nodes. The collector node is set in the host property of the collectors section in this file. For example, collectors = { host = "node3" port = "4739"}
2. Ensure that the host property is set to one of the following options:
 - An IP address that can be reached by the server that hosts the data collector
 - A host name that can be resolved to a reachable IP address by the the server that hosts the data collector

Related reference

- ➔ [Configuring the collection of performance data for IBM Spectrum Scale](#)
-

HWNPM0282I Performance monitoring is unavailable for resource *resource_name* because the associated data sources are unable to collect performance data from the resource.

Explanation

One or more data sources for the resource are defined, but the particular types of data sources cannot collect performance data. The data sources might be able to complete other tasks for the resource.

Action

Add the resource using a data source that can retrieve performance data from the resource, if such a data source is available.

HWNPM0283I Performance monitoring is unavailable for *resource_name* because this resource does not support performance monitoring.

Explanation

One or more agents for the resource are defined in the product, but these agents cannot retrieve performance statistics for the resource. The agents might be able to perform other tasks for the resource.

Action

Upgrade or reinstall the firmware for the device.

HWNPM0284I Performance monitoring is unavailable for resource *resource_name* because the associated agent does not have the required level of software *agent_level*.

Explanation

The product does not support performance monitoring of the device at its current agent software level. In most cases, the current agent level is earlier than the required level, in which case an upgrade of the agent software is necessary. In rare cases, the agent software level is a later level that is not supported.

Action

Upgrade or reinstall the agent software for the device.

HWNPM0285I Performance monitoring is unavailable for resource *resource name* because the associated agent is unable to fully monitor the resource.

Explanation

A device agent (an SMI-S provider, SMI agent, or a proprietary service API, etc.) must exist for IBM Spectrum Control to be able to retrieve the performance statistics and other necessary information to monitor the device. The currently defined agent(s) for the device will not allow IBM Spectrum Control to perform performance monitoring on the device. This can happen primarily for FC switches in mixed fabrics if there is a mismatch between the SMI agent and device, in other words if one switch vendor's SMI agent was able to discover a different vendor's switch. The mismatching agent will not be able to fully manage the other vendor's switches, and in particular, will not be able to retrieve performance statistics for those switches.

Action

Please define a "matching" agent for the particular vendor's device, for example for Brocade switches ensure that there is a Brocade SMI agent defined to manage the switch, for McData switches a McData SMI agent, and so forth. Switches with embedded SMI agents can only be managed using that embedded agent.

HWNPM0286I Performance monitoring is unavailable for resource *resource name* because the associated SMI-S provider does not have the required SMI-S support.

Explanation

An SMI-S provider has been defined in IBM Spectrum Control to manage the device, but unfortunately that agent does not have the necessary SMI-S support to allow retrieval of performance statistics for the device. For FC switches, the SMI-S provider needs to support

the SMI-S "Switch" profile, and must support the SMI-S level 1.0.2 at minimum. For storage subsystems, the SMI-S provider needs to support the "Array" profile and the "Block Server Performance" (BSP) sub-profile.

Action

Install an SMI-S provider with the necessary SMI-S support, and configure it to manage the device in question. Define the agent to IBM Spectrum Control using the IBM Spectrum Control GUI Administrative Services, Data Sources. Note that some vendors require purchase of a separate feature to enable this support.

HWNPM0287I Performance monitoring is unavailable for resource *resource name* because the resource or the associated agent does not support performance monitoring.

Explanation

This can happen primarily for virtual devices, for example a logical FC switch. IBM Spectrum Control does not support performance data collection for virtual devices.

Action

Run the performance monitor on the physical device rather than on the individual virtual devices configured for the physical device.

HWNPM0288I Performance monitoring is unavailable for resource *resource name* because the resource was not probed.

Explanation

To monitor the performance of a resource, you must first run a probe to collect asset and configuration information about that resource. Probes are data collection jobs that you schedule or start immediately.

Action

Define and run a probe for the resource. To run a probe, go the resource list page for the resource, right-click the resource, and select Data Collection > Start Probe. For example, to probe a storage system, go to Storage Systems page, right-click the storage system, and select Data Collection > Start Probe. After the probe completes successfully, run the performance monitor again.

To monitor the performance of a switch, the following conditions must be met:

- The switch must be probed through a SMI or SNMP agent. Probing a switch through a Storage Resource agent does not provide sufficient performance information.
- The probe of a SMI agent must complete successfully and discover at least one port on the switch. If the probe does not discover one or more ports, the switch is not eligible for performance monitoring using that SMI agent. If multiple agents are used for a probe, it is possible that an SNMP or Storage Resource agent discovers switch ports but a SMI agent does not. If you suspect that this situation occurred, stop and restart the SMI agent and rerun the fabric probe.

HWNPM0289W Performance monitoring is unavailable for resource *resource_name* because no agents are available.

Explanation

One or more of the agents that monitor the resource are not available. If multiple agents are monitoring the resource, the product tries to use each agent to collect performance data. If none of the agents are up and running, no data can be collected.

Action

To resolve the problem, try the following actions:

- Ensure that the agent for the resource is up and running.
- Verify that the local area network is available.
- Verify that the product can communicate with the agent.
- Restart the performance monitor that collects data about the resource.
- Check for error messages in the log files for the Device server.

HWNPM0290E Performance monitoring is unavailable for resource *resource_name* because the associated agent was could not be selected.

Explanation

This is due to an internal failure in the device server.

Action

Try to delete and then recreate the performance monitor job definition. If the problem continues, contact IBM Software Support.

HWNPM0291I Performance monitoring is unavailable for switch *resource_name* because the switch has no ports.

Explanation

All performance data for FC switches is associated with the individual switch ports. If the switch has no ports, no performance data can be collected for it.

Action

If the switch does have ports but the ports were not discovered, run the probe for the switch again. To run a probe, go to the resource list page for switches, right-click the switch, and select Data Collection > Start Probe. After the probe completes successfully, run the performance monitor again.

HWNPM0292I Performance monitoring is unavailable for switch *resource_name* because the switch was not probed using the correct agent.

Explanation

To monitor the performance of a resource, you must first run a probe to collect asset and configuration information about that resource. Probes are data collection jobs that you schedule or start immediately. In addition, to successfully collect performance data for FC switches using SMI agents, it is necessary to have probed the switch using that exact SMI agent. If the switch was probed using a Storage

Resource agent or SNMP agent, it is not possible to collect performance data using a SMI agent. If the switch is managed by multiple SMI agents, only those SMI agents that have been previously used to probe the switch can be used to collect performance data for it.

Action

If a probe is not yet defined for the switch, define and run a probe for the resource. To run a probe, go to the resource list page for switches, right-click the switch, and select Data Collection > Start Probe. After the probe completes successfully, run the performance monitor again. If the Data Collection -> Start Probe action is not available, a probe is not yet defined. Right-click the switch and select Data Collection -> Schedule to define and save the probe parameters, and then select Data collection -> Start Probe to run it.

Even if a probe has successfully completed in the past, it may be necessary to run the probe again. When new agents have been added for managing the switch, or old agents have become unreachable, running a new probe will ensure that all the data needed for successful performance monitoring was collected.

If running a new probe does not resolve the error, it may be necessary to reset the SMI agent. It may not be obvious when a SMI agent is returning incorrect or incomplete data, especially when using multiple, different types of agents to probe the switch. Stop and restart the SMI agent and run the probe again.

HWNPM0293I Performance monitoring is unavailable for FlashSystem *resource_name* because its SNMP agent is disabled. You can enable SNMP for FlashSystem storage systems in the FlashSystem GUI.

Explanation

Collection of performance data from a FlashSystem 840 or FlashSystem 900 requires the use of an SNMP data source. If the FlashSystem SNMP agent is not enabled, the performance monitor for that system fails with this message.

Action

Go to the management GUI of the FlashSystem storage system, then go to the SNMP Settings page, set the SNMP v1 Read Community name, and enable the SNMP agent. The SNMP agent for the FlashSystem storage system supports only SNMPv1 for authentication. If using SNMPv1 for authentication is unacceptable in your environment due to security reasons, do not enable the SNMP agent. If the SNMP agent is not enabled you cannot collect performance data from your FlashSystem storage system.

If IBM Spectrum Control is already monitoring the FlashSystem storage system, run another probe after you enable the SNMP Agent. To run a probe, go the Storage Systems page, right-click the storage system, and click Data Collection > Start Probe. After the probe completes successfully, run the performance monitor again.

HWNPM0300E There is an exception for each device processed in a multiple devices call.

Explanation

Because each device got an exception during the process, the method call will throw the first exception in the result array as the general exception for multiple devices.

Action

None.

HWNPM0390E A system failure occurred.

Explanation

A system failure occurred, which caused the operation to fail.

Action

None.

HWNPM0400I This operation (*operation name*) on Threshold Service was successful.

Explanation

None.

Action

None.

HWNPM0401E The device (*device_id*) that was passed to the method is invalid.

Explanation

The device is null or is not supported.

Action

Provide the correct device to the method.

HWNPM0410E The Performance threshold policy that was passed to the method (*threshold policy*) is null.

Explanation

The specified policy is invalid and could not be successfully set into effect. The previous performance threshold policy remains in effect for the associated device(s).

Action

Please ensure that all applicable rules were followed when the new policy was created.

HWNPM0411E The Performance threshold that was passed to the method (*threshold*) is null.

Explanation

The performance threshold is null.

Action

Provide a valid performance threshold to the method.

HWNPM0412E The Performance threshold filter that was passed to the method (*filter*) is null.

Explanation

The performance threshold filter is null.

Action

Provide a valid performance threshold filter to the method.

HWNPM0420E The device type received (*device_type*) is invalid.

Explanation

A device type is null or not supported by the IBM Spectrum Control system.

Action

Provide the correct device type to the method.

HWNPM0421E There is no default performance threshold policy or default threshold filter for this device.

Explanation

A default performance threshold policy and threshold filter should exist. These values are shipped with the product.

Action

Re-install the database.

HWNPM0425E There is an exception for each device processed in a multiple devices threshold call.

Explanation

Because each device received an exception during the process, the method call will throw the first exception in the result array as the general exception for multiple devices.

Action

None.

HWNPM0590E Performance Manager failed due to system failure.

Explanation

A system failure occurred which caused the failure of the operation.

Action

None.

HWNPM0600E Parameter number *a* *number* of the call made to the IBM Spectrum Control Performance Manager reporting API *method name* of the api is invalid. The invalid value is *the invalid value* of parameter *descriptive name* of the parameter.

Explanation

The caller of a Performance Manager reporting API receives a TPCMessage object containing this message if an API call fails with an InvalidParameterException. The message states what the invalid parameter is.

Action

The InvalidParameterException indicates the caller of the API passed an invalid value in one of the parameters. Usually this indicates an error in the implementation of the calling function. You will need to report the failure to the personnel supporting that function.

HWNPM0601E A request to continue the data retrieval can not be performed. Information for continuing the data retrieval does not exist.

Explanation

The caller of a Performance Manager reporting API receives a TPCMessage object containing this message, as part of an InvalidParameterException. The message states what the invalid parameter is.

Action

The exception might have occurred because the continuation state information has been deleted. The information might have been deleted by an explicit close request, or because a time limit exceeded because the previously initiated request, or because the continuation parameter was set incorrectly by the application.

HWNPM0602E Support for the device type *device_type_name* is not available in the Performance Manager reporting API function *method_name*.

Explanation

A caller invoked the specified Performance Manager reporting API function. Device-type specific support needed by that function is not currently available in IBM Spectrum Control.

Action

Report the problem to IBM support.

HWNPM0603E The performance reporting API *method_name* failed at *time_of_failure* as a result of an internal processing exception. The Performance Manager logs contain message *message_ID* that describes the internal processing exception.

Explanation

The caller of the reporting API receives a TPCMessage object containing this message if an API call fails with a TPCServerException.

Action

The TPCServerException indicates a condition beyond the control of the caller of the API. In some cases, retrying the API call might succeed. In other cases, you must report the failure to the personnel supporting your product. Include the information contained in this message in your report.

HWNPM0604E The sort order parameter of a call to the performance reporting API *method_name* contains a value not included in the report columns list, at position *list_item* in the sort order list.

Explanation

The caller of a product reporting API receives a TPCMessage object containing this message if an API call fails with an InvalidParameterException. A value in the sort order list does not appear in the report columns list as is required.

Action

The metrics identified to be sorted on must be included in the list of report column metrics.

HWNPM0605E The report columns parameter of a call to the performance reporting API *method_name* contains a

metric or counter type that is not available for a specified device of type *device_type* and specified component with type code *component_type*. The metric or counter type code is *type_code*.

Explanation

The caller of a product reporting API receives a TPCMessage object containing this message if an API call fails with an InvalidParameterException. One of the data columns requested in the output is for a metric or counter of a type that is not available for a requested device and component type.

Action

The application must exclude the unavailable metric or counter from the request. The application can use the getMetricList and getCounterList APIs to determine the available metrics and counters prior to requesting data.

HWNPM0606E Unable to instantiate performance reporting service *service class name*.

Explanation

A failure occurred trying to instantiate the performance reporting service of Performance Manager. This usually indicates an internal error.

Action

If you have made changes to the PM configuration file, reverse those changes. Try to restart the IBM Spectrum Control Device Server service. If the problem persists, contact your IBM support representative.

HWNPM0607E An error occurred while the performance data was being retrieved.

Explanation

An error occurred that caused a delay in presenting the performance data that was being retrieved for the storage system and its resources.

Action

Wait a few minutes and try again. If you still can't see the performance data, go to Service Engage (<https://www.ibm-serviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM0630E An invalid operator (*operator identifier*) was specified for the filter expression.

Explanation

The caller of the performance reporting filter related constructor or method specified an invalid operator identifier.

Action

The application should use a valid operator identifier as described in the documentation of the method or constructor.

HWNPM0631E An invalid first operand (*operand class*) was specified for the filter expression. It must be a *operand class* class.

Explanation

The caller of the performance reporting filter related constructor or method specified an invalid first operand. The operand should be of the indicated type.

Action

The application should use a valid operand type as described in the documentation of the method or constructor.

HWNPM0632E An invalid first operand was specified for the filter expression. The data type of the operand (*data type*) is invalid or unsupported.

Explanation

The caller of the performance reporting filter related constructor or method specified an invalid first operand. The operand, usually an ICounter, should have a valid data type.

Action

The application should use a valid data type as described in the documentation of the method or constructor.

HWNPM0633E An invalid second operand (*operand class*) was specified for the filter expression. It must be a *operand class* class.

Explanation

The caller of the performance reporting filter related constructor or method specified an invalid second operand. The operand should be of the indicated type.

Action

The application should use a valid operand type as described in the documentation of the method or constructor.

HWNPM0650E The IBM Spectrum Control Performance Manager reporting API *method name* failed as a result of exception *the related exception* from a call to

method *method name*, of the lower-level service name internal service.

Explanation

The Performance Manager reporting API received an exception from a call to an internal processing function. The exception resulted in failure of the reporting API call.

Action

Examine the log entries from the specified internal service for aid in determining the cause of the received exception.

HWNPM0651E The configuration data needed to generate the affected volumes and hosts report for the device *device name* was not found in the IBM Spectrum Control database.

Explanation

The configuration data of the device at the time the threshold or constraint violation occurred is not present in the database. The affected volumes and hosts report cannot be generated in absence of the device configuration data.

Action

Contact your IBM support representative.

HWNPM2000I Performance monitoring is enabled.

Explanation

The ability to monitor the performance of resources is enabled.

Action

To monitor the performance of a storage system or switch, schedule a performance monitor for that resource. Performance monitors can collect performance data daily and enable you to track trends and identify performance bottlenecks.

HWNPM2001E The IBM Spectrum Control Performance Manager is not operational.

Explanation

The Performance Manager component of IBM Spectrum Control is not running or has been stopped.

Action

Restart the Performance Manager Service and try again.

HWNPM2002E An initialization error occurred.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2003E Initialization of the Device server event service failed. No performance threshold exception alerts will be generated.

Explanation

A failure occurred initializing the Device server event service. This means that no internal performance monitoring events can be externalized, including any threshold exception events that would normally cause the configured alerts to be generated. However, threshold exceptions are still logged and can be displayed using constraints violation reports.

Action

Restart the Device Server service. If the problem continues, contact IBM Software Support.

HWNPM2004E Initialization of the product scheduler status service failed. The status of performance monitors will not be updated in the GUI.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2005E Initialization of the product configuration data service failed. Performance monitors cannot be started without this service.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2006E Initialization of the product configuration data service failed. Performance monitors cannot be started without this service.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2007E Initialization of the product counter data service failed for device type using agent type. Performance monitors will not be able to collect performance data from devices of this type.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2008E Initialization of the product metadata service failed. Performance monitors cannot be started without this service.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2009E Unable to instantiate lower level service *service_class_name*.

Explanation

A failure occurred while trying to instantiate a particular lower level product service. This usually indicates an internal error.

Action

If you have made changes to the [TPC_installation_directory]\device\conf\pm.conf configuration file, reverse those changes. Restart the Device server service. If the problem continues, contact IBM Software Support.

HWNPM2010E Unable to instantiate the collection logic implementation service class name.

Explanation

A failure occurred trying to instantiate a particular implementation class in the Performance Manager. This usually indicates an internal error.

Action

Contact your IBM support representative.

HWNPM2011E Unable to instantiate the performance statistics data class name.

Explanation

A failure occurred trying to instantiate a particular data class in the Performance Manager. This usually indicates an internal error.

Action

Contact your IBM support representative.

HWNPM2012I The product is using trace log directory *log_directory_name*.

Explanation

The specified log directory is in use.

Action

No action is required.

HWNPM2020W The performance monitor for device *device name* is not currently active, so a dynamic update of its monitor policy is not necessary.

Explanation

An attempt was made to dynamically update the monitor policy for a particular device, but the performance monitor for that device was not active. Policies have to be dynamically updated only for running monitors; for all other monitors updates are static, and take effect when the monitor for that device is started again.

Action

The policy updates are saved in the database, and will take effect when the performance monitor for the device is started. There is no effect on any other running monitors.

HWNPM2021W The performance monitor for device *device name* is not currently active, so a dynamic update of its threshold policy is not necessary.

Explanation

An attempt was made to dynamically update the threshold policy for a particular device, but the performance monitor for that device was not active. Policies have to be dynamically updated only for running monitors; for all other monitors updates are static, and take effect when the monitor for that device is started again.

Action

The policy updates are saved in the database, and will take effect when the performance monitor for the device is started. There is no effect on any other running monitors.

HWNPM2022E A performance monitor for device *device name* is already active. A new monitor for the same device cannot be started until the previous monitor completes or is cancelled.

Explanation

An attempt was made to start a new performance monitor for the specific device. There can be only a single performance monitor active within the IBM Spectrum Control environment for an individual device. Attempts to start a new monitor while a previous one is still running will fail.

Action

Cancel the previous monitor for the device before starting a new one, if so desired.

HWNPM2023W The performance monitor for device *device_name* is not currently active.

Explanation

An attempt was made to stop an existing performance monitor for the device. However, the performance monitor for that device was not active.

Action

No action is required.

HWNPM2024E Unable to find a monitor policy applicable to resource *resource_name*.

Explanation

While starting a performance monitor for the specific resource, the monitor policy for the resource could not be determined. This error usually indicates a database access problem, because a policy is always in effect for every resource, even if it is only the default policy. However, a new performance monitor cannot be started for the resource until the problem is resolved.

Action

Try the following actions:

- Verify that the local area network is available.
- Verify that the database repository is up and running
- Verify that the related database service is active.
- Start the performance monitor again.

HWNPM2025E Unable to find a threshold policy applicable to resource *resource_name*.

Explanation

While starting a performance monitor for the specific resource, the threshold policy for the resource could not be determined. This error usually indicates a database access problem, because a policy is always in effect for every resource, even if it is only the default policy. However, a new performance monitor cannot be started for the resource until the problem is resolved.

Action

Try the following actions:

- Verify that the local area network is available.
- Verify that the database repository is up and running
- Verify that the related database service is active.
- Start the performance monitor again.

HWNPM2026I The performance monitor's primary process has failed unexpectedly. Attempting to recover from

the failure.

Explanation

The performance monitor failed and did not collect performance data. The monitor will be automatically restarted to resolve the problem. Performance data collection will be interrupted temporarily until the monitor is restarted successfully.

Action

No action is required.

HWNPM2027I The performance monitor threshold checker has failed unexpectedly. Attempting to recover from the failure.

Explanation

Although the threshold checker has stopped, performance data continues to be collected.

Action

No action is required.

HWNPM2028I The performance monitor purge process has failed unexpectedly. Attempting to recover from the failure.

Explanation

Expired data will be removed when the service is restarted.

Action

No action required.

HWNPM2029I Successfully recovered from the performance monitor failure.

Explanation

The automatic recovery attempt of the earlier failure was successful. The subject process has been restarted, and the performance monitor will continue to operate.

Action

None.

HWNPM2030E Unable to recover from the performance monitor failure. The performance monitor for the storage resource will be shut down.

Explanation

The attempt to restart the performance monitor failed.

Action

From the Resources menu, click Storage Systems. Check the status of the performance monitors. If the performance monitor is stopped, right-click the storage system, click Data Collection, and then click Start Performance Monitor.

If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2031E The performance monitor failed due to an internal error.

Explanation

If the error is recoverable, the performance manager will attempt to restart. This failure might be temporary, and will result in a temporary disruption of performance data collection for the device.

Action

From the Resources menu, click Storage Systems. Check the status of the performance monitors. If the performance monitor is stopped, right-click the storage system, click Data Collection, and then click Start Performance Monitor.

If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2032W The performance monitor for device *device name* is not currently using the default monitor policy, so a dynamic update of the policy is not necessary.

Explanation

An attempt was made to dynamically update the default monitor policy for a particular device, but the performance monitor for that device is using an already customized monitor policy rather than the default policy. The update is ignored for this device.

Action

The new default monitor policy may have an affect on the running performance monitors of other devices, but it will not affect the running performance monitor of this device. To modify the behavior of the performance monitor of this device, please update the custom monitor policy in effect for this device.

HWNPM2033W The performance monitor for device *device_name* is not currently using the default threshold policy, so a dynamic update of the policy is not necessary.

Explanation

An attempt was made to dynamically update the default threshold policy for a particular device, but the performance monitor for that device is using an already customized threshold policy rather than the default policy. The update is ignored for this device.

Action

The new default threshold policy may have an affect on the running performance monitors of other devices, but it will not affect the running performance monitor of this device. To modify the behavior of the performance monitor of this device, please update the custom threshold policy in effect for this device.

HWNPM2040E The device key specified for the snapshot vote (key) was not found in the database. The device does not exist.

Explanation

During the internal operation of the product, an invalid device ID was used.

Action

This issue resolves without user action. If these error messages persist, contact your IBM support representative. If this error message persists, contact IBM Software Support.

HWNPM2050E Failed to get the latest configuration data for device *device_name*.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2051E No performance data was collected from device *device_name* for the current collection interval (*time_stamp*) because the performance monitor was stopped.

Explanation

The performance monitor was stopped while it was collecting data from the device.

Action

No action is required.

HWNPM2052E No performance data was collected from device *device_name* for the current collection interval due to an error. Data was last collected at *time_stamp*.

Explanation

No performance data was received from the device for the current collection interval. This could be due to an internal error, or a problem communicating with the device or device agent.

Action

No action is required. The current performance monitor is not affected and will continue to try to collect performance data for the device.

HWNPM2053E The new performance data collected from device *device_name* could not be saved in the database. Increase the size of the transaction log.

Explanation

The transaction log size of the database is too low. This is preventing large transactions such as performance data collections from being saved to the database. The current set of performance data could not be saved.

Action

Increase the size of your database transaction log and try the operation again.

HWNPM2054E The new performance data collected from device *device_name* could not be saved in the database. Increase the size of the database lock list.

Explanation

The lock list size of the database is too low. This is preventing large transactions such as performance data collections from being saved to the database. The current set of performance data could not be saved.

Action

Increase the size of your database lock list and try the operation again.

HWNPM2055E The new performance data collected from resource device *name* could not be saved.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibm.com/serviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2056E No performance data was collected from device *device name* for the current performance monitor job duration. The performance monitor job status is set to 'failed'.

Explanation

No performance data was received from the device for the current job duration. This could be due to the fact that there are no IOs on the device.

Action

None. The running performance monitor is not affected, and will continue to try to collect performance data for the device until the duration has elapsed.

HWNPM2057E No performance data was collected from device *device_name* for the current collection interval because the performance monitor was stopped.

Explanation

The performance monitor was stopped while it was collecting data from the device.

Action

No action is required.

HWNPM2058E No performance data was collected from device *device_name* for the current collection interval due to an error.

Explanation

No performance data was received from the device for the current collection interval. This could be due to an internal error, or a problem communicating with the device or device agent.

Action

No action is required. The current performance monitor is not affected and will continue to try to collect performance data for the device.

HWNPM2060W The device does not support performance management for segment pool *pool ID*. Only incomplete performance data can be collected for array *array ID*.

Explanation

The specified segment pool contains multiple ranks, which makes it impossible to accurately manage the performance for those ranks, the arrays associated with those ranks, and the device adapters associated with those arrays.

For DS6000 and DS8000 devices whenever a segment pool contains multiple ranks, any volumes allocated in that segment pool might be spread across those ranks in an unpredictable manner. This makes it impossible to determine the performance impact of the volumes on the individual ranks. To avoid presenting the user with inaccurate or misleading performance data, the Performance Manager does not attempt to compute the performance metrics for the affected arrays and device adapters.

Action

None.

HWNPM2061W The device does not support performance management for segment pool *pool ID*. Only incomplete performance data can be collected for device adapter *DA ID*.

Explanation

The specified segment pool contains multiple ranks, which makes it impossible to accurately manage the performance for those ranks, the arrays associated with those ranks, and the device adapters associated with those arrays.

For DS6000 and DS8000 devices whenever a segment pool contains multiple ranks, any volumes allocated in that segment pool might be spread across those ranks in an unpredictable manner. This makes it impossible to determine the performance impact of the volumes on the individual ranks. To avoid presenting the user with inaccurate or misleading performance data, the Performance Manager does not attempt to compute the performance metrics for the affected arrays and device adapters.

Action

None.

HWNPM2062W Invalid error message saved in database

Explanation

The program tried to save an error message in the database, but that message was invalid.

Action

None.

HWNPM2100E The performance monitor for resource device name cannot be started because configuration data for the resource is not available.

Explanation

This problem might occur when the service is interrupted. Service Engage is investigating the problem and service will be resumed as soon as possible.

Action

Wait a few minutes and try again. If you still can't complete the action, go to Service Engage (<https://www.ibm.com/serviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2101E All agents that can collect performance data for resource device name are currently non-operational.

Explanation

A performance monitor could not collect performance data with the agents that are configured for the resource. When this error occurs, the performance monitor will be stopped or it will retry the agents periodically until an operational agent is found. You can determine which action is taken by selecting an option for the Sampling Failed alert in the definition of the performance monitor.

Action

To resolve the problem, try the following actions:

- Verify that the local area network is available.
- Verify that the agents for the resource are up and available.
- Verify that the product can communicate with at least one of the agents.
- Verify that the resource is up and available.
- Start the performance monitor again.

HWNPM2102E The performance monitor for resource device name cannot be started because the resource might not support the collection of performance data.

Explanation

When a performance monitor starts, the product verifies that the monitored resource supports the collection of performance data. If performance support cannot be verified, the following problems might exist: the resource does not support performance data collection, older microcode exists on the resource, or the associated SMI-S provider is an older version.

Action

If you believe that the resource does support performance data collection, ensure that the proper microcode levels are installed on that resource and the associated SMI-S provider is up to date. If the problem persists, contact the vendor of the resource.

HWNPM2103W Agent *agent name* is non-operational. Attempting to find an alternative agent.

Explanation

The agent that has been used to retrieve performance statistics from the resource is no longer returning statistics. Contact with a different agent will be attempted, if one is defined. There will be additional messages issued to notify you whether the attempted change in agents was successful.

Action

Ensure that the specified agent is up and running. Respond to any further messages.

HWNPM2104I The performance monitor policy was adjusted due to agent limitations. Current values in effect are: *interval-length=interval-length*, *frequency=frequency*.

Explanation

After switching to an alternative agent, it may be necessary to adjust the performance manager policy because different types of agents may have different capabilities. If the new agent does not support as low an interval-length or frequency as the previous agent, this message is issued, and the policy that is in effect is temporarily adjusted as indicated in the message.

Action

None. The policy in effect will return to the original user-specified values after the original agent is reestablished for performance data collection for the monitor.

HWNPM2105E The performance monitor for resource *resource name* failed because the resource for enabling performance data collection cannot be reached.

Explanation

When starting a performance monitor for the resource, a connection to the resource or associated agent could not be established. This problem might occur when there is a network problem, or there is an undiscovered change in the network attributes of the resource or associated agent, such as a change to an IP address or port number. It might also occur when the resource or associated agent is down or not available.

Action

If the networking attributes of the resource or associated agent have changed, run a probe. Ensure that the proper user name and password is being used, and (if applicable) certificate files were specified for communication with the resource or agent.

Ensure that a network path exists to resource or agent, including appropriate pass-through of any firewalls between the two network endpoints. If you suspect network connectivity problems, contact your network administrator.

Ensure that the resource or agent is operational. Check the log files to verify that no errors exist that would prevent it from accepting connection requests.

HWNPM2106E The performance monitor for device *device name* failed because of errors trying to enable performance data collection on the device or device agent: *error description*

Explanation

While starting a performance monitor for the specific device, the Performance Manager was able to establish a connection to the device or device agent, but was unable to initiate performance data collection on the device and/or device agent.

Action

Ensure that the device and/or device agent are fully operational. Check for error condition in the logs of the device or device agent.

HWNPM2107E The performance monitor for device *device name* failed because of unrecognized errors trying to enable performance data collection on the device or device agent: *error description*

Explanation

While starting a performance monitor for the specific device, the Performance Manager was able to establish a connection to the device or device agent, but was unable to initiate performance data collection on the device and/or device agent. This might be due to an internal error in the IBM Spectrum Control Performance Manager.

Action

Ensure that the device and/or device agent are fully operational. Retry the operation. If the problem persists, contact your IBM support representative.

HWNPM2108E The performance monitor for resource *resource name* failed during shutdown because the resource cannot be reached for terminating data collection.

Explanation

When stopping a performance monitor for the resource, a connection to the resource or associated agent could not be established. This problem might occur when there is a network problem, or there is an undiscovered change in the network attributes of the resource or associated agent, such as a change to an IP address or port number. It might also occur when the resource or associated agent is down or not available.

Action

If the networking attributes of the resource or associated agent have changed, run a probe. Ensure that the proper user name and password is being used, and (if applicable) certificate files were specified for communication with the resource or agent.

Ensure that a network path exists to resource or agent, including appropriate pass-through of any firewalls between the two network endpoints. If you suspect network connectivity problems, contact your network administrator.

Ensure that the resource or agent is operational. Check the log files to verify that no errors exist that would prevent it from accepting connection requests.

Because the performance monitor is shutting down anyway, there is no immediate affect on operations. However, some resources or agents might not allow a subsequent restart of performance data collection, unless the previous collection was terminated properly. For some resources, leaving performance data collection activated can cause additional burden when processing their related resources. In either case, you can also try to manually stop the performance data collection on the resource by using the interface for that resource.

HWNPM2109E The performance monitor for resource resource name failed during shutdown because of errors during termination of performance data collection: error description

Explanation

When stopping a performance monitor for the resource, a connection was established, but the process for collecting performance data could not be terminated. This problem might occur when there is a network problem, or there is an undiscovered change in the network attributes of the resource or associated agent, such as a change to an IP address or port number. It might also occur when the resource or associated agent is down or not available.

Action

Because the performance monitor is shutting down anyway, there is no immediate affect on operations. However, some resources or agents might not allow a subsequent restart of performance data collection, unless the previous collection was terminated properly. For some resources, leaving performance data collection activated can cause additional burden when processing their related resources. In either case, ensure that the resource or agent are fully operational. Check for error condition in the logs of the resource or agent. You can also try to manually stop the performance data collection on the resource using the interface for that resource.

HWNPM2110E The performance monitor for resource resource name failed during shutdown because of unrecognized errors during termination of performance data collection: error description

Explanation

When stopping a performance monitor for the resource, a connection was established, but the process for collecting performance data could not be terminated. This might be due to an internal error in the product.

Action

Because the performance monitor is shutting down anyway, there is no immediate affect on operations. However, some resources or agents might not allow a subsequent restart of performance data collection, unless the previous collection was terminated properly. For some resources, leaving performance data collection activated can cause additional burden when processing their related resources. In either case, try to manually stop the performance data collection on the resource by using the interface for that resource. If the problem persists, contact IBM Software Support.

HWNPM2111E The performance monitor for resource *resource name* failed because of errors retrieving the most recent configuration data for the resource.

Explanation

When starting a performance monitor for the resource, its configuration data could not be retrieved and processed. This problem might occur when there is corrupt or invalid configuration data in the database repository.

Action

Try running a probe job for the resource and starting the performance monitor again. If the problem persists, contact IBM Software Support.

Related reference

-  [Getting help for IBM Storage Insights](#)

HWNPM2112I Agent *agent name* was selected for performance data collection from resource *resource name*.

Explanation

This message shows how performance data was collected for the resource. Performance data can be collected either through an SMI-S provider or a direct connection. This message is useful in environments where there are multiple agents that manage the same resource.

Action

No further action is required.

HWNPM2113I The performance monitor for resource *resource name* is starting in an active state.

Explanation

Performance monitors start in an active state when initiated due to a user or a scheduled action, or due to a server restart when the monitor was previously active and has not reached its intended duration. The monitor will collect performance data from the resource when its initialization has completed.

Action

No further action is required.

HWNPM2114I The performance monitor for resource *resource name* is starting in a dormant state.

Explanation

Performance monitors start in a dormant state due to a server restart, if the monitor was previously dormant or if it was previously active and has reached its intended duration. A dormant monitor does not collect new performance data from its associated resource, but only performs basic maintenance functions such as summarization and purge processing.

Action

No further action is required. If you want to reactivate the performance monitor, schedule or run it immediately.

HWNPM2115I Monitor Policy: name="*policy name*", creator="*policy creator*", description="*policy description*"

Explanation

This message provides information regarding a particular performance monitor policy that is in effect for a particular device.

Action

None.

HWNPM2116I Monitor Policy: retention period: sample data=*length in days* days, hourly data=*length in days* days, daily data=*length in days* days.

Explanation

This message provides information about a performance monitor policy that is in effect for a resource.

Action

No further action is required.

HWNPM2117I Monitor Policy: interval length=*length in seconds* secs, frequency=*length in seconds* secs, duration=*length in hours* hours.

Explanation

This message provides information about a performance monitor policy that is in effect for a resource.

Action

No further action is required.

HWNPM2118I Threshold Policy: name="*policy name*", creator="*policy creator*", description="*policy description*"

Explanation

This message provides information about a performance monitor threshold policy that is in effect for a resource.

Action

No further action is required.

HWNPM2119I Threshold Policy: retention period: exception data=*length in days* days.

Explanation

This message provides information about a performance monitor threshold policy that is in effect for a resource.

Action

No further action is required.

HWNPM2120I Threshold Policy: threshold name=*name*, component=*component type*, enabled=Yes or No, boundaries=critical stress boundary,warning stress boundary,warning idle boundary,critical idle boundary units.

Explanation

This message provides information about a performance monitor threshold policy that is in effect for a resource.

Action

No further action is required.

HWNPM2121I Monitor Policy: interval length=*length in seconds secs*, frequency=*length in seconds secs*, duration=continue indefinitely.

Explanation

This message provides information about a performance monitor policy that is in effect for a resource.

Action

No further action is required.

HWNPM2122W No valid performance data was provided by the monitored resource. No performance data records were inserted into the database.

Explanation

The performance monitor contacted the resource and tried to collect data. However, the resource did not provide valid performance counter information.

If message HWNPM2124W is also displayed, the resource was able to provide performance data, but it was determined to be invalid and discarded.

Action

The operation of the performance monitor is not affected, and it will attempt to retrieve performance data again for the next sample interval. If the monitored resource continues to provide no performance data, ensure that it is fully operational. If appropriate, also ensure that performance functionality is enabled for the resource.

HWNPM2123I Performance data for resource timestamp date and time was collected and processed successfully. record count performance data records were inserted into the database repository.

Explanation

This message provides information for an active performance monitor. The performance data was collected at the indicated resource time in the server timezone. The indicated number of performance statistics records were saved in the database repository. The saved information was either received from the resource, or was computed based on the information received from the resource.

Action

None.

HWNPM2124W Performance data continuity is broken. The device was possibly reset or rebooted. record count performance data records were discarded.

Explanation

The message indicates that invalid performance information was received from the device.

In general, performance information is represented as a set of ever-increasing counters, and actual statistics are computed by taking the difference between two consecutive sets of such counters.

However, if a counter appears to decrease rather than increase between consecutive sets, the information is unusable and is discarded.

Counters can be expected to decrease if they are reset to zeros, which might happen normally when a device is reset or rebooted. For example, when new firmware is loaded, or in some cases when a device agent (such as an SMI-S provider) is reset or rebooted. In those situations, this warning message can be safely ignored.

If this warning is displayed when no reset or restart happened, the device or device agent might be generating incorrect performance statistics. You might have to contact your device vendor for further instructions.

Action

Determine whether the device or device agent was reset or rebooted.

Those situations include loading of new firmware, or fail-over and fail-back scenarios for Enterprise Storage Server, DS6000, and DS8000 storage subsystems.

In any of these cases, the reset of performance counters is expected behavior, and this warning message can be safely ignored. If it is not one of these cases, the device might be generating incorrect performance data, which might or might not lead to inaccurate performance reports.

Contact your device vendor for further instructions in those cases.

HWNPM2125W Aggregated performance values have been computed from the remaining data records, but their accuracy cannot be guaranteed.

Explanation

This message only appears in combination with message HWNPM2124W. See the description of this message for background information on the condition that has occurred. Configuration parameter LimitCheckLenient controls whether or not any data will be saved in the IBM Spectrum Control database when HWNPM2124W occurs. If set to true, then only those performance records where invalid counters were specifically detected are discarded (indicated with message HWNPM2124W), but all other data for that sample interval is saved (indicated with message HWNPM2123I). However because a number of records had to be discarded, any performance statistics derived from the remaining data (for example the aggregated statistics for the entire subsystem) will be inaccurate because they will not include the activity represented by that discarded data.

Action

Use any performance data saved for this sample interval cautiously, due to its inherent inaccuracy. To avoid such potentially inaccurate values from being saved in the IBM Spectrum Control database, you can set the LimitCheckLenient configuration parameter to false. However this will mean that no performance data will be saved in the database for any sample intervals where invalid counters are detected.

HWNPM2126I The performance monitor for device *device name* is stopping because its intended duration has elapsed.

Explanation

Performance monitors with a preset duration end when that duration has elapsed. The monitor job might show normal completion or failure, depending on the success or failure of the data collection process during its life.

Action

None. If you want to reactivate the monitor, start another monitor job for the device.

HWNPM2127I The performance monitor for device *device name* is stopping due to a user request.

Explanation

The performance monitor is ending because a user requested the monitor to stop. A user request can be submitted either from the IBM Spectrum Control graphical user interface, or the IBM Spectrum Control command line interface.

Action

None. If you want to reactivate the monitor, start another monitor job for the device.

HWNPM2128E The performance monitor for device *device name* is stopping due to an unexpected failure.

Explanation

The performance monitor is ending due to an environmental condition or due to an internal error. Additional messages prior to this message indicate the cause of the failure.

Action

In case of an environmental condition, such as a network problem, correct the problem and restart the monitor. In case of an internal error, contact your service representative. For additional details regarding the cause of the failure, see the trace logs.

Related reference

-  [Getting help for IBM Storage Insights](#)

HWNPM2129I The performance monitor for device *device name* is stopping because of a shutdown request.

Explanation

The performance monitor is ending because the IBM Spectrum Control Performance Manager Service is shutting down, usually due to the IBM Spectrum Control device server being stopped.

Action

None. When the Performance Manager Service is restarted, the previously running monitors will be automatically restarted, as long as their originally intended duration has not been exceeded.

HWNPM2130W Failed to retrieve the latest configuration data for device *device name*.

Explanation

During the normal operation of a performance monitor, it will periodically attempt to retrieve the latest configuration data for its associated device. This attempt failed for the monitor of the specified device.

The immediate operation of the running performance monitor is unaffected. However if the failure persists for prolonged periods of time, it is possible that a discrepancy between the saved performance data collected from the device and the configuration data of that device could develop. In that case, the performance reports or any advanced analysis of the performance data might yield misleading results.

Action

Try running a probe job for the specific device, and retry starting the performance monitor. If the problem persists, contact your IBM support representative.

HWNPM2131W Performance data could not be collected for device *device name*, because the device or data source cannot be reached (reason *reason code*). The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length.

The immediate operation of the running performance monitor is unaffected. The reason code can be used to help identify the exact cause of the problem encountered:

1. Reason Code 0 indicates that the exact reason for the failure could not be determined. This should be a rare occurrence.
2. Reason Code 1 indicates a bad target (device or data source) address. This condition can occur when the user-specified host name or IP address, or the target port number are invalid such that they would cause the formation of an invalid URL or IP Address. This type of failure is rare and can usually also be identified via a java.net.MalformedURLException printed in the trace logs.
3. Reason Code 2 indicates the problem to be an unknown target address. This condition can occur when a hostname rather than an IP address was specified as target address, and:
 - either the network is down,
 - the specified hostname cannot be resolved (i.e. the nameserver cannot be contacted, or the nameserver is down, or the specified hostname is not known to the nameserver), or
 - the specified hostname can be resolved by the nameserver but no longer exists on the network.This type of failure can usually also be identified via a java.net.UnknownHostException printed in the trace logs.
4. Reason Code 3 indicates the problem to be an unreachable target address. This condition can occur when an IP address rather than a hostname was specified as target address, and either the network or a part of the network is down or is blocked by a firewall (the host cannot be contacted), or the specified IP address does not exist on the network. This type of failure can usually also be identified via a java.net.NoRouteToHostException in the trace logs.
5. Reason Code 4 indicates the problem to be an unresponsive target. This condition can occur when the target server is powered off, or when the server is not listening on the port which is the target of the communication (for example if the web server or SMI-S provider is not operational). This type of failure can usually also be identified via a java.net.ConnectException printed in the trace logs.
6. Reason Code 5 indicates a communication time-out for communication that uses UDP rather than TCP, for example when using SNMP data sources. This condition can occur when the target server cannot be reached, or when the SNMP data source is disabled on the target server, or when the SNMP port (161) is blocked by a firewall.

Action

If the problem persists for an hour or longer, ensure that your device and data source (if applicable) are operational. Also ensure that a network path exists between the IBM Spectrum Control server and the device or data source, including any appropriate firewall pass-throughs. If there is nothing wrong with the device or device agent, or with the network path, try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2132W Performance data could not be collected for device *device name*. The current samples are skipped. (error description)

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The immediate operation of the running performance monitor is unaffected. However the next performance data sample recorded into the database might represent an average over more than the configured interval length.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational, and that performance data collection is still enabled. Try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

For a NetApp device it is recommended to put all the NetApp volumes online before collecting performance data.

HWNPM2133W Performance data could not be collected for device *device name* due to an unknown error. The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The immediate operation of the running performance monitor is unaffected. However the next performance data sample recorded into the database might represent an average over more than the configured interval length.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational, and that performance data collection is still enabled. Try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2134W The state of the performance monitor for resource *resource name* started, but the status of the performance monitor was not updated.

Explanation

The status of the performance monitor was not updated and won't be shown in the GUI.

Action

Wait a few minutes and check the status of the performance monitor for the resource on the Storage Systems page. If the status is not updated to 'Starting', go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2135W The state of the performance monitor for device *device name* has changed to 'active', but could not be recorded appropriately.

Explanation

The state of the specified monitor has changed to 'active'. However the IBM Spectrum Control user interfaces might not be able to display this fact due to a failure in updating the monitor's state record in the database.

Action

This error is usually indicative of a database problem. Ensure that the IBM Spectrum Control database is operational. If the problem persists, contact your IBM support representative.

HWNPM2136W The performance monitor for the resource *resource name* generated a warning, but the status of the performance monitor was not updated.

Explanation

The status of the performance monitor was not updated and won't be shown in the GUI.

Action

Wait a few minutes and check the status of the performance monitor for the resource on the Storage Systems page. If the status is not updated to 'Warning', go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2137W The performance monitor for the resource *resource name* stopped, but the status of the performance monitor was not updated.

Explanation

The status of the performance monitor was not updated and won't be shown in the GUI.

Action

Wait a few minutes and check the status of the performance monitor for the resource on the Storage Systems page. If the status is not updated to 'Stopping', go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2138W The performance monitor for the resource *resource name* completed the collection of data, but the status of the performance monitor was not updated.

Explanation

The status of the performance monitor was not updated and won't be shown in the GUI.

Action

Wait a few minutes and check the status of the performance monitor for the resource on the Storage Systems page. If the status is not updated to 'Completed', go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2139W The performance monitor for the resource *resource name* failed, but the status of the performance monitor was not updated.

Explanation

The status of the performance monitor was not updated and won't be shown in the GUI.

Action

Wait a few minutes and check the status of the performance monitor for the resource on the Storage Systems page. If the status is not updated to 'Failed', go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2140W The status of the performance monitor for the resource *resource name* was not updated.

Explanation

The status of the performance monitor was not updated and won't be shown in the GUI.

Action

Wait a few minutes and check the status of the performance monitor for the resource on the Storage Systems page. If the status is not updated, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2141E The service is unavailable because an unexpected error occurred.

Explanation

The request for the performance service wasn't accepted.

Action

Wait a few minutes and try again. If the service is still unavailable, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2142E Performance data can't be collected for the resource *resource name* because the performance monitor was disabled.

Explanation

The performance monitor stopped because it was disabled while it was completing a scheduled collection .

Action

Complete these steps:

1. From the Resources menu, click Storage Systems.
2. Check the status of the performance monitor.
3. If the status of the performance monitor is set to disabled, right-click the storage system, and click Start Performance Monitor.

If the the performance monitor is not disabled or you can't restart it, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2143E The performance monitor for the resource *resource name* was started, but the status of the performance monitor was not updated and might not be shown in the GUI.

Explanation

The current status of the performance monitor might not be shown in the GUI.

Action

Wait a few minutes and check the status of the performance monitor for the resource on the Storage Systems page. If the status is not updated to 'Starting', go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM2144W The performance data cannot be checked against the alert conditions, so no alerts can be generated.

Explanation

After every new set of performance data is collected by the performance monitor, the data is checked to determine whether it violates any alert conditions. When violations are detected, the appropriate alerts are generated and any necessary user notifications are sent.

This message indicates that the normal checking against the new data cannot be done. Because the checking cannot be done, violations are not detected, alerts are not generated, and no notifications are sent.

Action

Go to Home > System Management to verify that the Alert Server component and the Database component are up and running. If these components are not operational, restart them. If the problem persists, contact IBM Software Support.

HWNPM2145I The data is being collected by the data collector: *data collector host*.

Explanation

This message is for informational purposes only.

Action

No action is required.

HWNPM2146W Performance data could not be collected for device *device name*, the exact reason for the failure could not be determined. The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length.

The immediate operation of the running performance monitor is unaffected.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational. Also ensure that a network path exists between the TPC server and the device or device agent, including any appropriate firewall pass-throughs. If there is nothing wrong with the device or device agent, or with the network path, try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2147W Performance data could not be collected for device *device name*, because of a bad target (device or agent) address. The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length. This condition can occur when the user-specified host name or IP address, or the target port number are invalid such that they would cause the formation of an invalid URL or IP Address. This type of failure is rare and can usually also be identified via a java.net.MalformedURLException printed in the trace logs.

The immediate operation of the running performance monitor is unaffected.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational. Also ensure that a network path exists between the TPC server and the device or device agent, including any appropriate firewall pass-throughs. If there is

nothing wrong with the device or device agent, or with the network path, try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2148W Performance data could not be collected for device *device name*, because of an unknown target address. The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length. This condition can occur when a hostname rather than an IP address was specified as target address, and either the network is down, the specified hostname cannot be resolved (i.e. the nameserver cannot be contacted, or the nameserver is down, or the specified hostname is not known to the nameserver), or the specified hostname can be resolved by the nameserver but no longer exists on the network. This type of failure can usually also be identified via a `java.net.UnknownHostException` printed in the trace logs.

The immediate operation of the running performance monitor is unaffected.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational. Also ensure that a network path exists between the TPC server and the device or device agent, including any appropriate firewall pass-throughs. If there is nothing wrong with the device or device agent, or with the network path, try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2149W Performance data could not be collected for device *device name*, because of an unreachable target address. The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length. This condition can occur when an IP address rather than a hostname was specified as target address, and either the network or a part of the network is down or is blocked by a firewall (the host cannot be contacted), or the specified IP address does not exist on the network. This type of failure can usually also be identified via a `java.net.NoRouteToHostException` in the trace logs.

The immediate operation of the running performance monitor is unaffected.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational. Also ensure that a network path exists between the TPC server and the device or device agent, including any appropriate firewall pass-throughs. If there is nothing wrong with the device or device agent, or with the network path, try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2150W Performance data could not be collected for device *device name*, because of an unresponsive target. The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length. The problem is an unresponsive target. This condition can occur when the target server is powered off, or when the server is not listening on the port which is the target of the communication (for example if the web server or CIMOM is not operational). This type of failure can usually also be identified via a java.net.ConnectException printed in the trace logs.

The immediate operation of the running performance monitor is unaffected.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational. Also ensure that a network path exists between the TPC server and the device or device agent, including any appropriate firewall pass-throughs. If there is nothing wrong with the device or device agent, or with the network path, try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2151W Performance data could not be collected for device *device name*, because a communication time-out for communication that uses UDP rather than TCP. The current samples are skipped.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length. This condition can occur when the target server cannot be reached, or when the SNMP data source is disabled on the target server, or when the SNMP port (161) is blocked by a firewall.

The immediate operation of the running performance monitor is unaffected.

Action

If the problem persists for an hour or longer, ensure that your device and device agent (if applicable) are operational. Also ensure that a network path exists between the TPC server and the device or device agent, including any appropriate firewall pass-throughs. If there is nothing wrong with the device or device agent, or with the network path, try cancelling and restarting the performance monitor job. If the problem is still not resolved, contact your IBM support representative.

HWNPM2200I The performance monitor successfully collected the configuration data for the storage system with the following internal resources: *number_of_pools* pools, *number_of_controllers* controllers, *number_of_device_adapters* device adapters, *number_of_ports* ports, *number_of_host_connections* host connections, *number_of_ranks* ranks, *number_of_arrays* arrays, and *number_of_volumes* volumes.

Explanation

The configuration data for the monitored storage system and its internal resources were collected.

The number of host connections that is shown here and in the log file might vary because only host connections with one or more assigned volumes are counted. To see the total number of host connections, got to the Overview page for the storage system.

Host connections with the same name and the same volume group are considered identical and are not double counted.

Action

No further action is required.

HWNPM2201I The performance monitor successfully collected the configuration data for the storage system with the following internal resources:
number_of_io_groups I/O Groups, *number_of_nodes* nodes, *number_of_ports* ports, *number_of_host_connections* host connections, *number_of_pools* pools, *number_of_managed_disks* managed disks, *number_of_local_disks* local disks, *number_of_volumes* volumes, and *number_of_volume_copies* volume copies.

Explanation

The configuration data for the monitored storage system and its internal resources were collected.

The number of host connections that is shown here and in the log file might vary because only host connections with one or more assigned volumes are counted. To see the total number of host connections, got to the Overview page for the storage system.

Host connections with the same name and the same volume group are considered identical and are not double counted.

The number of volume copies includes both the primary and secondary volume copies for all of the volumes.

Action

If the number of internal resources shown in the message doesn't match the number of actual internal resources for the storage system, run a probe on the storage system.

HWNPM2202I The performance monitor successfully retrieved the configuration data for the switch. The following internal resources were found:
number_of_trunks trunks, and *number_of_ports* ports.

Explanation

The running performance monitor has updated its internal state with the latest configuration data from the switch. The specified internal resources were found.

Trunks are ISL Trunks, ICL Trunks, or port channels configured for the switch.

Action

None.

HWNPM2203I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: *number_of_host_connections* host connections, *number_of_modules* modules, *number_of_ports* ports, *number_of_pools* pools, and *number_of_volumes* volumes.

Explanation

The running performance monitor has updated its internal state with the latest configuration data from the storage system. The specified internal resources were found.

Note: The number of host connections reflects only the host connections that have at least one volume assigned. Host connections with 0 volumes have no associated performance data.

In some cases, the number of host connections that is shown in a log file is less than the number of host connections that is shown on the Storage System details page in the web-based GUI. This difference might occur because log files do not count host connections that have no volumes assigned. However, the Storage System details page does count host connections with 0 volumes.

Action

None.

HWNPM2204I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: *number_of_nodes* nodes, *number_of_ports* ports, and *number_of_modules* flash modules.

Explanation

The running performance monitor has updated its internal state with the latest configuration data from the storage system. The specified internal resources were found.

Action

No action is required.

HWNPM2205I The performance monitor successfully retrieved the configuration data for the storage system. The following internal resources were found: *number_of_ports* ports, *number_of_controllers* controllers, *number_of_volumes* volumes, and *number_of_disks* disks.

Explanation

The running performance monitor has updated its internal state with the latest configuration data from the storage system. The specified internal resources were found.

Action

No action is required.

HWNPM3000E There was a problem establishing the database connection.

Explanation

An exception occurred when trying to retrieve the database connection from the connection pool.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM3001E An unexpected null row was returned from a database cursor.

Explanation

An unexpected null row was returned when trying to retrieve a row from a database cursor.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM3002E An unexpected database exception occurred.

Explanation

An unexpected database exception occurred when trying to access the database.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM3003E An unexpected database exception occurred on the snapshot database tables.

Explanation

An unexpected database exception occurred when trying to access the snapshot database tables.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM3004E The snapshot ID could not be found.

Explanation

The snapshot ID could not be found in the snapshot database tables.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM3500E The current transaction has been rolled back because of a deadlock.

Explanation

The application is rolled back to the previous COMMIT because of a deadlock.

Action

Contact your IBM Support Representative.

HWNPM3501E The current transaction has been rolled back because of a timeout.

Explanation

The application is rolled back to the previous COMMIT because of a timeout.

Action

Check if there is an escalation problem with the database. If so, enlarge the database lock list.

HWNPM3502E The current transaction has been rolled back because the database transaction log has been exhausted.

Explanation

The application is rolled back to the previous COMMIT because the transaction log is full.

Action

Ensure there is sufficient disk space for the database transaction logs. Retry the operation and if the error persists, increase the DB transaction log size.

HWNPM3503E The current transaction has been rolled back because the database disk space has been exhausted.

Explanation

The application is rolled back to the previous COMMIT because there is insufficient disk space to write more data into the database.

Action

Increase the amount of disk space available for the database. If this is impossible, reduce your history retention settings to decrease the size of the database. If deleting data fails due to transaction logs also being exhausted, some tables or indices may have to be temporarily dropped. Contact your IBM Support Representative for assistance.

HWNPM3600E The threshold identifier parameter value : *threshold ID* is not valid.

Explanation

The Affected volumes and hosts Reporting feature is not supported for the threshold identifier parameter passed to the function.

Action

Contact your IBM support representative.

HWNPM3601E The target component type parameter value : *component type* is not valid for the threshold identifier : *threshold ID* passed to the affected volumes and hosts reporting function.

Explanation

Each threshold identifier is associated with a target component type. The target component type parameter value passed in is not valid.

Action

Contact your IBM support representative.

HWNPM3602E There was a problem retrieving the performance data needed to generate the affected volumes and hosts report for the device *device name*.

Explanation

An exception occurred when trying to retrieve the performance statistics data from the database that was needed to generate the affected volumes and hosts report.

Action

Ensure the IBM Spectrum Control database is operational and retry the operation. Contact your IBM support representative.

HWNPM3603E The sample volume performance data needed to generate the affected volumes and hosts report for the device *device name* was not found in the IBM Spectrum Control database.

Explanation

The sample volume performance statistics data collected during the time the threshold or constraint was violated is no longer present in the IBM Spectrum Control database. The affected volumes and hosts report cannot be generated in absence of this data.

Action

Contact your IBM support representative.

HWNPM3604E There are no volumes associated with the specified target component, *component name*, in the IBM Spectrum Control database. Therefore, the resulting Affected Volumes and Hosts report will be empty.

Explanation

A constraint violation is always associated with a particular component (array, controller, I/O group, MDisk, etc.), which is the component that actually violated the constraint. In this case, the component associated with the constraint violation that was selected as the target for the Affected Volumes and Hosts report, currently has no volumes configured or assigned to it. This means that there are neither volumes nor hosts affected by this particular constraint violation, and the resulting report will be empty.

Action

It is possible that the IBM Spectrum Control database has outdated information for the corresponding device. If you believe that there are one or more volumes configured or assigned to the constraint violation's component, run a new probe of the device, to ensure that the latest configuration information is present in the IBM Spectrum Control database. Future constraint violations for this component (and for all other components of the device) will use this updated information, and should generate an accurate Affected Volumes and Hosts report.

HWNPM4000E Unable to retrieve the device agent that managed this device: *device identifier*.

Explanation

Unable to retrieve the device agent, such as an SMI-S provider, that controls this device. An invalid user ID, password, or namespace might be configured in IBM Spectrum Control for this device.

Action

Confirm that this device is registered with a device agent, and that the device agent is known to IBM Spectrum Control with correct user ID, password and namespace. If the device agent is correct, contact your IBM support representative.

HWNPM4001E Timeout while starting performance data collection for this device: *device identifier*.

Explanation

An SMI-S provider communication timeout occurred while starting performance data collection.

Action

Increase the SMI-S provider communication timeout. If the problem persists, contact your IBM support representative.

HWNPM4002E Unable to start performance data collection for this device: *device identifier*.

Explanation

No response was returned while communicating with this device or its device agent.

Action

Check that the device agent, or SMI-S provider, is functional and that the IBM Spectrum Control user ID, password, and namespace are correct for the device agent. If they are, contact your IBM support representative.

HWNPM4003E Performance data collection has already been enabled for this device: *device identifier*.

Explanation

Another user has already started performance data collection, and this device or its device agent only allows one collection to be performed at a time.

Action

Wait for the previously enabled collection to complete, then try again.

HWNPM4004E Failed to enable performance data collection for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to enable performance data collection.

Action

Check the frequency and duration of the performance data collection. If correct, contact your IBM support representative.

HWNPM4005I Successfully enabled performance data collection on the storage subsystem, using device access point *SMI-S provider address*.

Explanation

Performance data collection was enabled successfully.

Action

None. While performance data collection is enabled, the storage subsystem will internally be generating statistics on the performance of various internal components, such as volumes, arrays, ports, and so forth. Performance data collection will be disabled again, when the user-specified duration of the performance monitor has elapsed.

HWNPM4006E An exception occurred while starting performance data collection for this device: *device identifier*.

Explanation

An exception occurred while attempting to start the performance data collection.

Action

Contact your IBM support representative.

HWNPM4007E A timeout occurred while stopping performance data collection for this device: *device identifier*.

Explanation

An SMI-S provider communication timeout occurred while stopping performance data collection.

Action

Increase the SMI-S provider communication timeout. If the problem persists, contact your IBM support representative.

HWNPM4008E Unable to stop performance data collection for this device: *device identifier*.

Explanation

No response was returned while communicating with this device or its device agent.

Action

Check that the device agent, or SMI-S provider, is functional and that the IBM Spectrum Control user ID, password, and namespace are correct for the device agent. If they are, contact your IBM support representative.

HWNPM4009E Performance data collection is not enabled for this device: *device identifier*.

Explanation

Performance data collection is not currently running for this device. It must be enabled before stopping it.

Action

None. Performance data collection is already stopped.

HWNPM4010E Failed to disable performance data collection for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to disable performance data collection.

Action

Contact your IBM support representative.

HWNPM4011I Successfully disabled performance data collection on the storage subsystem, using device access point *SMI-S provider address*.

Explanation

The performance data collection was disabled successfully.

Action

None. While performance data collection is disabled, the storage subsystem will not be generating statistics on the performance of its internal components. Performance data collection will be enabled again, when the next performance monitor is started for this device.

HWNPM4012E An exception occurred while stopping performance data collection for this device: *device identifier*.

Explanation

An exception occurred while attempting to stop the performance data collection.

Action

Contact your IBM support representative.

HWNPM4013E A timeout occurred while retrieving the status of the performance data collection for this device: *device identifier*.

Explanation

An SMI-S provider communication timeout occurred while retrieving the performance data collection's status.

Action

Increase the SMI-S provider communication timeout. If the problem persists, contact your IBM support representative.

HWNPM4014E Unable to retrieve the status of the performance data collection for this device: *device identifier*.

Explanation

No response was returned while communicating with this device or its device agent.

Action

Check that the device agent, or SMI-S provider, is functional and that the IBM Spectrum Control user ID, password, and namespace are correct for the device agent. If they are, contact your IBM support representative.

HWNPM4015I Performance data collection is not enabled for this device: *device identifier*.

Explanation

Performance data collection is not currently running for this device.

Action

None.

HWNPM4016I Performance data collection is enabled for this device: *device identifier*.

Explanation

Performance data collection is currently running for this device.

Action

None.

HWNPM4017E Unable to determine the status of the performance data collection for this device: *device identifier*.

Explanation

The device or device agent returned an error code when retrieving the status.

Action

Contact your IBM support representative.

HWNPM4018E Failed to retrieve the status of the performance data collection for this device: *device identifier*.

Explanation

An exception occurred while attempting to retrieve the performance data collection's status.

Action

Contact your IBM support representative.

HWNPM4019E A timeout occurred while polling the performance statistics for this device: *device identifier*.

Explanation

An SMI-S provider communication timeout occurred while polling the performance statistics.

Action

Increase the SMI-S provider communication timeout. If the problem persists, contact your IBM support representative.

HWNPM4020E Unable to retrieve the performance statistics for this device: *device identifier*.

Explanation

No response was returned while communicating with this device or its device agent.

Action

Check that the device agent, or SMI-S provider, is functional and that the IBM Spectrum Control user ID, password, and namespace are correct for the device agent. If they are, contact your IBM support representative.

HWNPM4021E No performance statistics available at the current time for this device: *device identifier*.

Explanation

No performance statistics available at the current time.

Action

The device agent might not be responding. Retry the performance data collection. If the problem persists, contact your IBM support representative.

HWNPM4022E Failed to disable performance data collection for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to disable performance data collection.

Action

Contact your IBM support representative.

HWNPM4023W A set of performance statistics data was empty for this device: *device identifier*.

Explanation

At least one cluster from the specified device was down.

Action

None.

HWNPM4024E An exception occurred while stopping performance data collection for this device: *device identifier*.

Explanation

An exception occurred while attempting to stop the performance data collection.

Action

Contact your IBM support representative.

HWNPM4025E Unable to retrieve storage subsystem for this device: *device identifier*.

Explanation

The storage subsystem was unable to be retrieved from the database.

Action

Re-probe the storage subsystem.

HWNPM4026E Failed to retrieve storage subsystem for this device: *device identifier*.

Explanation

An Exception occurred when retrieving the subsystem information from the database.

Action

Re-probe the storage subsystem.

HWNPM4027E Failed to properly initialize counter data service for this device: *device identifier*.

Explanation

An Exception occurred when retrieving the subsystem information from the database.

Action

Check if the database contains the storage subsystem for this device.

HWNPM4028W Performance data cannot be collected because the security role authority of the user account *user name* for accessing *device identifier* is not sufficient.

Explanation

The user account that is being used to access and log in to the resource does not have the required authority for collecting performance data. If the resource is a Spectrum Virtualize storage system, you must use a user account with 'Administrator' or 'SecurityAdmin' authority.

Action

If the resource is a Spectrum Virtualize storage system, complete one of the following tasks:

- Open the management GUI for the storage system and change the role of the user account to either 'Administrator' or 'SecurityAdmin'.
 - In the Spectrum Control GUI, go to the Storage Systems page, right-click the resource, and select Connections -> Modify Connection. Enter a different user name that has sufficient authority for collecting performance data. You might need to stop and restart the performance monitor to have these changes take effect; right-click the resource again and select the appropriate Data Collection options.
-

HWNPM4051E Failed to obtain a reference to the Performance Manager Configuration Data Service for this device: *device name*.

Explanation

The Switch counter data service was unable to access the configuration data service. Without the configuration data service, the Switch counter data service cannot run.

Action

Contact your IBM support representative.

HWNPM4052E Error occurred in trying to retrieve a device agent for this device: *device name*.

Explanation

An error occurred while attempting to obtain a device agent, such as an SMI-S provider, that controls this device.

Action

Confirm that this device is registered with a device agent, and that the device agent is known to IBM Spectrum Control. If there is a device agent, contact your IBM support representative.

HWNPM4053E Unable to locate or retrieve the device agent that manages this device: *device name*.

Explanation

Unable to locate the device agent, such as an SMI-S provider, that controls this device, or an internal error occurred while attempting to retrieve the agent.

Action

Confirm that this device is registered with a device agent, and that the device agent is known to IBM Spectrum Control. If there is a device agent, contact your IBM support representative.

HWNPM4054E Error occurred in trying to construct the poll state information for this device: *device name*.

Explanation

An error occurred while attempting to construct the poll state information, a prerequisite for collecting performance statistics.

Action

Re-probe the storage subsystem.

HWNPM4055E Unable to construct the poll state information for this device: *device name*.

Explanation

Unable to construct the poll state information for this device, or an internal error occurred while attempting to construct this information. This information is a prerequisite for collecting performance statistics.

Action

Re-probe the storage subsystem.

HWNPM4056E SMI-S provider operation triggered a timeout (*step timeout= step timeout value seconds, operation timeout= total timeout value seconds*,).

Explanation

The SMI-S provider communication timeout expired while executing an SMI-S provider operation for the switch device.

Action

Increase the SMI-S provider connection (individual step) timeout and communication (total operation) timeout for the device. If the problem persists, contact your IBM support representative.

HWNPM4057E Mismatch in device identifier for this device: *device name*.

Explanation

The Switch counter data service passed a different value of the unique device identifier for this operation from the value used earlier. The same value of the unique device identifier must be used for all invocations of Counter Data Service for Switch functionality. This is an error by the invoking code.

Action

Contact your IBM support representative.

HWNPM4058E Failed to build the parameter Map for this device: *device name*.

Explanation

Failed to build the parameter Map, which needs to be passed to the Discovery Service for collecting performance statistics. The Counter Data Service for the device cannot successfully collect performance statistics for this device without this initialization. This is an internal error.

Action

Contact your IBM support representative.

HWNPM4059I Performance data collection has already been enabled for this device: *device name*.

Explanation

Performance data collection has already been started for this device. It is good practice to stop the previously started collection before starting a fresh collection.

Action

None.

HWNPM4060I Performance data collection was successfully started for this device: *device name*.

Explanation

Performance data collection has been started for this device. It will continue until configured or stopped.

Action

None.

HWNPM4061E Performance data collection could not be started for this device: *device name*.

Explanation

Performance data collection could not be started for this device.

Action

Verify that the device is functioning and known to IBM Spectrum Control, supports the SMI-S Switch profile, and is reachable via a functioning access point that has been registered with IBM Spectrum Control. Contact your IBM support representative.

HWNPM4062I Performance data collection successfully stopped for this device: *device name*.

Explanation

Performance data collection successfully stopped for this device.

Action

None.

HWNPM4063W Parse exception in performance data collected this device: *device name*.

Explanation

A parse error occurred while processing performance data collected for this device. An exception was caught while trying to extract an SMI-S provider Property from the data returned by the collector. The data is ignored.

Action

Contact your IBM support representative.

HWNPM4064E Wrong format in performance data collected for this device: *device name*.

Explanation

The performance data object representing the performance statistics for a port of this device does not have the expected format. This is an internal error.

Action

Contact your IBM support representative.

HWNPM4065W *number of null time stamps* null time stamp(s) for performance data collected from the device were substituted by server time stamp(s) .

Explanation

The switch device did not report the required SMI-S provider StatisticTime time stamp property for the reported number of statistics instances reported. These were substituted by IBM Spectrum Control server time stamps. If this is an intermittent problem, it might cause inconsistencies in performance reports. This is a device provider error.

Action

Contact your IBM support representative, and switch vendor.

HWNPM4066W *count of null operational status null Port Operational Status value(s) for performance data collected from the device was/were substituted by default value(s) .*

Explanation

The switch device did not report the required SMI-S provider OperationalStatus property for the reported number of statistics instances reported. These were substituted by a default value of port operational status ('unknown'). This can be caused either because an assembled FCPort CIMInstance was used by Fabric Data collection code, or by an error in the provider for the device.

Action

If this warning occurred when collecting performance statistics for all the ports of a switch, contact your IBM support representative, and switch vendor.

HWNPM4081E *A database cursor operation failed.*

Explanation

A failure occurred when IBM Spectrum Control attempted to obtain or use a database cursor.

Action

Verify that the database is operational and online.

HWNPM4082E *A database connect operation failed.*

Explanation

A failure occurred when IBM Spectrum Control attempted to connect to the database.

Action

Verify that the database is operational and online.

HWNPM4083E *A database retrieve operation failed.*

Explanation

A failure occurred when IBM Spectrum Control attempted to retrieve a row from a database table. This is an internal error, that can occur either because of a problem with the database, or because an attempt was made to retrieve a non-existent row from the database.

Action

Verify that the database is operational and online. If it is verified to be so, contact your IBM support representative.

HWNPM4084E A database operation failed.

Explanation

A generalized database failure occurred.

Action

Verify that database is operational and online. If it is verified to be so, contact your IBM support representative.

HWNPM4085E A database query operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted a database query operation. This is an internal error, that can occur either because of a problem with the database, or because an attempt was made to retrieve a non-existent row from the database.

Action

Verify that database is operational and online. If it is verified to be so, contact your IBM support representative.

HWNPM4086W A database query gave no result rows.

Explanation

IBM Spectrum Control executed a query operation that generated no result rows. This might be because the parameters to the query were valid, but there is no underlying data, or the parameters to the query were incorrect. This might result in the failure of a higher level operation.

Action

Check the trace log for more information.

HWNPM4087W Missing or invalid association between SMI-S provider *SMI-S provider URL* and device *device name*. The configured SMI-S provider is inoperative, or may no longer be managing the specified device.

Explanation

The IBM Spectrum Control database no longer carries the association between the indicated SMI-S provider and device. This could be because a previous IBM Spectrum Control discovery job detected that the device was removed from the SMI-S provider configuration, or it could be because the SMI-S provider was not operational at the time of the last IBM Spectrum Control discovery job, causing the SMI-S provider-to-device association to be deleted from the IBM Spectrum Control database.

Action

There are several common causes for this problem:

1. If the device was moved to a different SMI-S provider, ensure that the most recent IBM Spectrum Control SMI-S provider discovery job detected the new SMI-S provider and its association to the device. If necessary, run a new SMI-S provider discovery job to detect this association. Then manually stop and restart the IBM Spectrum Control performance monitor for the device, to force the use of the new SMI-S provider by the monitor.
2. If the device is intended to still be managed by the indicated SMI-S provider, check the SMI-S provider configuration. If the device was accidentally removed from the configuration, add it back, or if the SMI-S provider is not currently operational, restart the SMI-S provider. Then run a new IBM Spectrum Control SMI-S provider discovery job to allow IBM Spectrum Control to rediscover the SMI-S provider-to-device association. The existing IBM Spectrum Control performance monitor for the device should start working again automatically, once the SMI-S provider-to-device association is added back to the IBM Spectrum Control database by the discovery job.

HWNPM4091E Encountered an error during execution of a discover service process.

Explanation

An unexpected error occurred during discover process execution for the fiber channel switch.

Action

Contact your IBM support representative.

HWNPM4092E Encountered exception during execution of a discover service process.

Explanation

An unexpected error occurred during discover process execution for the fiber channel switch. The specified exception was caught as a result.

Action

Contact your IBM support representative.

HWNPM4093E An input business object could not be converted to a CIMInstance.

Explanation

An input business object (such as a Switch or a Port object) could not be converted to the CIMInstance form (required by an executing discover service process) because its CIM Keys were not found in the IBM Spectrum Control database. This could be because the input object was erroneous, hence no record for its keys exists in the database, or because the top level discovery is incomplete or erroneous (for example, the CIM keys of the Switch exist in the database, but not the keys of its constituent ports). This is an internal error.

Action

Contact your IBM support representative.

HWNPM4100E Failed to initialize SVC counter data service discover service reference.

Explanation

The SVC counter data service was unable to access the discover service. Without the discover service, the SVC counter data service cannot run.

Action

Contact your IBM support representative.

HWNPM4101E Failed to initialize SVC counter data service configuration service reference.

Explanation

The SVC counter data service was unable to access the configuration data service. Without the configuration data service, the SVC counter data service cannot run.

Action

Contact your IBM support representative.

HWNPM4102E Failed to parse performance data file time stamp suffix: *filename*.

Explanation

An error occurred while attempting to parse the time stamp suffix of an SVC iostats log file.

Action

Contact your IBM support representative.

HWNPM4103E SMI-S provider operation timeout (*timeout value* seconds) expired.

Explanation

The SMI-S provider communication timeout expired while executing an SMI-S provider operation.

Action

Increase the SMI-S provider communication timeout. If the problem persists, contact your IBM support representative.

HWNPM4104E Failed to retrieve SMI-S provider password for SVC counter data service access point: access point.

Explanation

An error occurred while trying to retrieve the password associated with an SVC counter data service access point. Without the password, the SVC counter data service cannot login to the SMI-S provider for performance data collection.

Action

Contact your IBM support representative.

HWNPM4105E Encountered an error when communicating with the device agent.

Explanation

An unexpected error occurred when attempting to communicate with the SMI-S provider. The SMI-S provider is either down, or is not fully operational. This condition can occur if the network path is blocked by a firewall.

Action

Please ensure that the device agent is fully functional. It may be necessary to reboot the device agent, if it is in a hung state. Also ensure that a network path exists between the IBM Spectrum Control server and the device or device agent, including any appropriate firewall pass-throughs.

HWNPM4106E Encountered invalid SVC component type: component type.

Explanation

An invalid SVC component type was encountered while processing SVC performance data. This is an internal error.

Action

Contact your IBM support representative.

HWNPM4107E Failed to create performance data object: performance data object class.

Explanation

An error occurred while trying to create an instance of the specified performance data object. This is an internal error.

Action

Contact your IBM support representative.

HWNPM4108E TimeZone property is not defined for SVC cluster: *cluster identifier*.

Explanation

The TimeZone property is not defined for the specified SVC cluster. A timezone must be available for successful performance data retrieval.

Action

Set the TimeZone property on the SVC cluster specified in the message. If you have trouble doing so, contact your IBM support representative.

HWNPM4109E SVC cluster TimeZone property is set to unrecognized value: *timezone id and name*.

Explanation

PM does not recognize the value associated with the SVC TimeZone property. This is an internal error.

Action

Contact your IBM support representative.

HWNPM4110E StatisticsStatus property is not defined for SVC cluster: *cluster identifier*.

Explanation

The StatisticsStatus property is not defined for the specified SVC cluster. This property must be set for PM to determine whether or not performance data collection is active on a given SVC. The value of this property is updated when performance data collection is either turned on or off. If it is not set, a problem might exist with the SVC.

Action

Contact your IBM support representative.

HWNPM4111E Failed to retrieve dump filename dump from SVC node *node identifier* (return code = *return code*).

Explanation

An error occurred while trying to retrieve the specified dump from the specified SVC node. As a result, performance data collection could not complete successfully. A problem might exist with the SVC.

Action

Contact your IBM support representative.

HWNPM4112E IsConfigNode property is not defined for SVC node: *node identifier*.

Explanation

The IsConfigNode property is not defined for the specified SVC node. The IsConfigNode property must be available for each node in a cluster for successful performance data retrieval.

Action

Contact your IBM support representative.

HWNPM4113E Caught exception while processing SVC XML performance data.

Explanation

An unexpected error occurred while attempting to parse SVC XML performance data.

Action

Contact your IBM support representative.

HWNPM4114E SVC cluster *cluster identifier* has more than one configuration node.

Explanation

The specified SVC cluster has more than one configuration node. The SVC is misconfigured.

Action

Configure the specified SVC cluster such that it has only one configuration node and retry performance data collection. If this message continues to appear, contact your IBM support representative.

HWNPM4115E SVC cluster *cluster identifier* does not have a configuration node.

Explanation

The specified SVC cluster does not have a configuration node. The SVC is misconfigured.

Action

Configure the specified SVC cluster such that it has exactly one configuration node and retry performance data collection. If this message continues to appear, contact your IBM support representative.

HWNPM4116W Failed to associate SVC performance data from non-configuration node with SVC performance data from configuration node.

Explanation

Time stamp information is used to correlate SVC performance data from non-configuration nodes with SVC performance data from configuration nodes. An attempt to perform such correlation failed. The likely cause is a mismatch in node clocks.

Action

Make sure the clocks of the nodes in the SVC from which data is being collected are in sync. If this message continues to appear, contact your IBM support representative.

HWNPM4117W Encountered incomplete SVC performance data sample.

Explanation

A SVC performance data sample is considered incomplete if one of the nodes in the cluster does not have an Nm_stats file. The likely cause of an incomplete performance data sample is a mismatch in node clocks.

Action

Make sure the clocks of the nodes in the SVC from which data is being collected are in sync. If this message continues to appear, contact your IBM support representative.

HWNPM4118E Firmware version information is not available for storage subsystem *subsystem name*. Performance data collection cannot proceed.

Explanation

Version information is not available for the specified storage subsystem.

Action

Contact your IBM support representative.

HWNPM4119E The firmware installed on storage subsystem *subsystem name* (*firmware version*) is not supported for performance data collection. The minimum

level of firmware supported for performance data collection is *firmware version*.

Explanation

The firmware installed on the specified device is too old to perform performance monitoring.

Action

Follow the vendor's instructions to upgrade the firmware on the specified storage subsystem to the level specified in the message. If the problem persists after the upgrade, contact your IBM support representative.

HWNPM4150E Unable to retrieve storage subsystem for this device: *device identifier*.

Explanation

The storage subsystem was unable to be retrieved from the database.

Action

Check if the database contains the storage subsystem for this device.

HWNPM4151E Unable to determine the status of any performance data collection for this device: *device identifier*.

Explanation

An exception occurred while attempting to communicate with this device or its device agent.

Action

Contact your IBM support representative.

HWNPM4152E Performance data collection has already been enabled for this device: *device identifier*.

Explanation

Another user has already started performance data collection, and this device or its device agent only allows one collection to be performed at a time.

Action

Wait for the previously enabled collection to complete, then try again.

HWNPM4153E Performance data collection is not enabled for this device: *device identifier*.

Explanation

Performance data collection is not currently running for this device. It must be enabled before stopping it.

Action

None. Performance data collection is already stopped.

HWNPM4154E Unable to start performance data collection for this device: *device identifier*.

Explanation

An exception occurred while attempting to communicate with this device or its device agent.

Action

Contact your IBM support representative.

HWNPM4155E Failed to enable performance data collection for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to enable performance data collection.

Action

Check the frequency and duration of the performance data collection. If correct, contact your IBM support representative.

HWNPM4156E Unable to stop performance data collection for this device: *device identifier*.

Explanation

An exception occurred while attempting to communicate with this device or its device agent.

Action

Contact your IBM support representative.

HWNPM4157E Failed to disable performance data collection for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to disable performance data collection.

Action

Contact your IBM support representative.

HWNPM4158E Unable to complete start performance data collection task for this device: *device identifier*.

Explanation

An exception occurred while attempting to execute an internal process.

Action

Contact your IBM support representative.

HWNPM4159E Unable to complete stop performance data collection task for this device: *device identifier*.

Explanation

An exception occurred while attempting to execute an internal process.

Action

Contact your IBM support representative.

HWNPM4160E Unable to complete performance data collection status query task for this device: *device identifier*.

Explanation

An exception occurred while attempting to execute an internal process.

Action

Contact your IBM support representative.

HWNPM4161E Performance data collection is not enabled for this device: *device identifier*.

Explanation

Performance data collection is not currently running for this device. It must be enabled in order to poll for performance data.

Action

Start performance data collection before polling for performance data.

HWNPM4162E Unable to retrieve port performance statistics data for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to retrieve port statistics.

Action

Contact your IBM support representative.

HWNPM4163E Unable to retrieve volume performance statistics data for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to retrieve volume statistics.

Action

Contact your IBM support representative.

HWNPM4164E Unable to retrieve rank performance statistics data for this device: *device identifier*.

Explanation

The device or device agent returned an error code when attempting to retrieve rank statistics.

Action

Contact your IBM support representative.

HWNPM4165E Unable to retrieve performance statistics data for this device: *device identifier*.

Explanation

An exception occurred while attempting to communicate with this device or its device agent.

Action

Contact your IBM support representative.

HWNPM4166E Unable to complete polling for performance data collection task for this device: *device identifier*.

Explanation

An exception occurred while attempting to execute an internal process.

Action

Contact your IBM support representative.

HWNPM4167E Unable to retrieve a device agent for this device: *device identifier*.

Explanation

An error occurred while attempting to obtain a device agent, such as an SMI-S provider, that controls this device.

Action

Confirm that this device is registered with a device agent, and that the device agent is known to IBM Spectrum Control. If there is a device agent, contact your IBM support representative.

HWNPM4168E Failed attempt to use device *device identifier* counter data service with device *different device identifier*.

Explanation

A collection service is already assigned to another device.

Action

An internal error occurred with misassigned devices. Contact your IBM support representative.

HWNPM4169E An invalid access point of device agent URL was used to acquire the agent for this device: *device identifier*.

Explanation

The access point passed into an internal process is in the wrong format.

Action

An internal error occurred with incorrect variables. Contact your IBM support representative.

HWNPM4170E The device agent's configuration for device identifier has changed from the given access point, device agent URL.

Explanation

The access point passed into an internal process is incorrect.

Action

An internal error occurred with misassigned devices. Contact your IBM support representative.

HWNPM4171E Performance data collection start task timed out after *time* seconds for device: device identifier.

Explanation

The internal task of starting performance data collection took too long.

Action

Contact your IBM support representative.

HWNPM4172E Performance data collection stop task timed out after *time* seconds for device: device identifier.

Explanation

The internal task of stopping performance data collection took too long.

Action

Contact your IBM support representative.

HWNPM4173E Performance data collection check status task timed out after *time* seconds for device: device identifier.

Explanation

The internal task of checking the performance data collection status took too long.

Action

Contact your IBM support representative.

HWNPM4174E Performance data collection poll task timed out after *time* seconds for device: *device identifier*.

Explanation

The internal task of polling for performance statistics data took too long.

Action

Contact your IBM support representative.

HWNPM4175W An error occurred while parsing statistics for port *port identifier*. Its statistics will be excluded.

Explanation

Unable to complete parsing statistics for this port. Possible problems include:

1. An internal component ID could not be created for the port.
2. A valid interval value was not returned.
3. A valid time stamp for the statistic was not returned.
4. The statistic returned was out of date.

Action

Contact your IBM support representative.

HWNPM4176W An error occurred while parsing statistics for volume *volume identifier*. Its statistics will be excluded.

Explanation

Unable to complete parsing statistics for this volume. Possible problems include:

1. An internal component ID could not be created for the volume.
2. A valid interval value was not returned.
3. A valid time stamp for the statistic was not returned.
4. The statistic returned was out of date.

Action

Contact your IBM support representative.

HWNPM4177W An error occurred while parsing statistics for rank *rank identifier*. Its statistics will be excluded.

Explanation

Unable to complete parsing statistics for this rank. Possible problems include:

1. An internal component ID could not be created for the rank.
2. A valid interval value was not returned.
3. A valid time stamp for the statistic was not returned.
4. The statistic returned was out of date.

Action

Contact your IBM support representative.

HWNPM4178E Failed to decrypt the device agent's password for device *device identifier*.

Explanation

An exception occurred while trying to decrypt the device agent's password. Without the password, the requested task cannot complete successfully.

Action

Contact your IBM support representative.

HWNPM4179W Performance data collection is currently enabled with errors for device *device identifier*.

Explanation

The device agent is indicating that the data collection has encountered a problem while collecting data from the device. This might result in the loss of some statistics data.

Action

Contact your IBM support representative.

HWNPM4180E Unable to retrieve *key identifier* value from the internal discover process.

Explanation

An internal process failed to map data correctly in order for the task to succeed.

Action

Contact your IBM support representative.

HWNPM4181W *number of ports of the port statistics from the device agent were unrecognized and were not included in this sample interval.*

Explanation

The port statistics data received from the device agent included data for a number of unknown ports. This could be due to one of the following conditions:

- The subsystem contains some ports which are not fibre-channel ports. IBM Spectrum Control as well as some device agents (mostly SMI-S providers) currently only support fibre-channel ports, so other types of ports (parallel SCSI-3, or ESCON ports for example) will be treated as unrecognized. If this is the case, this warning message can be safely ignored.
- The probe of the subsystem did not complete successfully, and failed to record information for all ports of the subsystem.
- The subsystem was recently upgraded and more ports were added which were not yet discovered by IBM Spectrum Control.

Action

If your subsystem contains unsupported ports, this message is expected but you can safely ignore it. Otherwise, run a probe for the subsystem to ensure that any unrecognized ports are discovered and properly recorded in the IBM Spectrum Control database. If this message persists for subsequent performance data collection intervals, even after successful completion of a probe, contact your IBM service representative.

HWNPM4182W *number of volumes of the volume statistics from the device agent were unrecognized and were not included in this sample interval.*

Explanation

The volume statistics data received from the device agent included data for a number of unknown volumes. This could be due to one of the following conditions:

- The probe of the subsystem did not complete successfully, and failed to record information for all volumes of the subsystem.
- The subsystem configuration was recently changed to add more volumes. These new volumes have not yet been discovered by IBM Spectrum Control.

Action

Rerun a probe for the subsystem to ensure that any unrecognized volumes are discovered and properly recorded in the IBM Spectrum Control database. If this message persists for subsequent performance data collection intervals, even after successful completion of a probe, contact your IBM service representative.

HWNPM4183W *number of ranks of the rank statistics from the device agent were unrecognized and were not included in this sample interval.*

Explanation

The rank statistics data received from the device agent included data for a number of unknown ranks. This could be due to one of the following conditions:

- The probe of the subsystem did not complete successfully, and failed to record information for all storage extents of the subsystem.
- The subsystem configuration was recently changed to add more ranks. These new storage extents have not yet been discovered by IBM Spectrum Control.

Action

Rerun a probe for the subsystem to ensure that any unrecognized ranks are discovered and properly recorded in the IBM Spectrum Control database. If this message persists for subsequent performance data collection intervals, even after successful completion of a probe, contact your IBM service representative.

HWNPM4184E The device agent configured for this storage subsystem is not supported for this task. The current version, *version number*, is downlevel from from the minimum required, *version number*.

Explanation

Performance data cannot be collected from the subsystem through this particular device agent (usually an SMI-S provider), because the version of the agent is not supported by the IBM Spectrum Control Performance Manager.

Action

Use another device agent, or upgrade the version of the existing device agent to the minimum required level indicated in the message.

HWNPM4185W The device agent did not return all performance statistics data for this time interval. The incomplete data is being processed.

Explanation

IBM Spectrum Control expects to receive performance data for ports, ranks, and volumes from the device and device agent. One or two of these types of data was not received as expected. This usually indicates that there is a problem with the device itself, the native device interfaces, or the device agent.

In the rare case that there are no ranks or no volumes defined on the device, this message can safely be ignored because then no rank or volume statistics will be sent by the device. However, in that case it is not necessary to run a performance monitor for the device because there is no performance to be measured.

Action

Ensure that the device and the native device interfaces are operating normally. Ensure that the device agent is operating normally. It might be necessary to view error and/or trace logs for your device and/or device agent. Contact your IBM service representative for help, if necessary.

HWNPM4186W The ESS SMI-S provider did not return performance statistics data for both clusters for this

time interval. The incomplete data is being processed.

Explanation

IBM Spectrum Control expects to receive performance data for ports, ranks, and volumes from ESS SMI-S provider for both clusters. The data for one cluster was not received as expected. This usually indicates that there is a problem with the device itself, the native device interfaces, or the device agent.

Action

Ensure that the device and the native device interfaces are operating normally. Ensure that the ESS SMI-S provider is operating normally. It might be necessary to view error and/or trace logs for your device and/or device agent. Contact your IBM service representative for help, if necessary.

HWNPM4187W The device does not support performance management for pool *pool ID* because it contains Space Efficient Volumes. Only incomplete performance data can be collected for array *array ID*.

Explanation

The specified pool contains space efficient volumes, which makes it impossible to accurately manage the performance for those ranks, the arrays associated with those ranks, and the device adapters associated with those arrays.

For DS8000 devices whenever a pool consisting of multiple ranks contains space efficient volumes that are not yet fully allocated, the performance impact of those volumes on their associated ranks cannot be measured. As a result, to avoid presenting the user with potentially inaccurate or misleading performance data, the Performance Manager does not attempt to compute the performance metrics for the affected arrays and device adapters.

Action

None.

HWNPM4188W The performance monitor was unable to collect performance statistics data from the device agent for the following component types: *component list*.

Explanation

The request for performance statistics from the agent resulted in no statistic data being received for either the ports, ranks, and/or volumes.

The performance monitor will attempt to retrieve statistics for all components until the next polling interval. If the components statistics continue to be missing for the next polling interval, the statistics that are available will be processed. This may result in the loss of some performance data.

Action

Confirm that both the subsystem and the subsystem's agent are working properly. Contact your IBM support representative for further assistance.

HWNPM4189W number of MDisks of the MDisk statistics from the device agent were unrecognized and were not included in this data collection interval.

Explanation

The MDisk statistics data received from the device agent included data for a number of unknown MDisks. This could be due to one of the following conditions:

- The probe of the subsystem did not complete successfully, and failed to record information for all storage extents of the subsystem.
- The subsystem configuration was recently changed to add more MDisks. These new storage extents have not yet been discovered by IBM Spectrum Control.

Action

Rerun a probe for the subsystem to ensure that any unrecognized MDisks are discovered and properly recorded in the IBM Spectrum Control database. If this message persists for subsequent performance data collection intervals, even after successful completion of a probe, contact your IBM service representative.

Related reference

-  [Getting help for IBM Storage Insights](#)

HWNPM4190W number of nodes of the node statistics from the resource agent were unrecognized and were not included in this data collection interval.

Explanation

The node statistics data that were received from the data source included data for a number of unknown nodes. This problem might be caused by the following conditions:

- The probe of the storage system did not complete successfully, and failed to record information for all nodes of the storage system.
- The storage system configuration was recently changed to add more nodes. These new nodes were not discovered.
- If the storage system is an IBM Spectrum Scale cluster, the OS host names and the cluster host names of the Spectrum Scale nodes might conflict. Similarly the cluster host names and the Zimon sensor or collector configuration files might conflict.

Action

If the storage system is an IBM Spectrum Scale cluster, check the OS host name and the IBM Spectrum Scale cluster host name of each of the nodes. Correct any mismatches, for example use the hostnamectl command to change the OS host name to the one shown by mmlscluster, which is the host name that is recognized by the cluster.

If the storage system is an IBM Spectrum Scale cluster, check the Zimon sensor configuration files on each of the nodes and the Zimon collector configuration file on the collector node. Correct any mismatches in the node host names that are used in those configuration files.

Otherwise, rerun a probe for the storage system to ensure that any unrecognized nodes are discovered and properly recorded in the database repository.

If you still can't complete the action, go to your Products and services page (<https://myibm.ibm.com/products-services/>) on IBM Marketplace. Click the down-arrow for the Storage Insights offering, click Support, and then choose an option.

Related reference

-  [Products and services page](#)

HWNPM4191W *number of modules out of total number of modules* module statistics could not be retrieved from the device agent due to errors, and were not included in this data collection interval.

Explanation

Each interface module in an XIV device is responsible for tracking performance statistics of the I/O flowing through it. In this case, one or more of the interface modules did not return its statistics data to IBM Spectrum Control. This is usually caused by the particular modules being inoperative.

Action

Check the health status of your XIV interface modules, and correct any errors. If this message persists for subsequent performance data collection intervals, even if all XIV interface modules are fully operational, contact your IBM service representative.

HWNPM4192W *number of Drives of the drive statistics from the device agent were unrecognized and were not included in this data collection interval.*

Explanation

The performance data gathered for local disks or flash modules from the data source included data for a number of unknown drives.

This warning can appear if one of the following conditions occurs:

- The probe of the storage system did not complete successfully, and failed to record information for all local disks or flash modules of the storage system.
- The storage system configuration was recently changed to add more drives. The new drives were not yet discovered when the previous probe was run.

Action

Run another probe for the storage system to ensure that any unrecognized local disks and flash modules are discovered and properly recorded in the database repository. If this message continues after a probe completes successfully, go to Service Engage (<https://www.ibmserviceengage.com/support>) where you can chat with an expert, browse troubleshooting topics and forums, submit support tickets, and access the IBM Knowledge Center.

HWNPM4193W *number of Volume-copies of the volume-copy statistics from the device agent were unrecognized and were not included in this data collection interval.*

Explanation

The volume-copy statistics data received from the device agent included data for a number of unknown copies. This could be due to one of the following conditions:

- The probe of the subsystem did not complete successfully, and failed to record information for all volume-copies of the subsystem.
- The subsystem configuration was recently changed to add more volumes or volume-copies. These new volumes or volume-copies have not yet been discovered by IBM Spectrum Control.

Action

Rerun a probe for the subsystem to ensure that any unrecognized volume-copies are discovered and properly recorded in the IBM Spectrum Control database. If this message persists for subsequent performance data collection intervals, even after successful completion of a probe, contact your IBM service representative.

HWNPM4194W *number of partitions of the partition statistics from the device agent were unrecognized and were not included in this data collection interval.*

Explanation

The partition statistics data received from the device agent included data for a number of unknown pools. This could be due to one of the following conditions:

- The probe of the subsystem did not complete successfully, and failed to record information for all pools of the subsystem.
- The subsystem configuration was recently changed to add more pools. These new pools have not yet been discovered by IBM Spectrum Control.

Action

Rerun a probe for the subsystem to ensure that any unrecognized pools are discovered and properly recorded in the IBM Spectrum Control database. If this message persists for subsequent performance data collection intervals, even after successful completion of a probe, contact your IBM service representative.

HWNPM4195W *number of file systems of the file system statistics from the device agent were unrecognized and were not included in this data collection interval.*

Explanation

The file system statistics data received from the device agent included data for a number of unknown file systems. This could be due to one of the following conditions:

- The probe of the storage system did not complete successfully, and failed to record information for all file systems of the storage system.
- The storage system configuration was recently changed to add more file systems. These new file systems have not yet been discovered by IBM Spectrum Control.

Action

Rerun a probe for the storage system to ensure that any unrecognized file systems are discovered and properly recorded in the IBM Spectrum Control database. If this message persists for subsequent performance data collection intervals, even after successful completion of a probe, contact your IBM service representative.

HWNPM4250E Failed to start the discover service for the SMI-S counter data service.

Explanation

An error occurred while attempting to start the discover service for the SMI-S counter data service.

Action

Contact your IBM support representative.

HWNPM4251E Failed to start the configuration service for the SMI-S counter data service.

Explanation

An error occurred while attempting to start the configuration service for the SMI-S counter data service.

Action

Contact your IBM support representative.

HWNPM4252I Successfully returned access point device namer for device device name.

Explanation

The access point required for the SMI-S counter data service was successfully retrieved.

Action

None.

HWNPM4253I Successfully stopped SMI-S counter data service on access point access point for device device name.

Explanation

The SMI-S counter data service was successfully stopped.

Action

None.

HWNPM4254I The SMI-S counter data service is active on access point access point for device device name.

Explanation

The SMI-S counter data service is active.

Action

None.

HWNPM4255I The SMI-S counter data service is inactive on access point *access point* for device *device name*.**Explanation**

The SMI-S counter data service is inactive.

Action

None.

HWNPM4256I Performance statistics successfully returned on access point *access point* for device *device name*.**Explanation**

The performance statistics for the SMI-S counter data service were successfully returned.

Action

None.

HWNPM4257W Performance statistics not returned on access point *access point* for device *device name*.**Explanation**

The performance statistics for the SMI-S counter data service were not successfully returned.

Action

If SMI-S block storage performance statistics are supported on the device, then contact your IBM support representative.

HWNPM4258E No SMI-S providers found for device *device name*.**Explanation**

No SMI-S providers were found for the device. The SMI-S provider is required to retrieve performance statistics for the SMI-S counter data service.

Action

Check if an SMI-S provider is defined for the device. If the SMI-S provider is defined, then contact your IBM support representative.

HWNPM4259E No storage subsystem found for device *device name*.**Explanation**

No storage subsystem was found for the device. A storage subsystem is required to retrieve performance statistics for the SMI-S counter data service.

Action

Check if a storage subsystem is defined for the device. If the storage subsystem is defined, then contact your IBM support representative.

HWNPM4260E Failed to initialize the polling context for device *device name*.**Explanation**

The polling context contains the data required to retrieve storage subsystem statistics from the SMI-S counter data service. Therefore, the request fails.

Action

Contact your IBM support representative.

HWNPM4261E Failed to retrieve the device capabilities for device *device name*.**Explanation**

The attempt to retrieve the device capabilities for the device failed.

Action

Contact your IBM support representative.

HWNPM4262E A database exception occurred trying to retrieve the device capabilities for device *device name*.**Explanation**

Unable to retrieve the device capabilities for the device due to a database exception.

Action

Contact your IBM support representative.

HWNPM4263E A database exception occurred trying to retrieve the storage subsystem for device *device name*.

Explanation

Unable to retrieve the storage subsystem for the device due to a database exception.

Action

Contact your IBM support representative.

HWNPM4264W Failed to retrieve manifest for *component type*.

Explanation

The attempt to retrieve a manifest for the device failed. Each component type will have its own manifest, and if the component is not supported, the manifest will not be located.

Action

If the component type is supported, contact your IBM support representative.

HWNPM4265E A database exception occurred trying to retrieve the Manifests for device *device name*.

Explanation

Unable to retrieve the manifests for the device due to a database exception.

Action

Contact your IBM support representative.

HWNPM4266E No manifests found for device *device name*.

Explanation

No manifests were found for the device. The manifests are required to parse the performance statistics that are returned. Therefore, the request fails.

Action

If the component type is supported, contact your IBM support representative.

HWNPM4267E A database exception occurred trying to retrieve the discovery parameters for device *device name*.

Explanation

Unable to retrieve the discovery parameters the device due to a database exception.

Action

Contact your IBM support representative.

HWNPM4268E Statistics record not correctly formatted due to exception *local exception string*.

Explanation

The statistics record is not correctly formatted.

Action

Contact your IBM support representative.

HWNPM4269E Statistics record not correctly parsed due to exception *local exception string*.

Explanation

The statistics record is not correctly parsed.

Action

Contact your IBM support representative.

HWNPM4270W The block storage statistics is not formatted for device *device name*.

Explanation

The block storage statistics is not correctly formatted for the device.

Action

If block storage statistics are supported for this device, contact your IBM support representative.

HWNPM4271E The SMI-S provider found for device *device name* is not valid.**Explanation**

The SMI-S provider found for the device is not valid. The SMI-S provider is required to retrieve performance statistics for the SMI-S counter data service.

Action

Check if an SMI-S provider found for the device is valid. If the SMI-S provider is valid, then contact your IBM support representative.

HWNPM4272E The storage subsystem found for device *device name* is not valid.**Explanation**

The storage subsystem found for the device is not valid. The storage subsystem must have a serial number, and a storage subsystem is required to retrieve performance statistics for the SMI-S counter data service.

Action

Check if a storage subsystem has a defined serial number. If the storage subsystem has a defined serial number, then contact your IBM support representative.

HWNPM4273W Discarding the stale performance statistics returned on access point *access point* for device *device name*.**Explanation**

Some of the performance statistics counters were not updated on the SMI-S provider for the device. IBM Spectrum Control will discard all the performance data retrieved from the SMI-S provider during this sample interval. IBM Spectrum Control will automatically try to retrieve the performance statistics after a short timeout.

Action

None

HWNPM4274E The SMI-S provider found for this device has changed. Please re-run SMI-S provider discovery and probe.**Explanation**

The SMI-S provider may have been migrated from the Brocade SMI Agent to the SMI Agent that is integrated in Brocade Data Center Fabric Manager, or vice versa.

Action

If SMI-S provider discovery and probe are executed after SMI-S provider migration and the problem still exists, contact your IBM support representative.

HWNPM4300E Access to the agent or device has been denied. Ensure that valid credentials have been specified for agent agent name.

Explanation

When attempting to retrieve performance statistics for the device, access was denied by the device or the device agent. Therefore no performance statistics could be retrieved. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the correct agent address has been specified, and that the specified credentials are valid and will allow access to the device or agent for performance data collection. The credentials usually consist of a username and password, but can also encompass other security related parameters such as ssh keys or authentication tokens, depending on the type of device or agent being accessed and, where applicable, the access method selected.

HWNPM4301E The device or device agent did not respond within the allotted time (timeout value seconds).

Explanation

When attempting to retrieve performance statistics for the device, the requested performance data was not returned before the timeout expired. Either the device or agent is completely unresponsive, or is much slower than expected by IBM Spectrum Control. No performance data will be inserted for the device in this time period. The next performance data sample recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the device and device agent are fully operational. It may be necessary to reboot either device or agent, if it is in a hung state. If you have reason to believe that the device and agent are operational but are simply slower than expected, you can also attempt to increase the timeout value used by the performance manager, which is set in configuration file device/conf/pm.conf.

HWNPM4302E New performance data is not yet available for the device. Statistics with time stamps later than time_stamp could not be found.

Explanation

If the time stamp in the message is "null", then no statistics were previously retrieved, and the performance manager is unable to get ANY statistics for the device.

In case performance data is cached by the device or device agent, the performance manager ensures that the most recently retrieved performance statistics are indeed newer than the previously retrieved statistics. If not, the performance manager waits for a short time and tries retrieving the statistics again. If after several tries no new statistics were retrieved, this message is issued.

No performance data is inserted for the device in this time period. The next performance data sample that is recorded into the database might represent an average over more than the configured interval length.

Action

Ensure that the device and device agent are fully operational. It might be necessary to restart either device or agent, if it is in a hung state. Ensure that if the device has multiple clocks (for example for multiple nodes or controllers), that the clocks are synchronized to within a few minutes.

HWNPM4303E An agent API call (*API name*) failed while attempting to retrieve performance data for the device.

Explanation

The current attempt to retrieve a set of performance data from the device failed. No performance data will be inserted for the device in this time period. The immediate operation of the running performance monitor is unaffected. However the next performance data sample recorded into the database might represent an average over more than the configured interval length.

The API name indicated in the message is the function or method which caused the error. If a null name is indicated, the exact function or method is unknown.

Action

Ensure that the device agent is fully operational. It may be necessary to reboot the agent if it is not working properly. If the problem persists, contact the vendor of the device and agent for problem diagnosis and resolution.

HWNPM4304E The request for performance data could not be retrieved from the queue by the data collector, probably this one is down or encountered problems connecting to the server.

Explanation

The data collector may be down, or the connection may be unavailable or congested.

Action

Verify the connection between the data collector and the server. Then, verify that the data collector is running and if not, restart the data collector process.

HWNPM4502E Attempt to delete a default policy.

Explanation

An IBM default policy or current default policy cannot be deleted.

Action

None.

HWNPM4503E A database update operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted to make an update to the database.

Action

Verify that database is operational and online.

HWNPM4504E A database insert operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted to insert a new row into the database.

Action

Verify that database is operational and online.

HWNPM4505E A database delete operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted to delete one or more rows from a database table.

Action

Verify that database is operational and online.

HWNPM4506E A database cursor operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted to obtain or use a database cursor.

Action

Verify that database is operational and online.

HWNPM4507E A database connect operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted to connect to the database.

Action

Verify that database is operational and online.

HWNPM4508E A database retrieve operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted to retrieve a row from a database table.

Action

Verify that database is operational and online.

HWNPM4509E A database operation failed.

Explanation

A generalized database failure occurred.

Action

Verify that database is operational and online.

HWNPM4510E A database query operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted a database query operation.

Action

Verify that database is operational and online.

HWNPM4511E A database commit operation failed.

Explanation

A failure occurred when IBM Spectrum Control attempted a database commit operation.

Action

Verify that database is operational and online.

HWNPM5200E The performance manager failed to publish event even name due to exception exception.

Explanation

The performance manager failed to publish event to other modules.

Action

Restart device server and try again.

HWNPM5210E The performance manager failed to receive event from other modules.

Explanation

The performance manager failed to receive event from other modules.

Action

Restart device server and try again.

HWNPM5211E The first parameter passed to this method is null.

Explanation

The subscriber can not be null when calling this method.

Action

Make sure the first parameter passed to this method is not null.

HWNPM5212E The second parameter passed to this method is invalid.

Explanation

The event array can not be null or empty.

Action

Make sure the second parameter passed to this method is valid.

HWNPM5400E The performance data collection identifiers are not valid integers: schedule ID {0}, schedule run number {1}, job run number {2}.

Explanation

Each performance data collection job is identified by three integers. The scheduler service did not receive three integers when asked to update the job status, and so could not identify the correct job.

Action

Contact your IBM support representative.

HWNPM5401E There was a problem establishing the database connection: {0}.

Explanation

An exception occurred when trying to retrieve the database connection from the connection pool.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM5402E There was a problem creating the new run job entry: {0}.

Explanation

An exception occurred when trying to insert a new run job entry into the database.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM5403E There was a problem updating the run job entry {0}: {1}.

Explanation

An exception occurred when trying to update an existing run job entry in the database.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM5404E There was a problem closing the database connection: {0}.

Explanation

An exception occurred when trying to close the database connection.

Action

Make sure your database is working correctly. If you cannot find anything wrong with the database, contact your IBM support representative.

HWNPM5405E There was a problem inserting a new run job into the database: {0}.

Explanation

An exception occurred when trying to insert the run job into the database table T_RUN_JOBS.

Action

Contact your IBM support representative.

HWNPM5406E There was a problem executing an update for run job number {0} in the database.

Explanation

No rows were updated when an attempt was made to update a run job in the database.

Action

Contact your IBM support representative.

HWNPM5407E There was a problem executing an update for run job number {0} in the database.

Explanation

No rows were updated when an attempt was made to update a run job in the database.

Action

Contact your IBM support representative.

HWNPM5408E There was a problem executing an update for run number {0} in the database.

Explanation

No rows were updated when an attempt was made to update a run in the database.

Action

Contact your IBM support representative.

HWNPM5409I Successfully retrieved the configuration data for the elastic device. Found *number of nodes* Nodes and *number of file systems* File systems,

Explanation

The running performance monitor has updated its internal state with the latest configuration data from the storage subsystem. The indicated device components were found.

Action

None.

HWNPM5410W The performance monitor could not collect performance data for the following cluster nodes: *nodes names*.

Explanation

The IBM Spectrum Scale performance monitoring tool on the GPFS cluster could not collect performance data for the nodes and related resources such as file systems.

Action

Check that the collector component of the performance monitoring tool is started on a single GPFS cluster node.

Check that the sensor component of the performance monitoring tool is started on the nodes.

Check the sensor and collector components are configured correctly on the nodes. To learn more about configuring the performance monitoring tool, see
http://www.ibm.com/support/knowledgecenter/STXKQY_4.1.1/com.ibm.spectrum.scale.v4r11.adv.doc/bl1adv_PMToverview.htm

Try the operation again.

HWNPM5411W The performance monitor could not collect performance data for the following filesystems: *filesystem names*.

Explanation

The IBM Spectrum Scale performance monitoring tool on the GPFS cluster could not collect performance data for the file systems. This problem might occur because the performance monitoring tool is not started or is not configured correctly on the nodes that the file system is mounted on.

Action

Check that the collector component of the performance monitoring tool is started on a single GPFS cluster node.

Check that the sensor component of the performance monitoring tool is started on the nodes that the file system is mounted on.

Check the sensor and collector components are configured correctly on the nodes. To learn more about configuring the performance monitoring tool, see
http://www.ibm.com/support/knowledgecenter/STXKQY_4.1.1/com.ibm.spectrum.scale.v4r11.adv.doc/bl1adv_PMToverview.htm

Try the operation again.

HWNPM5413E The process failed because the userid or password provided failed to connect to the Export Tool.

Explanation

Performance data collection for Hitachi systems requires a user name and password to be defined in the Hitachi Device Manager for the Export Tool. Connection with the provided user name or password failed.

Action

Check the credentials for the user that is configured to monitor the block storage system. To connect to the storage system for both probe and performance monitoring, ensure that the following credentials match:

- The user name and password that is defined in Hitachi Device Manager.
- The user name and password that is used for Hitachi Command Suite to connect to the device.

HWNPM5414E The process failed because the Hitachi SVP was busy and did not return data or timed out.

Explanation

The hitachi external process was unable to collect data because the Hitachi SVP is too busy.

Action

The Hitachi SVP seems to be too busy to return performance data. Collection will retry at the next performance interval.