Operations Manager Administration Guide

For Use with DataFabric® Manager Server 3.8

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About this guide

Here you can learn what this document describes and who it is intended for; what special terminology is used in the document; what command, keyboard, and typographic conventions this document uses to convey information; and other details about finding and using information.

This guide describes the NetApp DataFabric Manager software and how to use it to monitor, administer, and optimize NetApp storage systems that run the Data ONTAP operating system. The information in this guide applies to all supported storage system models.

This guide does not cover basic system or network administration topics, such as IP addressing and network management; it emphasizes the characteristics of integrated management of storage systems and describes how to use Operations Manager, the Web-based user interface (UI) of DataFabric Manager.

Next topics

Audience on page 23
Terminology conventions in Operations Manager on page 23
Command, keyboard, and typographic conventions on page 24
Special messages on page 25

Audience

Here you can learn if this guide is right for you, based on your job, knowledge, and experience.

This document is for system administrators and others interested in managing and monitoring storage systems with DataFabric Manager.

This document is written with the assumption that you are familiar with the following technology:

- Data ONTAP operating system software
- The protocols that you use for file sharing or transfers, such as NFS, CIFS, iSCSI, FC, or HTTP
- The client-side operating systems (UNIX or Windows)

Terminology conventions in Operations Manager

To understand the concepts in this document, you might need to know the terms defined here.

General storage system terminology

- Storage systems that run Data ONTAP are sometimes referred to as *filers*, *appliances*, *storage appliances*, or *systems*. The terms used in Operations Manager reflect one of these common usages.
- When the term *appliance* is used in Operations Manager, the information applies to all supported storage systems, NearStore systems, FAS appliances, and in some cases Fibre Channel switches.
- When the term *filer* is used, it can refer to any supported storage system, including FAS appliances or NearStore systems.

General terms

- The term *type* means pressing one or more keys on the keyboard.
- The term *enter* mean pressing one or more keys on the keyboard and then pressing the Enter key, or clicking in a field in a graphical interface and typing information into it.

Command, keyboard, and typographic conventions

This document uses command, keyboard, and typographic conventions that help you enter commands.

Command conventions

In examples that illustrate commands executed on a UNIX workstation, the command syntax and output might differ, depending on your version of UNIX.

Keyboard conventions

- When describing key combinations, this document uses the hyphen (-) to separate individual keys. For example, "Ctrl-D" means pressing the "Control" and "D" keys simultaneously.
- This document uses the term "Enter" to refer to the key that generates the digital equivalent of a carriage return, although the key is named "Return" on some keyboards.

Typographic conventions

The following table describes typographic conventions used in this document.

Convention	**Type of information**
Italic font	Words or characters that require special attention. Placeholders for information you must supply. For example, if the guide says to enter the `arp -d` *`hostname`* command, you enter the characters "arp -d" followed by the actual name of the host. Book titles in cross-references.
`Monospaced` font	Command names, option names, keywords, and daemon names. Information displayed on the system console or other computer monitors. The contents of files.
`Bold monospaced` font	Words or characters you type. What you type is always shown in lowercase letters, unless you must type it in uppercase letters.

Special messages

This document might contain the following types of messages to alert you to conditions you need to be aware of. Danger notices and caution notices only appear in hardware documentation, where applicable.

Note: A note contains important information that helps you install or operate the system efficiently.

Attention: An attention notice contains instructions that you must follow to avoid a system crash, loss of data, or damage to the equipment.

Danger: A danger notice warns you of conditions or procedures that can result in death or severe personal injury.

Caution: A caution notice warns you of conditions or procedures that can cause personal injury that is neither lethal nor extremely hazardous.

What is new in this release

The "What is new in this release" section describes new features and changes in Operations Manager for DataFabric Manager server 3.8. Detailed information about the features is provided elsewhere in this guide.

Next topics

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User interface changes on page 27
New and changed CLI commands on page 29

Overview of new and changed features

Operations Manager for DataFabric Manager server 3.8 contains new and changed features.

New features

IPv6 Support	Starting from DataFabric Manager 3.8, Internet Protocol version 6 (IPv6) is supported along with IPv4.
Host-initiated discovery	This discovery mechanism is based on DNS SRV record (RFC 2782), where DataFabric Manager details are maintained. Currently, host-initiated discovery is supported by NetApp Host Agent only.

Changes

Withdrawal of support for Solaris platforms	DataFabric Manager 3.8 and later do not support Solaris platforms.
Removal of NetCache support	DataFabric Manager 3.8 and later do not support NetCache-related features.

User interface changes

DataFabric Manager server 3.8 introduces terminology changes and changes to the Web-based UI pages.

Terminology changes

All of the instances of the term "data set" across the Operations Manager Web-based UI are changed to "dataset." The following table describes the change in the data set terminology.

Old terminology	New terminology
Data Set	Dataset
DataSet	Dataset

Changes to Web-based UI pages

Following are the modifications to the Web-based UI pages, based on task flow:

- The Protection Data Transfer category is added to the Report Categories list (Control Center > Reports > All). Backup, Mirror, and Dataset are groups under this category.
- The following new backup reports are added:
  - DP Transfer Backup, Daily
  - DP Transfer Backup, Individual
  - DP Transfer Backup, Monthly
  - DP Transfer Backup, Quarterly
  - DP Transfer Backup, Weekly
  - DP Transfer Backup, Yearly
- The following new mirror reports are added:
  - DP Transfer Mirror, Daily
  - DP Transfer Mirror, Individual
  - DP Transfer Mirror, Monthly
  - DP Transfer Mirror, Quarterly
  - DP Transfer Mirror, Weekly
  - DP Transfer Mirror, Yearly
- The following new dataset reports are added:
  - DP Transfer Dataset, Daily
  - DP Transfer Dataset, Monthly
  - DP Transfer Dataset, Quarterly
  - DP Transfer Dataset, Weekly
  - DP Transfer Dataset, Yearly

- The following fields are added to the PrimaryDirectory and SnapmirrorRelationship custom reports:
  - Imported
  - Orphan
  - Redundant

New and changed CLI commands

DataFabric Manager server 3.8 includes new and changed CLI commands to support the new and changed features. For detailed information about these commands, see the DataFabric Manager man pages.

New CLI commands to support new features

- List the relationships managed or discovered by Protection Manager
  - dfpm relationship list

Introduction to Operations Manager

Operations Manager is a Web-based UI of DataFabric Manager.

You can use Operations Manager for the following day-to-day activities on storage systems:

- Discover storage systems
- Monitor the device or the object health, the capacity utilization, and the performance characteristics of a storage system
- View or export reports
- Configure alerts and thresholds for event managements
- Group devices, vFiler units, host agents, volumes, qtrees, and LUNs
- Run Data ONTAP CLI commands simultaneously on multiple systems
- Configure role-based access control (RBAC)
- Manage host users, user groups, domain users, local users, and host roles

Note: DataFabric Manager 3.8 and later supports not only IPv4, but also IPv6.

Next topics

What DataFabric Manager server does on page 31
What a license key is on page 32
Access to Operations Manager on page 32
Information to customize in Operations Manager on page 32
Administrator accounts on the DataFabric Manager server on page 33
Authentication methods on the DataFabric Manager server on page 33

What DataFabric Manager server does

The DataFabric Manager server provides infrastructure services such as discovery, monitoring, role-based access control (RBAC), auditing, and logging for products in the NetApp Storage and Data suites.

You can script commands using the command-line interface (CLI) of DataFabric Manager software that runs on a separate server. The software does not run on the storage systems.

What a license key is

To use DataFabric Manager, you must enable the Operations Manager license by using the license key. The license key is a character string that is supplied by NetApp.

If you are installing the software for the first time, you enter the license key during installation. You can enter the license key in the Options window under Licensed Features. You must enable additional licenses to use other features, such as disaster recovery and backup.

Access to Operations Manager

You can access Operations Manager and the CLI from the IP address or DNS name of the DataFabric Manager server.

After successfully installing the DataFabric Manager software, the DataFabric Manager server starts discovering, monitoring, collecting, and saving information about objects in its database. Objects are entities such as storage systems; the vFiler units, disks, aggregates, volumes, and qtrees on these storage systems; LUNs; and user quotas.

In the case of the server on Windows, Operations Manager launches automatically and a welcome page appears.

Use the either of the following URLs to access Operations Manager:

http://[server_ip_address]:8080

http://server_dnsname:8080

Depending on your Domain Name System (DNS) setup, you might need to use the fully qualified name in the second URL; for example, use tampa.florida.com instead of tampa.

Information to customize in Operations Manager

You can use Operations Manager to configure storage system IP addresses or names, administrator access control, and alarms, set up SNMP communities and administrator accounts and create groups.

DataFabric Manager 3.8 and later supports IPv6 along with IPv4. However, the following Operations Manager features lack IPv6 support:

- LUN management
- Snapshot-based backups (because SnapDrive for Windows and SnapDrive for UNIX do not support IPv6 addressing)
- Disaster recovery

- High Availability (HA) over Veritas Cluster Servers (VCS)
- "hosts.equiv" file based authentication
- APIs over HTTPS do not work for storage systems managed using IPv6 addresses, when the option `httpd.admin.access` is set to a value other than `legacy`.
- Discovery of storage systems and host agents that exist on remote network
- Protocols such as RSH and SSH do not support IPv6 link local address to connect to storage systems and host agents.

  Note: Link local address works with SNMP and ICMP only.

Administrator accounts on the DataFabric Manager server

You can use Operations Manager to set up administrator accounts on the DataFabric Manager server. You can grant capabilities such as read, write, delete, backup, restore, distribution, and full control to administrators.

The DataFabric Manager software provides the following two different administrator accounts:

- Administrator—grants full access for the administrator who installed the software
- Everyone—allows users to have read-only access without logging in

Related concepts

How roles relate to administrators on page 53

Authentication methods on the DataFabric Manager server

The DataFabric Manager server uses the information available in the native operating system for authentication. However, you can configure the server to use Lightweight Directory Access Protocol (LDAP).

The server does not maintain its own database of the administrator names and the passwords. If you configure LDAP, then the server uses it as the preferred method of authentication.

Next topics

Authentication with native operating system on page 33
Authentication with LDAP on page 34

Authentication with native operating system

You do not need to configure any options to enable the DataFabric Manager server to use the native operating system for authentication.

Based on the native operating system, the DataFabric Manager application supports the following authentication methods:

- For Windows: local and domain authentication
- For UNIX: local password files, and NIS or NIS+

Note: Ensure that the administrator name you are adding matches the user name specified in the native operating system.

Authentication with LDAP

You can enable LDAP authentication on the DataFabric Manager server and configure it to work with your LDAP servers.

The DataFabric Manager application provides predefined templates for the most common LDAP server types. These templates provide predefined LDAP settings that make the DataFabric Manager server compatible with your LDAP server.

Discovery process

Discovery is the process that the DataFabric Manager server uses to find storage systems on your organization's network.

Discovery is enabled by default; however, you might want to add other networks to the discovery process or to enable discovery on all networks. Depending on your network setup, you might want to disable discovery entirely. You can disable autodiscovery and use manual discovery only if you do not want SNMP network walking.

When you install the DataFabric Manager software, the DataFabric Manager server attempts to discover storage systems on the local subnet.

Next topics

Discovery by the DataFabric Manager server on page 35
What host discovery is on page 36
Ping methods in host discovery on page 36
What host-initiated discovery is on page 36
How DataFabric Manager server discovers vFiler units on page 37
Discovery of storage systems on page 37
Discovery of storage systems and networks on page 38
Methods of adding storage systems and networks on page 39
What SNMP is on page 41

Discovery by the DataFabric Manager server

The DataFabric Manager server depends on Simple Network Management Protocol (SNMP) to discover and periodically monitor storage systems.

If your storage systems is not SNMP-enabled, you must enable it before the server can discover them. You can enable SNMP on storage systems by using either FilerView or the Data ONTAP CLI.

If the routers, switches, or storage systems use SNMP communities other than "public," you must specify the appropriate communities on the **Edit Network Credentials** page.

The server needs to locate and identify storage systems so that it can add them to its database. The server can monitor and manage only systems and networks that are in the database.

Automatic discovery is typically the primary process the server uses to discover storage systems and networks. In this process, the server and the systems (storage systems, vFiler units, and Host Agents) communicate automatically with each other.

Manual addition is secondary to the discovery process. You typically only need it for the storage systems and the networks that you add after the server discovers the infrastructure.

What host discovery is

The DataFabric Manager server automatically discovers storage systems and Host Agents that are in the same subnet as the server. When you install the DataFabric Manager software, the Host Discovery option is enabled by default.

The discovery of networks, when enabled, is integrated with the discovery of storage systems and Host Agents. The discovery occurs at the same time.

Note: DataFabric Manager 3.8 supports discovery of IPv6 networks and hosts.

Ping methods in host discovery

The DataFabric Manager server uses SNMP queries for host discovery. You must enable SNMP on your storage systems and the routers for DataFabric Manager to monitor and manage systems.

By default, SNMP is enabled on storage systems.

Ping methods might include ICMP echo, HTTP, NDMP, or ICMP echo and SNMP. The latter ping method does not use HTTP to ping a host. Therefore, if a storage system (behind a transparent HTTP cache) is down and the HTTP cache responds, the server does not mistake the storage system to be running. The ICMP echo and SNMP ping method is the default for new installations.

Note: When you select ICMP echo and the SNMP ping method, the server uses ICMP echo first, and then SNMP, to determine if the storage system is running.

What host-initiated discovery is

Host-initiated discovery is based on the DNS SRV record, where DataFabric Manager details are maintained. Currently, host-initiated discovery is supported by NetApp Host Agent only.

Whenever a host initiates communication with the DataFabric Manager server, the DataFabric Manager server does not identify the host until its network (IPv6) address details are added. You can add the host IPv6 network to DataFabric Manager by using the `dfm network add` command. When it receives this command, the host initiates a request to DataFabric Manager. After the DataFabric Manager server identifies the network, the host is added to the DataFabric Manager host list.

For information about how you can modify the DataFabric Manager server details for host-initiated discovery, see the *NetApp Host Agent Installation and Administration Guide*.

Related information

NetApp Host Agent Installation and Administration Guide - http://now.netapp.com/NOW/knowledge/docs/nha/nha_index.shtml

How DataFabric Manager server discovers vFiler units

The DataFabric Manager server monitors hosting storage systems to discover vFiler units. You must set authentication credentials for the hosting storage system to ensure the discovery of vFiler units.

You can disable the vFiler discovery in Setup menu > Options > Discovery options, or by using the following CLI command:

```
dfm option set discovervfilers=no
```

When you disable this option, the server continues to monitor the discovered vFiler units. However, when the server discovers a vFiler unit, it does not add the network to which the vFiler unit belongs to its list of networks on which it runs host discovery. In addition, when you delete a network, the server continues to monitor the vFiler units present in that network.

The server monitors the hosting storage system once every hour to discover new vFiler units that you configured on the storage system. The server deletes from the database the vFiler units that you destroyed on the storage system.

You can change the default monitoring interval in Setup menu > Options > Monitoring options, or by using the following CLI command:

```
dfm option set vFilerMonInterval=1hour
```

Related tasks

Changing password for storage systems in DataFabric Manager on page 131
Changing passwords on multiple storage systems on page 132

Discovery of storage systems

This table describes the process that DataFabric Manager uses to discover storage systems if the Host Discovery option is enabled and the Network Discovery option is disabled (the default value).

Stage	Description
1.	DataFabric Manager issues an SNMP GET request to all hosts on the local network. The purpose of the request is to determine the system identity of the hosts. The local network is the network to which the DataFabric Manager server is attached.

Stage	Description	
2.	If...	Then...
	The SNMP GET request is successful	DataFabric Manager adds the discovered storage systems to its database and continues to Stage 4. If the storage system is a hosting storage system on which vFiler units are configured, DataFabric Manager also discovers those vFiler units. **Note:** vFiler units will be discovered only after you set the credentials for the hosting storage system.
3.	DataFabric Manager repeats Stages 1 through 2 until it has sent queries to all the networks in its database. The minimum interval for repeating the cycle is set by the Discovery Interval (the default is every 15 minutes) and the Discovery Timeout (the default is 2 seconds). The actual interval depends on the number of networks to scan and their size.	

Note: DataFabric Manager repeats Stages 1 to 2 to discover new storage systems. The minimum interval for repeating the discovery process is set by the Discovery Interval option.

Discovery of storage systems and networks

This table describes the process that DataFabric Manager uses to discover storage systems and networks if both the Host Discovery and Network Discovery options are enabled.

Stage	Description	
1.	DataFabric Manager issues an SNMP GET request to all hosts on the local network. The purpose of the request is to determine the system identity of the hosts. The local network is the network to which the DataFabric Manager server is attached.	
2.	If...	Then...
	The SNMP GET request is successful	DataFabric Manager adds the discovered storage systems to its database and continues to Stage 4. If the storage system is a hosting storage system on which vFiler units are configured, DataFabric Manager also discovers those vFiler units. **Note:** vFiler units will be discovered only after you set the credentials for the hosting storage system.

Stage	Description
3.	DataFabric Manager issues another SNMP GET request to routers that responded to the first SNMP request. The purpose of the request is to gather information about other networks to which these routers might be attached.
4.	When DataFabric Manager receives replies, if it finds networks that are not included in its database, it adds the new networks to its database.
5.	DataFabric Manager selects another network from its database and issues an SNMP GET request to all hosts on that network.
6.	DataFabric Manager repeats Stages 2 through 5 until it has sent SNMP queries to all the networks in its database. By default, the minimum interval for repeating the network discovery cycle is set at every 15 minutes.

Methods of adding storage systems and networks

You can apply a combination of methods to efficiently add storage systems and networks to DataFabric Manager.

- Keep the defaults for the discovery options of Host Discovery (Enabled), and Network Discovery (Disabled).
- Start the discovery process by manually adding one storage system from each network that has storage systems.

  When you add a storage system, its network is added, too. Then other storage systems on the network are found automatically.
- After verifying that all of the storage systems have been added, disable host discovery to save network resources.
- After attaching a new storage system to your network, add hosts by using either Operations Manager or through the command line with the `dfm host add` command.
- If you set up a new network of storage systems, add one storage system so that its network and all other storage systems on it are found.

Guidelines for changing discovery options

You must follow a set of guidelines for changing the default values of the discovery options.

Discovery Interval (15 minutes)

This option specifies the period after which DataFabric Manager scans for new storage systems and networks.

Change the default value if you want to lengthen the minimum time interval between system discovery attempts. This option affects the discovery interval only at the time of installation. After storage systems are discovered, the number

of networks and their size determines the interval. If you choose a longer interval, there might be a delay in discovering new storage systems, but the discovery process is less likely to affect the network load.

Discovery Timeout (2 seconds)

This option specifies the time interval after which DataFabric Manager considers a discovery query to have failed.

Change the default value if you want to lengthen the time before considering a discovery to have failed (to avoid discovery queries on a local area network failing due to long storage system response times of a storage system).

Host Discovery (Enabled)

This option enables the discovery of storage systems through SNMP.

Change the default value if any of the following situations exist:

- All storage systems that you expected DataFabric Manager to discover have been discovered and you do not want DataFabric Manager to keep scanning for new storage systems.
- You want to manually add storage systems to the DataFabric Manager database.

  Manually adding storage systems is faster than discovering storage systems in the following cases:

  - You want DataFabric Manager to manage a small number of storage systems.
  - You want to add a single new storage system to the DataFabric Manager database.

Network Discovery (Disabled)

This option enables the discovery of networks.

Change the default value if you want the DataFabric Manager server to automatically discover storage systems on your entire network.

Note: When the Network Discovery option is enabled, the list of networks on the **Networks to Discover** page can expand considerably as DataFabric Manager discovers additional networks attached to previously discovered networks.

Network Discovery Limit (in hops) (15)

This option sets the boundary of network discovery as a maximum number of hops (networks) from the DataFabric Manager server.

Change the default value if you want to increase this limit if the storage systems that you want DataFabric Manager to discover are connected to networks that are more than 15 hops (networks) away from the network to which the DataFabric Manager server is attached. The other method for discovering these storage systems is to add them manually.

	Decrease the discovery limit if a smaller number of hops includes all the networks with storage systems you want to discover. For example, reduce the limit to six hops if there are no storage systems that must be discovered on networks beyond six hops. Reducing the limit prevents DataFabric Manager from using cycles to probe networks that contain no storage systems that you want to discover.
Networks to discover	This option allows you to manually add and delete networks that DataFabric Manager scans for new storage systems. Change the default value if you want to add a network to DataFabric Manager that it cannot discover automatically, or you want to delete a network in which you no longer want storage systems to be discovered.
Host agent discovery	This option allows you to enable or disable host agents. Change the default value if you want to disable the discovery of LUNs or storage area network (SAN) hosts.
Network Credentials	This option enables you to specify, change, or delete an SNMP community that DataFabric Manager uses for a specific network or host. Change the default value if storage systems and routers that you want to include in DataFabric Manager do not use the default SNMP community.

What SNMP is

Simple Network Management Protocol (SNMP) is an application-layer protocol that facilitates the exchange of management information between network devices.

SNMP is part of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite. SNMP enables network administrators to manage network performance; find and solve network problems; and plan for network growth.

Next topics

When to enable SNMP on page 42
SNMP protocols to discover and monitor storage systems on page 42
What the Preferred SNMP Version option is on page 43
How DataFabric Manager chooses network credentials for discovery on page 43
Discovery process using SNMPv1 or SNMPv3 on page 43
Monitoring process using SNMPv1 on page 44
Monitoring process using SNMPv3 on page 44
Setting SNMPv1 or SNMPv3 as the preferred version on page 45
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Setting SNMPv1 or SNMPv3 to monitor a storage system on page 45
Modifying the network credentials and SNMP settings on page 46
Deleting the SNMP settings for the network on page 46
Addition of a storage system from an undiscovered network on page 46
Diagnosis of SNMP connectivity on page 47

When to enable SNMP

You must enable SNMP on your storage systems before you install DataFabric Manager, if you want DataFabric Manager to discover the storage systems immediately.

You can also wait until after installing the software to enable SNMP on storage systems. However, this causes a delay in the server to discover the storage systems.

SNMP protocols to discover and monitor storage systems

DataFabric Manager uses the SNMP protocol versions to discover and monitor the storage systems.

By default, DataFabric Manager uses SNMPv1, with public as the community string to discover the storage systems. To use a specific configuration on a network, you must add the networks required.

SNMPv1 is a widely used simple request/response protocol. SNMPv3 is an interoperable standards-based protocol with security and remote configuration capabilities.

SNMPv3 provides user-based security with separate authentication and authorization. It is a method to specify common credentials.

Note: SNMPv3 support is available only on storage systems running Data ONTAP 7.3 or later.

You can use SNMPv3 to discover and monitor storage systems if SNMPv1 is disabled.

Note: The user on the storage system whose credentials are specified in Operations Manager should have the login-snmp capability to be able to use SNMPv3.

The version specified in the Preferred SNMP Version option at the storage system level is used for monitoring the discovered storage system. If no version is specified at the storage system level, then either the network setting or the global setting is used. However, you can modify the SNMP version, if required.

Note: If the monitoring fails using the specified SNMP version, then the other SNMP version is not used for storage system monitoring.

Related concepts

Methods of adding storage systems and networks on page 39

Related tasks

Modifying the network credentials and SNMP settings on page 46

Related references

Guidelines for changing discovery options on page 39

What the Preferred SNMP Version option is

The Preferred SNMP Version option is a global or network-specific option that specifies the SNMP protocol version to be used first for discovery.

You can use Operations Manager to configure the option with values such as SNMPv1 or SNMPv3.

Preferred SNMP version setup

This table specifies the settings used corresponding to the SNMP version preferred at the storage system level or network level.

If the preferred SNMP version is...	Then...
Specified at the storage system level	The version preferred takes precedence over the network and global settings.
Not specified at the storage system level	Network setting is used.
Not specified at the network level	Global setting is used.

When DataFabric Manager is installed for the first time or updated, by default, the global and network setting uses SNMPv1 as the preferred version. However, you can configure the global and network setting to use SNMPv3 as the default version.

Related tasks

Modifying the network credentials and SNMP settings on page 46

How DataFabric Manager chooses network credentials for discovery

This table shows how DataFabric Manager chooses the network credentials for discovery.

If...	Then...
The discovery is running on a particular network and the network credentials are configured	The network credentials configured for that particular network are used for discovery.
No network exists	The network credentials configured as global settings are used for discovery.

Discovery process using SNMPv1 or SNMPv3

This table describes the discovery process for a storage system by using SNMPv1 or SNMPv3.

If...	Then...
The storage system is discovered using the preferred SNMP version (let us say, SNMPv1)	The discovered storage system is added with the preferred SNMP version as Global/Network Default. This implies that the network or global settings are used for monitoring.
The storage system is not discovered using SNMPv1	SNMPv3 is used for storage system discovery.
The discovery succeeds using SNMPv3	SNMPv3 is set as the preferred version for monitoring.

When all or most of the storage systems in a network are running only a particular SNMP version, then you are recommended to specify only that version as the preferred SNMP version for the network. This speeds up the discovery of storage systems running only a particular SNMP version.

You can prevent using a particular version of SNMP from being used for discovery. For example, if a particular version of SNMP is not in use in the network, then you can disable that SNMP version. This speeds up the discovery process.

Monitoring process using SNMPv1

This table shows how storage systems are monitored using SNMPv1.

If...	Then...
The Preferred SNMP Version option is set to SNMPv1, or the Preferred SNMP Version option is not set for the storage system, and the global or network setting is SNMPv1	The community string set at the network level is used for the SNMPv1 monitoring.
The community string is not specified at either global or network level	SNMPv1 is disabled and an event is generated to indicate the SNMP communication failure with the storage system.

Monitoring process using SNMPv3

This table shows how storage systems are monitored using SNMPv3.

If...	Then...
The Preferred SNMP Version option is set to SNMPv3, or the Preferred SNMP Version option is not set for the storage system, and the global or network setting is SNMPv3	The login and the password specified for the storage system are used for the SNMPv3 monitoring.
The storage system credentials are not specified	The login and the password specified at the network level are used for the SNMPv3 monitoring.
No credentials are provided at the network level	The login and the password specified at the global level are used for the SNMPv3 monitoring.

If...	Then...
No credentials are provided at the global level	An event is generated to indicate the SNMP communication failure with the storage system.

Setting SNMPv1 or SNMPv3 as the preferred version

You can set SNMPv1 or SNMPv3 as the preferred version for storage system discovery on a specific network.

Steps

1. Select the Network Credentials submenu from the Setup menu.

   Alternatively, select the Discovery submenu from the Setup menu and click the edit link corresponding to the Network Credentials option.

2. Provide values for each of the parameters requested.
3. Click **Add**.

Setting SNMPv1 as the only SNMP version

You can set SNMPv1 as the only SNMP version available to monitor all storage systems in a network.

Steps

1. Go to the **Network Credentials** page.
2. Click the **edit** link corresponding to the Edit field for the SNMPv3 enabled network.
3. In the Edit Network Credentials section, modify the value of the Preferred SNMP Version option to SNMPv1.
4. In the SNMPv3 Settings section, clear the Login and Password values.
5. Click **Update**.
6. If the storage system in the network has the Preferred SNMP Version option set to SNMPv3, then
   a) Go to the **Edit Appliance Settings** page of the corresponding storage system.
   b) Modify the value of the Preferred SNMP Version option to `Global/Network Default`.

Setting SNMPv1 or SNMPv3 to monitor a storage system

You can set SNMPv1 or SNMPv3 to monitor a storage system.

Steps

1. Go to the **Edit Appliance Settings** page.
2. Set the Preferred SNMP Version option for the corresponding storage system.
3. Click **Update**.

Modifying the network credentials and SNMP settings

You can modify the network credentials and SNMP settings using Operations Manager.

Steps

1. Select the **Network Credentials** submenu from the **Setup** menu.

   Alternatively, select the **Discovery** submenu from the **Setup** menu and click the **edit** link corresponding to the `Network Credentials` option.

2. Click the **edit** link corresponding to the Edit field in the **Network Credentials** page.
3. Modify values for the parameters required.
4. Click **Update**.

Deleting the SNMP settings for the network

You can delete the SNMP settings for the network using Operations Manager.

Steps

1. Go to the **Network Credentials** page.
2. Select the check box corresponding to the **Delete** field for the required network.
3. Click **Delete Selected**.

Addition of a storage system from an undiscovered network

You can add a single storage system to DataFabric Manager from an undiscovered network on which only SNMPv3 is enabled.

You can add the storage system by running the `dfm host add -N` command, with the appropriate values for the following storage system credentials:

- hostLogin
- hostPassword

In this case, the discovery is not enabled on the storage system's network.

Diagnosis of SNMP connectivity

You can diagnose the SNMP connectivity with a host by running the Diagnose Connectivity tool from Operations Manager.

You can access the Diagnose Connectivity tool from the Appliance Tools list located at the lower left of Operations Manager.

Alternatively, you can run the `dfm host diag <hostname>` command to diagnose DataFabric Manager's connectivity using SNMPv1 and SNMPv3 with a host. The credentials used for diagnosing connectivity using rsh and ssh are the host credentials. However, if host credentials are unspecified, then the network or global credentials are used for SNMPv3.

Related concepts

Use of the Diagnose Connectivity tool for a managed storage system on page 282
Use of the Diagnose Connectivity tool for unmanaged storage system on page 282
Where to find the Diagnose Connectivity tool in Operations Manager on page 283
Reasons why DataFabric Manager might not discover your network on page 283

Role-based access control in DataFabric Manager

DataFabric Manager uses role-based access control (RBAC) for user login and role permissions.

Next topics

What role-based access control is on page 49
Configuring vFiler unit access control on page 50
Logging in to DataFabric Manager on page 50
List of predefined roles in DataFabric Manager on page 51
Active Directory user group accounts on page 52
Adding administrative users on page 53
How roles relate to administrators on page 53
What an RBAC resource is on page 57
How reports are viewed for administrators and roles on page 59
What a global and group access control is on page 59
Management of administrator access on page 59

What role-based access control is

DataFabric Manager uses role-based access control (RBAC) for user login and role permissions.

If you have not changed DataFabric Manager's default settings for administrative user access, you do not need to log in to view information by using DataFabric Manager.

Note: By default, you will not be able to view DataFabric Manager data.

However, when you initiate an operation that requires specific privileges, DataFabric Manager prompts you to log in. For example, to create administrator accounts, you need to log in with Administrator account access.

RBAC allows administrators to manage groups of users by defining roles. If you need to restrict access to the database to specific administrators, you must set up administrator accounts for them. Additionally, if you want to restrict the information that these administrators can view and the operations they can perform, you must apply roles to the administrator accounts you create.

Configuring vFiler unit access control

An administrator who does not have any roles on a global level, but has enough roles on a group that contains only vFiler units is considered a vFiler administrator. The vFiler administrator does not have access to the host storage system information.

Considerations

The following restrictions are applicable to vFiler units' administrators:

- If a vFiler unit has a volume assigned to it, the vFiler administrator cannot view details or reports for the aggregate in which the volume exists.
- If a vFiler unit has a qtree assigned to it, the vFiler administrator cannot view details or reports for the volume in which the qtree exists.

Note: The full name of a qtree contains a volume name (for example, `10.72.184.212:/hemzvol/hagar_root_backup_test`) even though the vFiler unit does not contain the volume.

This procedure describes how to configure access control that allows an administrator to view and monitor vFiler units.

Steps

1. Create a group that contains vFiler objects.
2. From the **Edit Group Membership** page, select vFiler units to add to the group.
3. From the **Roles** page, create a role for the vFiler administrator and assign it the following database operations: Delete, Read, and Write.
4. From the **Edit Administrator Settings** page, assign role to the vFiler administrator.

Logging in to DataFabric Manager

You can log in to DataFabric Manager by entering the administrator name and password on the Operations Manager interface.

Steps

1. From the **Control Center**, select **Log In**.

2. Type your administrator name and password.
3. Click **Log In**.

What default administrator accounts are

DataFabric Manager uses administrator accounts to manage access control and maintain security. When you install DataFabric Manager software, default administrator accounts are created: the “Administrator” and “Everyone” accounts. Administrator accounts have predefined roles assigned to them.

Administrator account	The Administrator has super user privileges and can perform any operation in the DataFabric Manager database and add other administrators. The Administrator account is given the same name as the name of the administrator who installed the software. Therefore, if you install DataFabric Manager on a Linux workstation, the administrator account is called root.
Everyone account	After installing DataFabric Manager, you must log in as the Administrator and set up the Everyone account to grant view permission on this account. This is optional. **Note:** Changes made will not be seen in the audit log.

Note: Prior to DataFabric Manager 3.3, the Everyone account was assigned Read and SRM View access by default. If you upgrade to DataFabric Manager 3.3 and later, these legacy privileges are retained by the Everyone account and mapped to the GlobalRead and GlobalSRM roles.

List of predefined roles in DataFabric Manager

This table provides a list of roles to different administrator accounts in DataFabric Manager.

Administrator account	Roles
Administrator	• GlobalAlarm • GlobalBackup • GlobalConfigManagement • GlobalDataProtection • GlobalDataSet • GlobalDelete • GlobalEvent • GlobalExecute • GlobalFailover • GlobalFullControl • GlobalMirror • GlobalPerfManagement • GlobalProvisioning • GlobalQuota • GlobalRead • GlobalReport • GlobalResourceControl • GlobalRestore • GlobalSAN • GlobalSDConfig • GlobalSDDataProtection • GlobalSDDataProtectionAndRestore • GlobalSDFullControl • GlobalSDSnapshot • GlobalSDStorage • GlobalSRM • GlobalWrite
Everyone	• No roles

Active Directory user group accounts

DataFabric Manager recognizes two types of users namely Administrator and User, thereby allowing domain administrators the ability to define roles based on a company’s organizational hierarchy.

To set up administrator accounts as a user group, use the following naming convention: `<AD domain>\group_dfmadmins`

In this example, all administrators who belong to group_dfmadmins can log in to DataFabric Manager and inherit the roles specified for that group.

Adding administrative users

You can create and edit administrator accounts from Operations Manager.

Steps

1. Log in to the Administrator account.
2. In the Control Center, select **Administrative Users** from the Setup menu.
3. Type the name for the administrator or domain name for the group of administrators.

   Note: User when added must be present locally.

4. Optionally, enter the e-mail address for the administrator or administrator group.
5. Optionally, enter the pager address, as an e-mail address or pager number, for the administrator or administrator group.
6. Click **Add**.

How roles relate to administrators

Role management allows the administrator who logs in with super-user access to restrict the use of certain DataFabric Manager functions to other administrators.

The super-user can assign roles to administrators on an individual basis, by group, or globally (and for all objects in DataFabric Manager).

An operation must be specified for every role. You can assign multiple operations levels if you want the administrator to have more control than a specific role provides. For example, if you want an administrator to perform both the backup and restore operations, you must assign Back Up and Restore roles to the administrator.

You can list the description of an operation by using the `dfm role operation list [ -x ] [ <operation-name> ]` command.

Next topics

What predefined global roles are on page 54

What inheritance roles are on page 55
What capabilities are on page 56
Role precedence and inheritance on page 56
Creating roles on page 56
Modifying roles on page 57

Related concepts

What a global and group access control is on page 59

Related references

Guidelines for changing discovery options on page 39

What predefined global roles are

Administrators assigned with global roles can view information or configure settings for all groups in the DataFabric Manager database, including the Global group.

DataFabric Manager provides the set of predefined global roles that can be inherited to the user creating roles as described in the following table.

Role	Operations
Default	None
GlobalAlarm	You can manage alarms. You can view, create, modify, or delete alarms.
GlobalBackup	You can create and manage backups.
GlobalConfigManagement	You can manage storage system configurations.
GlobalDataProtection	You can perform all the operations of GlobalBackup, GlobalRead, and GlobalDataSet.
GlobalDataSet	You can perform DataSet write and DataSet delete operations.
GlobalDelete	You can delete information in the DataFabric Manager database, including groups and members of a group, monitored objects, primary and secondary storage systems, and backup relationships, schedules, and retention policies.
GlobalEvent	You can view and acknowledge events in addition to create and delete alarms.
GlobalExecute	You can execute commands on storage system.
GlobalFailover	You can manage disaster recovery for datasets.
GlobalFullControl	You can view and perform any operation on any object in the DataFabric Manager database and configure administrator accounts. You cannot apply this role to accounts with group access control.
GlobalMirror	You can create, destroy, and can update replication or failover policies.

Role	Operations
GlobalPerfManagement	You can manage views, event thresholds, and alarms apart from viewing performance information in Performance Advisor.
GlobalProvisioning	You can provision primary dataset nodes and can attach resource pools to secondary or tertiary dataset nodes. You also have all the capabilities of the GlobalResourceControl, GlobalRead, and GlobalDataset roles for dataset nodes that are configured with provisioning policies.
GlobalQuota	You can view user quota reports and events.
GlobalRead	You can view the DataFabric Manager database, backup configurations, events and alerts, and replication or failover policies.
GlobalReport	You can manage custom reports and report schedules.
GlobalResourceControl	You can add members to dataset nodes that are configured with provisioning policies.
GlobalRestore	You can perform restore operations from backups on secondary volumes.
GlobalSAN	You can create, expand, and destroy LUNs.
GlobalSDConfig	You can read, modify, and delete SnapDrive configuration.
GlobalSDDataProtection	You can manage backups and datasets with SnapDrive.
GlobalSDDataProtection AndRestore	You can perform backup and restore operations with SnapDrive.
GlobalSDFullControl	You can perform operations specific to GlobalSDConfig, GlobalSDSnapshot, and GlobalSDStorage roles.
GlobalSDSnapshot	You can list the snapshots and the objects inside them. You can create, modify, and delete snapshots. You can create clones of volumes, luns, and qtrees. You can restore volumes, luns, and qtrees from snapshots.
GlobalSDStorage	You can list, create, modify and delete storage objects and their attributes.
GlobalSRM	You can view information collected by SRM path walks.
GlobalWrite	You can view or write to the DataFabric Manager database.

Note: Super users are assigned the GlobalFullControl role in Operations Manager. For Linux, super user is the root user. For Windows, super-users belong to the administrators group.

What inheritance roles are

Administrators assigned with group roles can view or configure settings for the group to which they belong.

When you view roles for an administrator, the settings are those explicitly set for the administrator at the group level. For example, if administrators have the GlobalRead role, they implicitly have the Read role on all groups. Similarly, if administrators have the Read role on a parent group, they implicitly have the Read role on all the subgroups of that parent group.

Several other factors also affect the group role that is granted to an administrator:

- The capabilities granted to the administrator, "Everyone"
- The administrator's membership in Active Directory (AD) user groups that have been added to the DataFabric Manager server database

Group roles are named similarly to the global roles that are defined in the previous table.

Note: Roles are carried forward prior to DataFabric Manager 3.3

What capabilities are

When creating roles, you must assign capabilities, a combination of operations and resources, to the role. You can view capabilities or edit them by modifying the operations that are associated with the resource. Resources can be groups of monitored objects, such as storage system and hosts.

Role precedence and inheritance

If an administrative user has both global and group roles on a group, the less restrictive (more powerful) of the two roles apply.

For example, if a user is assigned GlobalRead role and GlobalWrite role on a group, that user can view all groups. However, the user can change settings or run commands only on the storage systems of the specified group.

Role inheritance simplifies the task of assigning roles to administrators by letting you use defined roles. Specifying roles for a parent group implicitly grants those roles on its subgroups. You should grant roles conservatively at higher levels of the group hierarchy and specify additional roles as needed at the lower levels of the hierarchy.

Creating roles

You can create roles from the Setup menu in Operations Manager.

Steps

1. Choose **Roles** from the **Setup** menu.
2. Click **Add Capabilities...** and, from the **Capabilities** window, select a resource from the resource tree.
3. Select the operations that you want to allow for the resource and click **OK**.

4. Optionally, to inherit capabilities from an existing role, select that role from the **Inherit Capabilities** list and click \>> to move the role to the list at the right.
5. Click **Add Role**.

Modifying roles

You can edit the roles created from the Setup menu in Operations Manager.

Steps

1. Modify **Roles** from the **Setup** menu.
2. Find the role in the list of roles and click **"edit"**.
3. Optionally modify the basic settings of the role, such as the name and description.
4. Click **Update**.
5. Modify role inheritance by doing one of the following:
   - To disinherit a role, select the role from the list at the right, and click **"<<"** to remove it.
   - To inherit a role, select the role from the "Inherit Capabilities" list and click **">>"** to move the role to the Inherit Capabilities list.

   Note: This step is optional.
6. Click **Update**.

What an RBAC resource is

An RBAC resource is an object on which an operation can be performed. In the DataFabric Manager RBAC system, these resources include Appliances, Aggregates, Volumes, LUNs, Protection policies, Provisioning policies,vFiler templates, Hosts, and DataFabric Manager Groups (except configuration groups).

A user with the Policy Write capability in the global scope can create schedules and throttles. A user with the Policy Write capability on the policy can modify data protection policies. Similarly, a user with the Policy Delete capability on a policy can delete that policy.

Note: On upgrading to DataFabric Manager 3.6 or later, a user has the following capabilities:

- User with the Database Write capability in the global scope is assigned the Policy Write capability.
- User with the Database Delete capability is assigned the Policy Delete capability.

Next topics

Granting restricted access to RBAC resources on page 58
Access check for application administrators on page 58

Granting restricted access to RBAC resources

You can grant restricted access to objects or resource groups in the DataFabric Manager server.

Steps

1. Create a user defined role.

   Example
   The following example shows you how to create a user role called EventRole using the CLI:

   ```
   $ dfm role create EventRol
   ```

2. Add the following capabilities to the role created in Step 1:

   - Read capability on Global resource for events
   - Write capability on Global resource for events

   Example
   The following example shows you how to add the capabilities:

   ```
   $ dfm role add EventRole DFM.Event.Read Global
   ```

   ```
   $ dfm role add EventRole DFM.Event.Write Global
   ```

3. Assign the role created in Step 1 to user Everyone, using the following command: `$ dfm user role add Everyone EventRole`

   Note: You can also use Operations Manager GUI to perform Steps 1 through 3.

4. Open Operations Manager. Read and acknowledge events without logging in.
5. Ensure the user Everyone does not have the capability DFM.Database.Write.

   Note: A user with the capability `DFM.Database.Write` can delete all events.

Access check for application administrators

DataFabric Manager introduces a new capability requirement to perform access check using RBAC.

The Core AccessCheck capability allows application administrators to check the capabilities of any arbitrary user. For example, if A wants to know the capability of B, A should have the capability to check B's capabilities.

However, any user is allowed to check their own capabilities, regardless of what they are.

When a user configures the client application, the Core AccessCheck capability has to be assigned to a role. Application administrators can check the access permissions of any user, only if they have the permission to do so.

A client application user configured on the DataFabric Manager server with this role allows the client application to check the access of all users.

Note: After upgrading to DataFabric Manager 3.6 or later, a user with the Database Read capability in the global scope is assigned the Core AccessCheck capability.

How reports are viewed for administrators and roles

You can view reports for administrators and roles from the CLI.

The following commands are used to generate reports for administrators and roles from the CLI:

- `dfm report role-admins`—Lists all administrators and the roles they are assigned, sorted by administrators.
- `dfm report admin-roles`—Lists all administrators and the roles they are assigned, sorted by role.

For information about how to use the CLI, see the DataFabric Manager man pages for `dfm report` commands. The man pages specifically describe command organization and syntax.

What a global and group access control is

Global access control authorizes an administrator to view and perform actions on any group in the DataFabric Manager database. Group access control authorizes the administrator to view and perform actions only on the objects of the groups you specify.

However, the administrator cannot add objects to or remove objects from the groups.

You can apply global or group access control to administrator accounts.

You cannot directly create group access administrator accounts. You must first create a global administrator account and then grant access to specific groups. If you want an administrator to have access to specific groups only, create a global administrator account with no roles assigned.

Management of administrator access

You can manage administrator access on storage systems and vFiler units, to define and control the access to the resources, based on the role or job function of a user.

By managing administrator access on storage systems and vFiler units, you can complete the following tasks.

- Manage and control access on storage systems and vFiler units from DataFabric Manager.
- Monitor and manage user groups, local users, domain users and roles on storage systems and vFiler units.
- Create and modify identical local users, roles, and user groups on more than one storage system or vFiler unit.
- Edit user groups, local users, domain users, and roles on storage systems and vFiler units.
- Push user groups, local users, domain users, and roles from a storage system or vFiler unit to another storage system or vFiler unit.
- Modify passwords of local users on a storage system or vFiler unit.

Next topics

Prerequisites for managing administrator access on page 60
Limitations in managing administrator access on page 61
Summary of the global group on page 61
Who local users are on page 61
What domain users are on page 67
What Usergroups are on page 69
What roles are on page 72
What jobs display on page 75

Prerequisites for managing administrator access

There are a set of prerequisites that you must consider for managing administrator access.

Following are the prerequisites for managing administrator access on storage systems and vFiler units:

- You must be using Data ONTAP 7.0 or later.
- In the case of local users, the minimum password age, maximum password age, and status fields are available in Data ONTAP 7.1 and later.
- Resetting passwords is available only for storage systems running on Data ONTAP versions 7.0 and later.
- To create or delete roles, user groups, or users on a host, you must have Core Control capability on the host.
- To modify roles, user groups, or users on a host, you must have Core Control and Database Read capabilities on the host.
- To list and view the details of roles, user groups, or users on a host, you must have Database Read capability on the host.
- To push roles, user groups, or users from host A to host B, you must have Database Read capability on host A and Core Control capability on host B.

Limitations in managing administrator access

Roles, user groups, and users without capabilities are not monitored, except for the user group Backup Operators and the users belonging to this user group.

Summary of the global group

You can view the summary that is specific to the global group containing storage systems and vFiler units by selecting Host Users from the Management menu.

Next topics

Viewing a specific summary page on page 61
Viewing users on the host on page 61

Viewing a specific summary page

You can view the summary page specific to a storage system or vFiler unit.

Steps

1. Click **Control Center ➤ Home ➤ Member Details ➤ Appliances**
2. Choose the storage system under Appliance and click on the link.
3. From the left pane, under Appliance Tools, click **Host Users Summary**.

Viewing users on the host

You can view the users on a host using the Host Users report. The Host Users report displays information about the existing users on the host.

Steps

1. From any page, select **Management ➤ Host Users**.
2. Select **Host Users, All** from the Report drop-down list.

Who local users are

Local users are the users created on storage systems and vFiler units.

Next topics

Viewing local users on the host on page 62
Viewing local user settings on the host on page 62
Adding local users to the host on page 63

Editing local user settings on the host on page 63
Users with Execute capability on page 64

Viewing local users on the host

You can view the local users on a host using the Host Local Users report. The Host Local Users report displays information about the existing local users on the host.

Steps

1. From any page, select **Management ➤ Host Users**.
2. Select **Host Local Users, All** from the Report drop-down list.

Viewing local user settings on the host

You can view the local users on the storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Local Users**.
2. Click the **view** link corresponding to the local user.

The following details of the selected local user appear.

Host Name	Name of the storage system or vFiler unit
User Name	Name of the local user
Description	Description of the local user
User Full-name	Full name of the local user
Usergroups	Usergroups that the user belongs to
Roles	Roles assigned to the local user
Capabilities	Capabilities of roles assigned to the local user part of user group
Minimum Password Age	Minimum number of days that a password must be used. The number of days should be less than or equal to maximum password age.
Maximum Password Age	Maximum number of days (0 to $2^{32}-1$) that a password can be used
Status	Displays the current status of the user account: • Enabled: The user account is enabled. • Disabled: The user account is disabled. • Expired: The user account is expired.

Note: Data ONTAP provides an option to set the maximum number of retries for the password, except for the root login. When the user fails to enter the correct password, even after the maximum retries, then the user account is disabled. The status of the user account is enabled only if the administrator resets the password for the user.

The user account expires if the user fails to change the password within the maximum password age.

For more information about maximum retries, see the *Data ONTAP System Administration Guide*.

Related information

Data ONTAP System Administration Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Adding local users to the host

You can add a local user to a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Local Users**.
2. Specify the parameters.

Host Name	Name of the storage system or vFiler unit which user is to be created
User Name	Name of the local user
Password	Password of the local user
Confirm Password	Confirm the password of the local user
User Full Name (optional)	Full name of the local user
Description (optional)	Description of the local user
Minimum Password Age (optional)	Minimum number of days that a password must be used
Maximum Password Age (optional)	Maximum number of days that a password must be used
Usergroup Membership	User groups you want the user to be a member of

3. Select one or more user groups from the list.
4. Add **Local User**.

Editing local user settings on the host

You can edit local user settings on a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Local Users**.
2. Click the **user** link in the Edit column corresponding to the local user.
3. Edit the parameters.

User Full-name	Full name of the local user
Description	Description of the local user
Minimum Password Age (in days)	Minimum number of days that a password must be used
Maximum Password Age (in days)	Maximum number of days that a password must be used
Usergroup Membership	Usergroups you want to be a member of

Note: You cannot edit Host Name and User Name in the Edit Local User section.

4. Select one or more user groups from the list.
5. Click **Update**.

Users with Execute capability

DataFabric Manager users with the Execute capability can reset the password of a local user on storage system or vFiler unit using the credentials that are stored in the database.

Other users who do not have the Execute capability use the credentials that are provided, to modify the password.

Next topics

Pushing passwords to a local user on page 64
Deleting local users from the host on page 65
Pushing local users to hosts on page 66
Monitoring changes in local user configuration on page 66
Editing passwords on page 66

Pushing passwords to a local user

You can push an identical password to a local user on multiple storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Local Users**.

2. From the List of Existing Local Users section, click the password link in the Push column corresponding to the local user.

If...	Then...
The local user is on the storage system	The **Storage System Passwords** page containing the section **Modify Password on Storage Systems** is displayed. **Note:** For more information about **Storage System Passwords**, see the *Operations Manager Help* .
The local user is on the vFiler	The **vFiler Passwords** page containing the section **Modify Password on vFilers** is displayed. **Note:** For more information about vFiler Passwords, see the *Operations Manager Help* .

3. Specify the parameters.

User Name	Name of the local user
Old Password	Password of the local user
New Password	New password of the local user
Confirm New Password	Confirm the new password of the local user
Select groups and/or Storage systems	Select the following from the respective list: • Storage systems on which the local user exists • DataFabric Manager groups on which the local user exists
Apply to subgroups	Select the check box if the password change applies to the storage systems of the selected group and the subgroups of the selected group

4. Click **Update**.

Note: Pushing an identical password creates a job that is displayed in the Jobs tab of **Password Management and Host User Management** window.

Deleting local users from the host

You can delete a local user from a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Local Users**.

2. From the List of Existing Local Users section, select the local user that you want to delete.
3. Click **Delete Selected**.

Pushing local users to hosts

You can push a local user to a group of storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Local Users**.
2. Select the DataFabric Manager group or storage system on which you want to push the local user.
3. Select **OK** in the Resources dialog box.
4. Click **Push**.

Note: Pushing local users to host creates a job that is displayed in the Jobs tab of Host User Management window.

Monitoring changes in local user configuration

You can monitor changes in local user configuration on a storage system or vFiler unit.

Steps

1. Click **Setup ➤ Alarms**.
2. Create a new alarm for the event Host User Modified.

Editing passwords

You can edit the password of a local user on a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Local Users**.
2. Click the **password** link in the Edit column corresponding to the local user.

   Note: You cannot edit Host Name and User Name in the **Edit Password** page.

3. Enter the old password.
4. Enter the new password.
5. Confirm the new password.

6. Click **Update**.

What domain users are

Domain users are the non-local users who belong to a Windows domain, and are authenticated by the domain.

Next topics

Viewing domain users on the host on page 67
Adding domain users to the host on page 67
Viewing domain user settings on the host on page 68
Editing domain user settings on the host on page 68
Removing domain users from all the user groups on page 69
Pushing domain users to hosts on page 69
Monitoring changes in domain user configuration on page 69

Viewing domain users on the host

You can view the domain users on a host using the **Host Domain Users** report. The **Host Domain Users** report displays information about the existing domain users on the host.

Steps

1. From any page, select **Management ➤ Host Users**.
2. Select **Host Domain Users, All** from the Report drop-down list.

Adding domain users to the host

You can add a domain user to a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Domain Users**.
2. Specify the parameters.

Host Name	Name of the storage system or vFiler unit from the drop-down list
User Identifier (domain-name\username or SID)	Any one of the following: • Domain user name • Security Identifier (SID) of the domain user

Usergroup Membership	Usergroups you want to be a member of

3. Select one or more user groups from the list.
4. Click **Add Domain User**.

Viewing domain user settings on the host

You can view the domain user settings on the storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Domain Users**.
2. Click the **view** link corresponding to the domain user.

The following details of the selected domain user appear.

Host Name	Name of the storage system or vFiler unit
User Name	Name of the domain user
SID	Security Identifier of the domain user
Usergroups	Usergroups that the user belongs to
Roles	Roles assigned to the domain user
Capabilities	Capabilities of roles assigned to the domain user as part of the user group

Editing domain user settings on the host

You can edit a domain user on a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Domain Users**.
2. Click the **edit** link corresponding to the domain user.
3. Edit Usergroup Membership.

Usergroup Membership	Usergroups you want to be a member of

Note: You cannot edit Host Name and User Name in the Edit Domain User section.

4. Click **Update**.

Removing domain users from all the user groups

You can remove a domain user from all the user groups.

Steps

1. From any page, select **Management ➤ Host Users ➤ Domain Users**.
2. Select the domain user that you want to remove.
3. Click **Remove From All Usergroups**.

Pushing domain users to hosts

You can push a domain user to a group of storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Domain Users**.
2. Click the **push** link corresponding to the domain user.
3. Select the DataFabric Manager group, storage system or vFiler unit on which you want to push the domain user.
4. Select **OK**.
5. Click **Push**.

Monitoring changes in domain user configuration

You can monitor the changes in domain user configuration on a storage system or vFiler unit.

Steps

1. Click **Setup ➤ Alarms**.
2. Create a new alarm for the event Host Domain User Modified.

What Usergroups are

Usergroups are groups to which the users belong.

Next topics

Viewing user groups on the host on page 70
Adding Usergroups to the host on page 70
Viewing Usergroup settings on the host on page 70

Editing Usergroup settings on the host on page 71
Deleting Usergroups from the host on page 71
Pushing Usergroups to hosts on page 72
Monitoring changes in Usergroup configuration on page 72

Viewing user groups on the host

You can view the user groups on a host using the Host Usergroups report. The Host Usergroups report displays information about the existing user groups on the host.

Steps

1. From any page, select **Management ➤ Host Users**.
2. Select **Host Usergroups, All** from the Report drop-down list.

Adding Usergroups to the host

You can add a user group to a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Usergroups**.
2. Specify the parameters.

Host Name	Name of the storage system or vFiler unit from the drop-down list
Usergroup Name	Name of the user group
Description	Description of the user group
Select Roles	Capabilities of roles

3. Select one or more roles.
4. Click **Add Usergroup**.

Viewing Usergroup settings on the host

You can view the user group settings on the storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Usergroups**.
2. Click the view link corresponding to the user group.

The following details of the selected user group appear:

Host Name	Name of the storage system or vFiler unit
Usergroup Name	Name of the user group
Description	Description of the user group
Roles	Roles assigned to the user group
Capabilities	Capabilities of the user group

Editing Usergroup settings on the host

You can edit user group settings on a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Usergroups**.
2. Click the **edit** link corresponding to the user group that you want to edit.
3. Edit the parameters.

Usergroup Name	Name of the user group
Description	Description of the user group
Select Roles	Capabilities of roles

Note: You cannot edit Host Name in the Edit Usergroup section.

4. Select one or more roles.
5. Click **Update**.

Deleting Usergroups from the host

You can delete a user group from a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Usergroups**.
2. Select the user group that you want to delete.
3. Click **Delete Selected**.

Pushing Usergroups to hosts

You can push identical user groups to a group of storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Usergroups**.
2. Click the **push** link of the user group that you want to push on other storage systems or vFiler units.
3. Select the DataFabric Manager group, storage system or vFiler unit on which you want to push the user group.
4. Select **OK**.
5. Click **Push**.

Monitoring changes in Usergroup configuration

You can monitor the changes in user group configuration on a storage system or vFiler unit.

Steps

1. Click **Setup ➤ Alarms**.
2. Create a new alarm for the event Host Usergroup Modified.

What roles are

A role is a set of capabilities that can be assigned to a group. You can predefine a role, or you can create or modify it.

Next topics

Viewing roles on the host on page 72
Adding roles to the host on page 73
Viewing role settings on the host on page 73
Editing role settings on the host on page 74
Deleting roles from the host on page 74
Pushing roles to the hosts on page 74
Monitoring changes in role configuration on page 75

Viewing roles on the host

You can view the role settings on the storage systems or vFiler units by using the Host Roles report.

Steps

1. From any page, click **Management ➤ Host Users**.
2. Select **Host Roles, All** from the Report drop-down list.

Adding roles to the host

You can add a role to a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Roles**.
2. Specify the parameters.

Host Name	Name of the storage system or vFiler unit from the drop-down list
Role Name	Name of the role
Description	Description of the role
Capabilities	Capabilities of the role Click the Add Capabilities link.

3. Select one or more capabilities you want to add.
4. Click **OK**.
5. Click **Add Role**.

Viewing role settings on the host

You can view the roles on the storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Roles**.
2. Click the view link corresponding to the host role.

The following details of the selected host role appear:

Host Name	Name of the storage system or vFiler unit
Role Name	Name of the role
Description	Description of the role

Capabilities	Capabilities of the role

Editing role settings on the host

You can edit a role on a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Roles**.
2. Click the **edit** link corresponding to the host role that you want to edit.
3. Edit the parameters.

Description	Description of the role
Capabilities	Capabilities of the role Click the Edit link.

Note: You cannot edit Host Name and Role Name in the Edit Role section.

4. Select one or more capabilities you want to add.
5. Click **Ok**.
6. Click **Update**.

Deleting roles from the host

You can delete a role from a storage system or vFiler unit.

Steps

1. From any page, select **Management ➤ Host Users ➤ Roles**.
2. Select the host role that you want to delete.
3. Click **Delete Selected**.

Pushing roles to the hosts

You can push identical roles to a group of storage systems or vFiler units.

Steps

1. From any page, select **Management ➤ Host Users ➤ Roles**.

2. Click the **push** link of the host role you want to push on other storage systems or vFiler units.
3. Select the DataFabric Manager group or storage system on which you want to push the role.
4. Select **OK**.
5. Click **Push**.

Monitoring changes in role configuration

You can monitor the changes in role configuration on a storage system or vFiler unit.

Steps

1. Click **Setup ➤ Alarms**.
2. Create a new alarm for the event Host Role Modified.

What jobs display

Jobs display the status of the push jobs.

Next topics

Pushing jobs on page 75
Deleting push jobs on page 75

Pushing jobs

To view the status of the push jobs, select Management > Host Users >Jobs.

Deleting push jobs

You can delete a push job.

Steps

1. Select the push job that you want to delete.
2. Click **Delete**.

Groups and objects

A group is a collection of DataFabric Manager objects. You can group objects based on characteristics such as the operating system of a storage system (Data ONTAP version).

You can also group objects based on storage systems at a location, or all file systems that belong to a specific project or group in your organization.

Storage system elements monitored by DataFabric Manager, such as storage systems, aggregates, file systems (volumes and qtrees), and logical unit numbers (LUNs), are referred to as objects.

Following is a list of DataFabric Manager objects that can be added to a resource group:

- Host (can include storage systems, Host Agents, and vFiler units)
- Volume
- Qtree
- Configuration
- LUN Path
- Aggregate
- SRM Path
- Dataset
- Resource Pool
- Disk

Following is a set of considerations for creating groups:

- You can group similar or different objects in a group.
- An object can be a member of any number of groups.
- You can group a subset of group members to create a new group.
- You cannot create a group of groups.
- You can create any number of groups.
- You can copy a group or move a group in a group hierarchy.

Next topics

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What a Global group is on page 79
What hierarchical groups are on page 79
Creating groups on page 80
Creating groups from a report on page 80
What configuration resource groups are on page 81
Guidelines for managing groups on page 82

Guidelines for creating configuration resource groups on page 82
Guidelines for adding vFiler units to Appliance Resource group on page 82
Editing group membership on page 83
What group threshold settings are on page 83
What group reports are on page 84
What summary reports are on page 84
What subgroup reports are on page 84

What group types are

DataFabric Manager automatically determines the type of a group based on the objects it contains. If you place your cursor over an icon, to the left of a group name, on the left side of Operations Manager main window, you can quickly find out the type of objects the group contains.

Next topics

What homogeneous groups are on page 78
What mixed-type groups are on page 79

What homogeneous groups are

You can group objects into sets of objects with common characteristics. They might, for example, have the same operating system or belong to a specific project or group in your organization.

You can create the following types of groups:

- Appliance Resource group ( )—contains storage systems, vFiler units, and host agents
- Aggregate Resource group ( )—contains aggregates only
- File System Resource group ( )—contains volumes and qtrees
- LUN Resource group ( )—contains LUNs only
- Configuration Resource group ( )—contains storage systems associated with one or more configuration files
- SRM path group ( )—contains SRM paths only
- Dataset ( )—is the data that is stored in a collection of primary storage containers, including all the copies of the data in those containers
- Resource pool ( )—is a collection of storage objects from which other storage containers are allocated

Note: For more information about datasets and resource pools, see the *Provisioning Manager and Protection Manager Administration Guide*.

Related information

Provisioning Manager and Protection Manager Administration Guide - http://now.netapp.com/NOW/knowledge/docs/DFM_win/dfm_index.shtml

What mixed-type groups are

You can add objects of different types to the same group. Grouping objects from different homogeneous groups also constitutes a mixed-type group. For example, a mixed-type group can have a group of vFiler units and volumes. You can also group objects based on their geographical location, or by the client, they support.

Configuration resource groups can contain only storage systems, vFiler units, and configurations. Once created, you cannot add any objects to the configuration resource group in DataFabric Manager. The elements of a configuration resource group cannot be a part of any other homogeneous group. DataFabric Manager prevents you from adding other object types to configuration resource groups. If a group already contains objects other hosts, you cannot add a configuration file to the group.

What a Global group is

By default, a group called Global exists in the DataFabric Manager database. All objects created in any subgroup, would, belong to the Global group.

You cannot delete or rename the Global group. When you delete an object from a Global group, DataFabric Manager stops monitoring and reporting data for that object. Data collection and reporting is not resumed until the object is added back (“undeleted”) to the database.

Note: You can perform group management tasks only on groups that you create in DataFabric Manager, but you cannot perform management tasks on the Global group.

What hierarchical groups are

In addition to creating groups of objects, you can create subgroups within groups to establish a hierarchy of groups.

Hierarchical groups help you manage administrative privileges, because privileges granted to a parent group are implicitly granted to all its subgroups. Besides, following are the benefits of having hierarchical groups:

- You can determine the capacity of the group and the chargeback options.
- You can keep a record of trending, that is, the data growth rate of the group.

- You can select arguments for reports to be generated.

Creating groups

You can create a new group from the **Edit Groups** page.

Before You Begin

To create a group, you must be logged in as an administrator with a role having Database Write capability on the parent group. To create a group directly under the Global group, the administrator must have a role with Database Write capability on the Global group.

Steps

1. From the **Control Center**, click the **Edit Groups**.
2. In the **Group Name** field, type the name of the group you want to create. See “Naming conventions” for groups.
3. From the list of groups, select the parent group for the group you are creating. You might need to expand the list to display the parent group you want.
4. Click **Add**.

The new group is created. The Current Groups list in the left-pane area is updated with the new group. You might need to expand the Current Groups list to display the new group.

Creating groups from a report

You can create a new group from a report in Operations Manager.

Steps

1. From the **Control Center**, click the **Member Details** tab.
2. Click **Aggregate**, **File Systems**, **LUN**, or tabs.
3. To the left of the list of objects in the main window, select the check boxes for the objects that you want to add to the group.
4. At the bottom left of the main window, click **Add to New Group**.
5. In the **Group Name** field, type the name of the group you want to create. See “Naming conventions” for groups.

6. From the list of groups, select the parent group for the group you are creating. You might need to expand the list to display the parent group you want.
7. Click **Add**.

   The new group is created. The Current Groups list in the left-pane area is updated with the new group. You might need to expand the Current Groups list to display the new group.

What configuration resource groups are

A configuration resource group is a group of storage systems that share a set of common configuration settings. A configuration resource group allows you to designate groups of managed storage systems that can be remotely configured to share the same configuration settings.

A configuration resource group must contain some number of storage systems and have one or more files containing the desired configuration settings. These configuration settings are listed in files called configuration files. Configuration files exist independently of groups, and can be shared between groups. Use Operations Manager to create configuration files and to specify the configuration settings that you want to include in them.

With Operations Manager, you can create and manage configuration files that contain configuration settings you want to apply to a storage system and vFiler unit or groups of storage systems and vFiler units. By using the storage system configuration management feature, you can pull configuration settings from one storage system and vFiler unit and push the same or a partial set of settings to other storage systems or groups of storage systems and vFiler units, ensuring that storage system and vFiler configuration conforms to the configuration pushed to it from Operations Manager.

When you create configuration resource groups, consider the following:

- Only storage systems running Data ONTAP 6.5.1 or later can be included in configuration resource groups.
- Storage systems running on different operating system versions can be grouped in the same configuration resource group.
- A storage system can belong to only one configuration resource group.
- A configuration resource group must have one or more configuration files associated with it. Otherwise, storage systems cannot be configured remotely.
- For configuration management, appropriate plug-ins must be associated.
- You cannot run any reports for a configuration resource group.

Besides specifying configuration settings by associating individual configuration files with a group of storage systems, you can also specify another configuration resource group from which to acquire configuration settings. Such a group is known as a parent group. For example, a previously created configuration resource group might already have most or all, of the settings you require.

Guidelines for managing groups

You should follow a set of guidelines when you create groups.

Use the following guidelines when you create groups:

- You can group similar or mix-types objects in a group.
- An object can be a member of any number of groups.
- You can group a subset of group members to create a new group.
- You cannot create a group of groups.
- You can create any number of groups.
- You can copy a group or move a group in a group hierarchy.

Note: If you are creating a Configuration Resource group, you must also follow the guidelines discussed in

Guidelines for creating configuration resource groups

You must use a set of guidelines when you create Configuration Resource groups.

Use the following guidelines when you create Configuration Resource groups:

- You can include storage systems, and vFiler units, with different model types and software versions.
- Storage system, and vFiler unit, can be a member of only one configuration resource group, but can still be a member of multiple groups for monitoring purposes.
- You cannot create a group of Configuration Resource groups.
- To apply settings to a Configuration Resource group, you must associate one or more configuration files with the group.

Note: Configuration resource group is supported only for Data ONTAP 6.5.1 or later.

Guidelines for adding vFiler units to Appliance Resource group

You must consider a set of guidelines before adding vFiler units to a resource group.

- You can add vFiler units as members to an Appliance Resource group. The hosting Storage system and the storage resources (qtrees, volumes, and LUNs) assigned to the vFiler unit are also added as indirect members. When you remove a vFiler unit from a group, its related hosting Storage system and storage resources are also removed.

- If you add a hosting Storage system that is configured with vFiler units to a group, the vFiler units are also added as indirect members. When you remove a hosting storage system from a group, its vFiler units are also removed.
- If you add a storage resource assigned to a vFiler unit to a group, the vFiler unit is also added as an indirect member. If you remove the storage resources from a group, the vFiler unit is also removed.

Note: Indirect members are considered for determining the group status.

Editing group membership

In Operations Manager, you can add members to a group.

Steps

1. Go to the Groups area on the left side of Operations Manager and expand the list as needed to display the group to which you want to add members.
2. Click the name of the group to which you want to add members.
3. From the **Current Group** menu at the lower left of Operations Manager, click **Edit Membership**.
4. Select the object from the **Choose from All Available** list and click >>to move the object to the list at the right.

   Operations Manager adds the selection to the group and updates the membership list displayed on the right side of the Edit Group Membership area.

What group threshold settings are

Group thresholds determine at what point you want DataFabric Manager to generate events regarding capacity problems with object groups. You can create an alarm for a group to send notification to designated recipients whenever a storage event occurs.

The thresholds you can change depend on the type of objects in a group. For example, you can change Appliance CPU Too Busy Threshold for only an Appliance Resource group. You can change Volume Full Threshold and Volume Nearly Full Threshold for only a File System Resource Group.

For a list of thresholds you can change for an object type, see the chapter where that type of object is the main topic of discussion in this guide.

Note: When you apply threshold changes to a group, the new threshold values are associated with the objects in the group. These new threshold values are not associated with the group. That is, if you add another object to a group, after applying a threshold change, the threshold value of the new object is not changed. The threshold value of the new object does not change if it is different from

the current group. Additionally, if you apply threshold changes to an object that belongs to multiple groups, the threshold value is changed for this object across all groups.

For information about how to change the thresholds for a group of objects, see the *Operations Manager Help*.

What group reports are

Grouping objects enables you to view consolidated data reports, events, and status of objects.

For example, you can view the total storage capacity used, or events generated by all manufacturing storage systems, by creating a group of the storage systems, and using the Summary tab of Operations Manager.

What summary reports are

Summary reports are available for all groups, including the Global group.

- Status
- Group members
- Storage capacity used and available
- Events
- Storage chargeback information
- Monitored devices
- Physical space
- Storage system operating systems
- Storage system disks
- Capacity graphs

Note: You can view additional reports that focus on the objects in a group by clicking the name of the group and then clicking the appropriate Operations Manager tab.

What subgroup reports are

If you run a report on a group with subgroups, the data displayed includes data on applicable objects in the subgroups. For example, if you display the Aggregate Capacity Graph report on a parent group containing aggregates, you see data about the aggregates in the parent group. You cal also see data

about the aggregates in its subgroups. You do not see data about other object types in the parent group or the subgroups.

If you run a report on a mixed-type object group, Operations Manager runs the report on group members of the applicable type. For example, qtrees for the Qtree Growth report. Operations Manager combines the results, and then eliminates the duplicates, if any.

Storage monitoring and reporting

Monitoring and reporting functions in DataFabric Manager depend on event generation. You must configure the settings in Operations Manager to customize monitoring and to specify how and when you want to receive event notifications.

Operations Manager allows you to generate summary and detailed reports. Depending on which tab you select, Operations Manager returns the appropriate graph or selection of reports (for example, reports about storage systems, volumes, and, disks).

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Links to FilerView on page 88
Query intervals on page 89
What SNMP trap listener is on page 90
Descriptions of events and their severity types on page 93
Alarm configurations on page 95
Working with user alerts on page 98
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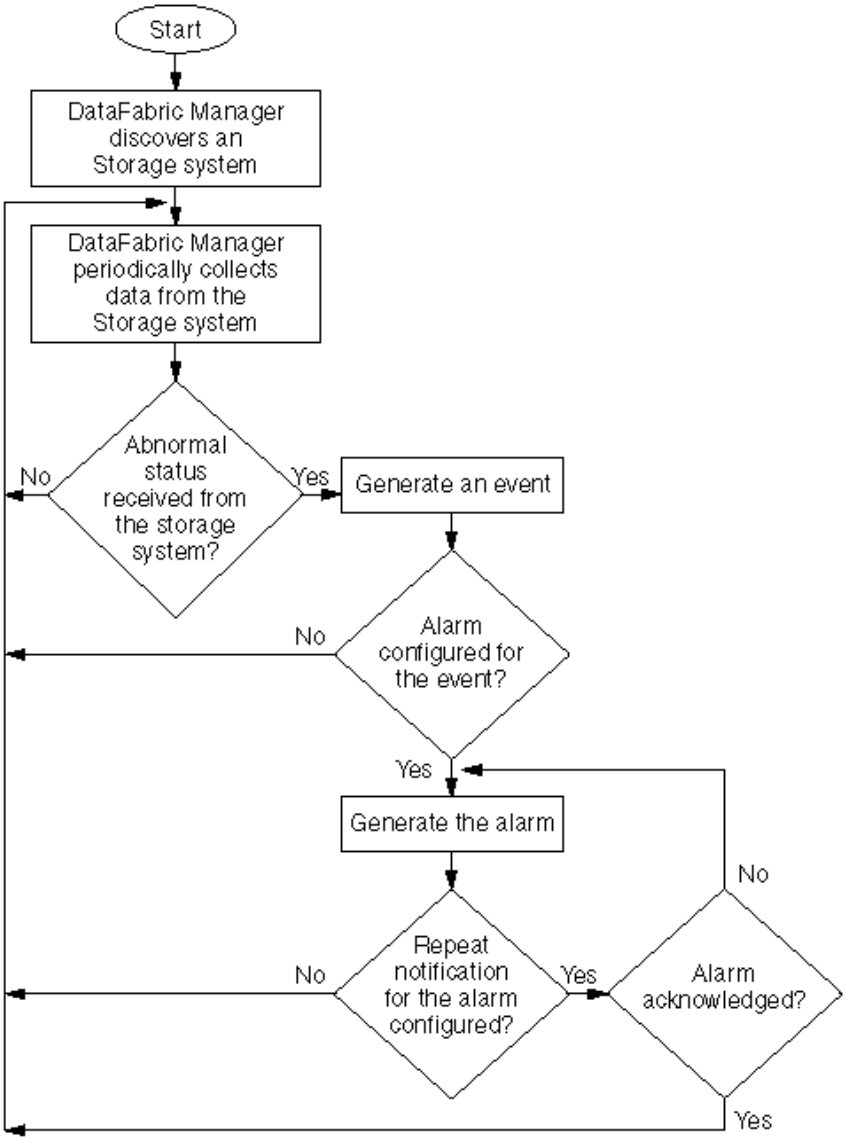
Data export in DataFabric Manager on page 120

What monitoring is

Monitoring involves several processes. First, DataFabric Manager discovers the storage systems supported on your network. DataFabric Manager periodically monitors data that it collects from the discovered storage systems, such as CPU usage, interface statistics, free disk space, qtree usage, and chassis environmental. DataFabric Manager generates events when it discovers a storage system, when the status is abnormal, or when a predefined threshold is breached. If configured to do so, DataFabric Manager sends a notification to a recipient when an event triggers an alarm.

The following flow chart illustrates the DataFabric Manager monitoring process.



Links to FilerView

In DataFabric Manager 2.3 and later, UI pages displaying information about some DataFabric Manager objects contain links, indicated by the icon to FilerView ( ), the Web-based UI for storage systems.

When you click the icon, you are connected to the FilerView location where you can view information about, and make changes to the object whose icon you clicked. Depending on your setup, you might need to authenticate the storage system whose FilerView you are connecting to, using one of the administrator user accounts on the storage system.

Query intervals

DataFabric Manager uses periodic SNMP queries to collect data from the storage systems it discovers. The data is reported by DataFabric Manager in the form of tabular and graphical reports and event generation.

The time interval at which an SNMP query is sent depends on the data being collected. For example, although DataFabric Manager pings each storage system every minute to ensure that the storage system is reachable, the amount of free space on the disks of a storage system is collected every 30 minutes.

Next topics

What global monitoring options are on page 89
Considerations before changing monitoring intervals on page 89

What global monitoring options are

The SNMP query time intervals are specified by the global monitoring option that is located in the **Monitoring Options** section of the **Options** page. Although you should generally keep the default values, you might need to change some of the options to suit your environment. All the monitoring option values apply to all storage systems in all groups.

Considerations before changing monitoring intervals

There are advantages and disadvantages to changing the monitoring intervals.

If you decrease the monitoring intervals, you receive more real-time data. However, DataFabric Manager queries the storage systems more frequently, thereby increasing the network traffic and the load on the server on which DataFabric Manager is installed and the storage systems responding to the queries. Similarly, if you increase the monitoring interval, the network traffic, and, the storage system load are reduced. However, data reported might not reflect the current status or condition of a storage system.

DataFabric Manager 3.1 and later includes an SNMP trap listener that speeds event generation.

Related concepts

What SNMP trap listener is on page 90

What SNMP trap listener is

In addition to periodically sending out SNMP queries, DataFabric Manager 3.1 and later include an SNMP trap listener as part of the server service. Event generation and alerting is faster than with SNMP queries because the proper monitoring mechanism is started immediately after the SNMP trap is received. In addition, monitoring is performed asynchronously, instead of waiting for the monitoring interval.

The SNMP trap listener listens for SNMP traps from monitored storage systems, if they have been manually configured to send traps to the DataFabric Manager server (over UDP port 162).

Note: The SNMP trap listener can receive SNMP traps only from storage systems that are supported on DataFabric Manager. Traps from other sources are dropped.

Next topics

What SNMP trap events are on page 90
How SNMP trap reports are viewed on page 91
When SNMP traps cannot be received on page 91
SNMP trap listener configuration requirements on page 91
How SNMP trap listener is stopped on page 92
Configuration of SNMP trap global options on page 92
Information about the DataFabric Manager MIB on page 92

What SNMP trap events are

When the SNMP trap listener receives an SNMP trap, DataFabric Manager issues an Information event, but does not change the status of the host.

Instead, the corresponding monitor associated with the trap generates the proper event and continues to monitor the host to report status changes. The name associated with the SNMP trap Information event indicates the severity of the trap: for example, Error Trap. The trap severities are deduced from the last digit of the trap ID, as specified in the custom MIB. The SNMP traps received by the SNMP trap listener are specified in the custom MIB. For a complete list of traps and associated trap IDs, see the *Data ONTAP Network Management Guide*.

The following list describes the SNMP trap Information event types:

- Emergency Trap Received
- Alert Trap Received
- Critical Trap Received
- Error Trap Received
- Warning Trap Received 106 SNMP traps
- Notification Trap Received
- Information Trap Received

If the severity of a trap is unknown, DataFabric Manager drops the trap.

Related concepts

Information about the DataFabric Manager MIB on page 92

Related information

Data ONTAP Network Management Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

How SNMP trap reports are viewed

You can use the Events tab to view reports about the SNMP traps that are received by DataFabric Manager.

The Events tab enables you to view a listing of all current SNMP traps or to sort them by severity. Each view provides information about each SNMP trap, for example, the name of the trap, the severity, and the condition that led to the error.

When SNMP traps cannot be received

DataFabric Manager cannot receive SNMP traps, if any of the following conditions exist:

- A system has not been configured to send traps to the DataFabric Manager.
- The host is not a supported storage system.
- DataFabric Manager version is before 3.1.

Additionally, DataFabric Manager cannot receive Debug traps.

SNMP trap listener configuration requirements

A set of configuration requirements must be met to enable reception of SNMP traps from managed storage systems.

On DataFabric Manager: No configuration is needed to start the SNMP trap listener on DataFabric Manager (the trap listener is automatically started after installation). The SNMP trap global options are also configured with default settings, although you might want to modify these settings.

On managed storage systems: You must manually add the DataFabric Manager server as a trap destination on all supported systems to be monitored. The traps must be sent to the DataFabric Manager server over UDP port 162.

Note: If another trap listener is listening on port 162, the startup of the built-in trap listener fails with an error and the Warning event is displayed in the **Events** page.

How SNMP trap listener is stopped

The SNMP trap listener is enabled by default. If you want to start or stop the SNMP trap listener, use the `snmpTrapListenerEnabled` CLI option.

Configuration of SNMP trap global options

You can configure the `SNMP trap global` options by accessing the `SNMP Trap Listener` options and the `Event and Alert` options on the **Options** page.

Configuration of the SNMP trap global options is not necessary at start-up. However, you might want to modify the global default settings.

The following global default settings can be modified:

- Enable SNMP trap listener
  Use this option to enable or disable the SNMP trap listener.
- SNMP Trap Listener Port
  Use this option to specify the UDP port on which the SNMP Manager Trap Listener receives traps. Supported storage systems can send SNMP traps only over UDP port 162.
- SNMP Maximum Traps Received per window and SNMP Trap Window Size
  Use these two options to limit the number of SNMP traps that can be received by the trap listener within a specified period.

Information about the DataFabric Manager MIB

The SNMP traps generated for the DataFabric Manager events are specified in the DataFabric Manager MIB.

The MIB at the following locations provides a complete list of DataFabric Manager SNMP traps and associated trap IDs:

- For Windows: `installation_directory\dfm\misc`
- For UNIX: `installation_directory/misc`

DataFabric Manager can send only the traps that are available in the MIB.

Note: DataFabric Manager can send information to an SNMP trap host only when an alarm for which the trap host is specified is generated. DataFabric Manager cannot serve as an SNMP agent; that is, you cannot query DataFabric Manager for information from an SNMP traphost.

Descriptions of events and their severity types

Events are generated automatically when a predefined condition occurs or when an object crosses a threshold. *Event messages* inform you when specific events occur. All events are assigned a severity type and are automatically logged on the **Events** window.

You can configure alarms to send notification automatically when specific events or severity types occur. If an application is not configured to trigger an alarm when an event is generated, you can find out about the event by checking the **Events** window. It is important that you take immediate corrective action for events with severity level Error or higher. Ignoring such events can lead to poor performance and system unavailability.

Note: Event types are predetermined. Although you cannot add or delete event types, you can manage notification of events.

Each event is associated with a severity type to help you determine priorities for taking corrective action, as follows.

Note: Performance Advisor uses only the Normal and Error events.

Severity type	Description
Normal or worse	A previous abnormal condition for the event source returned to a normal state and the event source is operating within the desired thresholds. To view events with this severity type, you select the All option.
Information or worse	The event is a normal occurrence—no action is required.
Warning or worse	The event source experienced an occurrence that you should be aware of. Events of this severity do not cause service disruption and corrective action might not be required.
Error or worse	The event source is still performing; however, corrective action is required to avoid service disruption.
Critical or worse	A problem occurred that might lead to service disruption if corrective action is not taken immediately.
Emergency	The event source unexpectedly stopped performing and experienced unrecoverable data loss. You must take corrective action immediately to avoid extended downtime.
Unknown	The event source is in an unknown state. To view events with this severity type, you select the All option.

Next topics

Viewing events on page 94
Managing events on page 94
Operations on local configuration change events on page 94

Viewing events

You can view a list of all events that occurred and view detailed information about any event.

Step

1. View the events logged by Operations Manager in any of the following ways:
   - Click the **Events: Emergency, Critical, Error, Warning** link located at the top of the Operations Manager main window.
   - From the **Control Center** tab, click the **Events** tab located in the Group Summary page.
   - Select the Details pages for storage systems, SAN hosts, FC switches, HBA ports, and FCP targets. The Details pages provide lists of events related to the specific component.
   - From the **Backup Manager** tab or the **Disaster Recovery Manager** tab, click the **Events** tab.

   Note: User quota threshold events can be viewed only with the User Quota Events report available through the Report drop-down list on the Events tab.

Managing events

If DataFabric Manager is not configured to trigger an alarm when an event is generated, you cannot find out about the event. However, to identify the event, you can check the events log on the server on which DataFabric Manager is installed.

Steps

1. From an **Events** view, select the check box for the event that you want to acknowledge. You can select multiple events.
2. Click **Acknowledge Selected** to acknowledge the event that caused the alarm.
3. Find out the cause of the event and take corrective action.
4. Delete the event.

Operations on local configuration change events

After receiving the event, you have the choice of acknowledging, fixing, or deleting the event.

If you click Fix, a new window that shows the differences between the local configuration and the group settings is displayed.

From this window, you can accept, or, reject the local configuration changes made on the storage system. If you reject the configuration changes, DataFabric Manager undoes all the local changes. If you accept the configuration changes, the configuration settings listed are not modified during subsequent configuration pushes.

Alarm configurations

DataFabric Manager uses alarms to tell you when events occur. DataFabric Manager sends the alarm notification to one or more specified recipients: an e-mail address, a pager number, an SNMP traphost, or a script that you write.

You are responsible for which events cause alarms, whether the alarm repeats until it is acknowledged, and how many recipients an alarm has. Not all events are severe enough to require alarms, and not all alarms are important enough to require acknowledgment. Nevertheless, you should configure DataFabric Manager to repeat notification until an event is acknowledged, to avoid multiple responses to the same event.

DataFabric Manager does not automatically send alarms for the events. You must configure alarms for the events, you specify.

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Creating alarms on page 95
Testing alarms on page 96
Comments in alarm notifications on page 97
Example of alarm notification in e-mail format on page 97
Example of alarm notification in script format on page 97
Example of alarm notification in trap format on page 98
Response to alarms on page 98
Deleting alarms on page 98

Configuration guidelines

When configuring alarms you must follow a set of guidelines.

- Alarms must be created by group, either an individual group, or the Global group. If you want to set an alarm for a specific object, you must first create a group with that object as the only member. Then, create an alarm for the newly created group.
- Alarms you create for a specific event are triggered when that event occurs.
- Alarms you create for a type of event are triggered when any event of that severity level occurs.
- Alarms can be for events of severity Information or higher.

Related concepts

Descriptions of events and their severity types on page 93

Creating alarms

You can create alarms from the **Alarms** page in Operations Manager.

Steps

1. Click **Control Center ➤ Setup ➤ Alarms**.
2. From the **Alarms** page, select the group that you want Operations Manager to monitor.

   You might need to expand the list to display the one you want to select.

3. Specify what triggers the alarm: an event or the severity of event.
4. Specify the recipient of the alarm notification.

   Note: If you want to specify more than one recipient or configure repeat notification, continue to Step 5.

5. Click **Add** to set the alarm. If you want to configure additional options, continue with Step 5.
6. Click **Advanced Version**.
7. Optionally, if you want to specify a class of events that should trigger this alarm, specify the event class.

   You can use normal expressions.

8. Optionally, specify the recipients of the alarm notification.

   Formats include administrator names, e-mail addresses, pager addresses, or an IP address of the system to receive SNMP traps (or port number to send the SNMP trap to).

9. Optionally, specify the period that Operations Manager sends alarm notifications.
10. Optionally, select **Yes** to resend the alarm notification until the event is acknowledged or No to notify the recipients only once.
11. Optionally, set the interval (in minutes) that Operations Manager waits before it tries to resend a notification.
12. Activate the alarm by selecting **No** in the Disable field.
13. Click **Add**.

Testing alarms

You can test the alarms from the **Alarms** page in Operations Manager.

Steps

1. From the **Alarms** page, click **Test** (to the right of the alarm you want to test).
2. Click **Test**.

DataFabric Manager generates an alarm and sends a notification to the recipient.

Comments in alarm notifications

By using DataFabric Manager, you can add details to alarm notifications, such as asset number, department code, location name, and support contact.

When you define a custom comment field, DataFabric Manager sends this information in the alarm notification to help you respond to the alarm.

Custom alarm notifications are sent by e-mail message or SNMP traps; you can also access them by executing scripts. Custom alarm notifications cannot be sent to pagers.

Example of alarm notification in e-mail format

Custom alarm notifications are sent by e-mail message or SNMP traps.

This example shows custom comments entered for comment fields Asset Number, Department Code, Location Name, and Support Contact.

```
From:
DataFabric.Manager.on.testserver@netapp.com[mailto:DataFabric.Mana
ger.on.testserver@netapp.com]
Sent: Wednesday, July 20, 2005 11:51 AM
To: root
Subject: dfm: Normal event on administrator-lxp (Host Up)
A Normal event at 20 Jul 11:51 IST on Host hiyer-lxp:
The Host is up.
*** Event details follow.***
Comment Fields:
---------------
Asset Number: Ashes00112
Department code: CS
Location Name: Lords
Support Contact: Glenn McGrath
```

Example of alarm notification in script format

A new environment variable, DFM_FIELD_, is added for each defined comment field. Characters other than [a-z][A-Z][0-9] are replaced with "_" (underscore).

This same example as the e-mail format in script format is shown here

```
DFM_FIELD_Asset_Number="Ashes00112"
DFM_FIELD_Department_Code="CS"
DFM_FIELD_Location_Name="Lords"
DFM_FIELD_Support_Contact="Glenn McGrath"
```

Example of alarm notification in trap format

A new SNMP variable is added to all existing traps. The value of this variable is a string, which contains the name and values of all the defined comment fields. If this string is not empty, it is appended to the trap.

The format of this string is as follows:

```
'name1=value','name2=value',...'name(n)=value(n)'

'Asset Number=Ashes00112','Department Code=CS','Location
Name=Lords','Support Contact=Glenn McGrath'
```

Response to alarms

When you receive an alarm, you should acknowledge the event and resolve the condition that triggered the alarm.

In addition, if the repeat notification feature is enabled and the alarm condition persists, you continue to receive notifications.

Deleting alarms

You can delete alarms from the **Alarms** page in Operations Manager.

Steps

1. From the **Alarms** page, select the alarm for deletion.
2. Click **Delete Selected**.

Working with user alerts

The DataFabric Manager server can send an alert to you whenever it detects a condition or problem, in your systems that requires attention. You can configure the mail server so that the DataFabric Manager can send alerts to specified recipients when an event occurs.

Next topics

What user alerts are on page 99
Differences between alarms and user alerts on page 99
User alerts configurations on page 100
E-mail addresses for alerts on page 100

Domains in user quota alerts on page 101
What the mailmap file is on page 101
Guidelines for editing the mailmap file on page 102
How the contents of the user alert are viewed on page 102
How the contents of the e-mail alert are changed on page 102
What the mailformat file is on page 102
Guidelines for editing the mailformat file on page 103

What user alerts are

By default, DataFabric Manager sends out user alerts (e-mail messages) to all users who exceed their quota limits.

Whenever a user event related to disk or file quotas occurs, DataFabric Manager sends an alert to the user who caused the event. The alert is in the form of an e-mail message that includes information about the file system (volume or qtree) on which the user exceeded the threshold for a quota.

You can disable the alerts for all users or for the users who have quotas.

Differences between alarms and user alerts

DataFabric Manager uses alarms to tell you when events occur. By default, DataFabric Manager sends out user alerts (e-mail messages) to all users who exceed their quota limits.

Alarms	**User alerts**
Alarms have to be configured for events before DataFabric Manager can send out notification to the specified recipients.	DataFabric Manager generates user alerts by default.
Alarms can be sent to one or more of the following recipients: • An e-mail address • A pager address • An SNMP traphost • A script that you write	User alerts can be sent to the user who exceeds the user quota thresholds. User alerts can be only in the form of an e-mail message.
Alarms can be sent to only users listed as administrators on the **Administrators** page of Operations Manager.	User alerts are sent to any user with user quota information in the DataFabric Manager database.

Alarms	User alerts
Alarms can be configured for any events with severity of Information or higher.	User alerts can be sent only when the following user quota events occur: • User Disk Space Quota Almost Full • User Disk Space Quota Full • User Files Quota Almost Full • User Files Quota Full

User alerts configurations

To receive user alerts, you must enable the `User Quota Alerts` option, configure e-mail addresses, and the e-mail domain. Optionally, you can configure the `mailmap` file.

If you want to enable or disable alerts to all users in the DataFabric Manager database, use the `Enable User Quota Alerts` option in the Users section on the **Options** page.

You can enable, or disable alerts to only the users who have quotas configured on a specific file system, or a group of file systems. Use the `Enable User Quota Alerts` option on the **Edit Volume Settings** or **Edit Qtree Settings** page of that volume or qtree.

E-mail addresses for alerts

The e-mail address that DataFabric Manager uses to send alerts depends on DataFabric Manager configuration.

The following list specifies the checks DataFabric Manager makes before selecting an e-mail address for the user:

- There are three ways to specify an e-mail address:
  - Use the **Edit User Settings** page (**Quotas or File SRM ➤ user name ➤ Edit Settings**)
  - Use the `dfm quota user` command

    Note: For more information about the `dfm quota user` command, see the DataFabric Manager man pages.

  - Use the `mailmap` file

  If you need to specify e-mail addresses of many users, by using the **Edit User Settings** page for each user might not be convenient. Therefore, DataFabric Manager provides a `mailmap` file that enables you to specify many e-mail addresses in one operation.
- When you do not specify the e-mail address, the default e-mail domain is configured and appended to the user name, by DataFabric Manager. The resulting e-mail address is used to send the alert.

  Note: DataFabric Manager uses only the part of the user name that is unique to the user. For example, if the user name is company/joe, Operations Manager uses joe as the user name.

- If a default e-mail domain is not configured, again Operations Manager uses the part of the user name that is unique to the user (without the domain information).

  Note: If your SMTP server processes only e-mail addresses that contain the domain information, you must configure the domain in DataFabric Manager to ensure that e-mail messages are delivered to their intended recipients.

Domains in user quota alerts

You can use the `Default Email Domain for Quota Alerts` option, to specify the domain that Operations Manager appends to the user name when sending out a user quota alert.

The `Quota Alerts` option is in the **User Options** section on the **Options** page (**Setup menu ➤ Options**).

If you specify a value for this option, it applies to all users except the ones who are listed with the e-mail domain information in the `mailmap` file.

What the mailmap file is

The `mailmap` file is a simple text file that contains a mapping between the user names and the e-mail addresses of these users.

The file is imported into the DataFabric Manager database by using the `dfm mailmap import` command. Once the file has been imported, the information in the database is used to find the e-mail addresses of the users.

For more information about the `dfm mailmap import` command, see the DataFabric Manager man pages.

Example of mailmap file

```
# Start mail map
USER windows_domain\joe joe@company.com
USER jane@nis1.company.com jane@company.com
USER chris@nisdomain1 chris
# End mail map
```

USER	A case-sensitive keyword that must appear at the beginning of each entry
user_name	The Windows or UNIX user name. If the name contains spaces, enclose the name in either double or single quotes.
e-mail address	E-mail address to which the quota alert is sent when the user crosses a user quota threshold

Guidelines for editing the mailmap file

You should follow a set of guidelines for editing the `mailmap` file.

- When specifying a user name for a UNIX user, you must specify the full NIS domain after the user name. For example, for UNIX user joe in NIS domain nisdomain1, specify joe@nisdomain1 as the user name.
- The specified NIS domain must match the one configured on the storage system. If no domain information is configured on the storage system, you must also leave the domain in the `mailmap` file empty.
- Use one or more spaces or tabs to separate the fields in the file.
- Use the "#" character in the beginning of a line that is a comment.
- If blank lines exist in the file, they are ignored.

How the contents of the user alert are viewed

You can obtain the content of the current e-mail alert that DataFabric Manager sends by entering the following command at DataFabric Manager console: `dfm quota mailformat export { path | - }`. Path is the location of the file containing e-mail alerts.

How the contents of the e-mail alert are changed

You can change the contents of the current e-mail alert by modifying the existing e-mail alert. The e-mail alert that you modify must conform to the format described in

After you have changed the contents of the e-mail alert, you can import the modified file in to the DataFabric Manager database by using the `dfm quota mailformat import` command.

For more information about the `dfm quota mailformat` command, see the DataFabric Manager man pages.

What the mailformat file is

The `mailformat` file is a simple text file that enables you to customize the contents of the e-mail alert that is sent to the users.

This file must contain entries in the following format:

```
mail-headers
<empty line>
body
```

mail-headers	The SMTP headers to be sent in the DATA section of the SMTP message
body	Body of the e-mail

Any words that begin with *DFM_* are treated as DataFabric Manager variables and are replaced by their values. The following table lists the valid variables.

Variable	Variable is replaced with...
DFM_EVENT_NAME	Name of the event
DFM_QUOTA_FILE_SYSTEM_NAME	Name of the file system (volume or qtree) that caused the quota event
DFM_QUOTA_FILE_SYSTEM_TYPE	Type of file system (volume or qtree)
DFM_QUOTA_PERCENT_USED	Percentage of quota used
DFM_QUOTA_USED	Amount of disk space or number of files used
DFM_QUOTA_LIMIT	Total disk space or files quota
DFM_QUOTA_TYPE	Type of quota (disk space or files), depending on whether the disk space or files quota threshold was exceeded
DFM_LINK_EVENT	Hyperlink to the event
DFM_QUOTA_USER_NAME	Name of the user exceeding the quota threshold

Example of the mailformat file

```
From: IT Administrator
Subject: URGENT: Your DFM_QUOTA_TYPE quota on
DFM_QUOTA_FILE_SYSTEM_NAME
You (as user "DFM_QUOTA_USER_NAME") have used up
DFM_QUOTA_PERCENT_USED (DFM_QUOTA_USED out of DFM_QUOTA_LIMIT) of
available DFM_QUOTA_TYPE quota on DFM_QUOTA_FILE_SYSTEM_NAME.
Please delete files that you no longer need.
Event (For IT Use only): DFM_LINK_EVENT
-- IT Administrator
```

Guidelines for editing the mailformat file

You should follow a set of guidelines for editing the `mailformat` file.

- Ensure that the `mailformat` file conforms to SMTP protocol.
- Specify an empty line between the header and the body of the e-mail message.
- Use any of the headers recognized by the SMTP servers, such as “content type: text/html” to send an e-mail message with HTML formatted body

Introduction to DataFabric Manager reports

DataFabric Manager provides standard reports that you can view from the CLI or Operations Manager.

You can run reports and create custom reports from the CLI. However, DataFabric Manager provides reports in easy-to-use Operations Manager interface, in which you can do the following:

- View a report.
- Save a report in Excel format.
- Print a report.
- Create a report.
- Delete a custom report. You cannot delete a standard report.
- Use a custom report as a template to create another custom report.

By using DataFabric Manager 3.6 or later, you can search all the reports from **Reports menu ➤ All**. All the reports are divided under the following categories:

- Recently Viewed
- Favorites
- Custom Reports
- Logical Objects
- Physical Objects
- Monitoring
- Performance
- Backup
- Disaster Recovery
- Data Protection Transfer
- Miscellaneous

For more information about these categories, see *Operations Manager Help*.

Note: The report category Performance contains the performance characteristics of objects. However, you can view the complete reports under their respective report categories.

Next topics

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Introduction to report catalogs on page 105
Different reports in Operations Manager on page 105
What performance reports are on page 109
Configuring custom reports on page 109
Deleting custom reports on page 110
Putting data into spreadsheet format on page 111
What scheduling report generation is on page 111
Methods to schedule a report on page 113
What Schedules reports are on page 116

What Saved reports are on page 117

Introduction to report options

DataFabric Manager provides standard reports that you can view from the CLI or Operations Manager.

The `dfm report` command specifies the report catalog object that you can modify to create the custom report. The custom report object has the following attributes that you can set:

- A short name (for CLI output)
- A long name (for GUI output)
- Field description
- The fields to display
- The report catalog it was created from

The custom report also has methods that let you create, delete, and view your custom reports. You can configure the report options in Operations Manager with respect to Name, Display tab, Catalogs, and Fields.

Introduction to report catalogs

DataFabric Manager provides report catalogs that you use to customize reports. You can set basic report properties from the CLI or Operations Manager.

Following are the basic report properties:

- A short report name (for CLI output)
- Long report name (for Operations Manager output)
- Field description
- The fields to display
- The report catalog it was created from

Every report that is generated by DataFabric Manager, including those you customize, is based on the catalogs.

For more information about how to use the CLI to configure and run reports, use the `dfm report help` command. The command specifically describes how to list a report catalog and its fields and command organization and syntax.

Different reports in Operations Manager

There are different kinds of reports in Operations Manager.

Aggregates The aggregate report shows you space utilization, capacity, performance characteristics, and availability by the volumes on your aggregates. By default,

	you can view aggregate reports from **Control Center ➤ Home ➤ Member Details ➤ Aggregates ➤ Report**.
Appliances	The appliances report shows you information about your storage systems, such as storage space used, storage space available, and the chargeback reports. By default, you can view the appliances reports from **Control Center ➤ Home ➤ Member Details ➤ Appliances ➤ Report**.
Array LUNs	The array LUNs report shows you information about the LUN residing on the third-party storage arrays that are attached to a V-series system. Information such as model, vendor, serial number of the LUN, and size is available in these reports. By default, you can view array LUNs reports from **Control Center ➤ Home ➤ Member Details ➤ Appliances ➤ Report**.
Aggregate Array LUNs	The aggregate array LUNs report shows you information about array LUNs contained on the aggregates of a V-series system. Information such as model, vendor, serial number of the LUN, and size is available in these reports. By default, you can view aggregate array LUNs reports from **Control Center ➤ Home ➤ Member Details ➤ Aggregates ➤ Report**.
Backup	The backup report shows you information about the data transfer during a backup.
Datasets	The datasets report shows you information about the resource, protection, and the conformance status of the dataset. This report also displays information about the policy with which the dataset is associated.
Dataset	The dataset report shows you information about the data transfer from individual mirror and backup relationships within a dataset.
Disks	The disks report shows you information about the disks in your storage systems, such as model, vendor, and size. You can view the performance characteristics and sort these reports by broken or spare disks, as well as by size. By default, you can view disks reports along with the appliance reports in the Member Details tab.
Events	The events report shows you information about event severity, user quotas, and SNMP traps. The information about all events, including deleted, unacknowledged, and acknowledged events, in the DataFabric Manager database are available in these reports. By default, you can view event reports in the Group Status tab.
FC Link	The FC link report shows you information about the logical and physical links of your FC switches and fabric interfaces. By default, you can view FC link reports along with the SAN reports in the Member Details tab.
FC Switch	The FC switch report shows you FC switches that have been deleted, have user comments associated with them, or are not operating. By default, you can view FC switch reports along with the SAN reports in the Member Details tab.
FCP Target	The FCP target report shows you information about the status, port state, and topology of the target. The FCP target also reports the name of the FC switch, the port to which the target connects and the HBA ports that the target can access. By

	default, you can view FCP target reports in the **Control Center ➤ Home ➤ Member Details ➤ LUNs tab**.
File System	The file system report shows you information about all file systems, and you can filter them into reports by volumes, Snapshot copies, space reservations, qtrees, and chargeback information. By default, you can view file system reports in the **Control Center ➤ Home ➤ Member Details ➤ File systems tab**.
Group Summary	The group summary report shows the status, storage space used, and storage space available for your groups. The FCP target report includes storage chargeback reports that are grouped by usage and allocation. By default, you can view group reports in the Group Status tab.
Host Users	The host users report shows you information about the existing users on the host. By default, you can view host users reports from **Management ➤ Host Users ➤ Report** .
Host Local Users	The host local users report shows you information about the existing local users on the host. By default, you can view the host local users reports from **Management ➤ Host Local Users ➤ Report** .
Host Domain Users	The host domain users report shows you information about the existing domain users on the host. By default, you can view the host domain users reports from **Management ➤ Host Domain Users ➤ Report** .
Host Usergroups	The host usergroups report shows you information about the existing user groups on the host. By default, you can view the host usergroups reports from **Management ➤ Host Usergroups ➤ Report** .
Host Roles	The host roles report shows you information about the existing roles on the host. By default, you can view the host roles reports from **Management ➤ Host Roles ➤ Report**.
LUN	The LUN report shows you information and statistics about the LUNs and LUN initiator groups on the storage systems, along with performance characteristics. By default, you can view LUN reports in the Member Details tab.
History Performance Report	The History, Performance Events report displays all the Performance Advisor events. By default, you can view the History, Performance Events reports from **Group Status ➤ Events ➤ Report**.
Mirror	The Mirror report displays information about data transfer in a mirrored relationship.
Performance Events	The Performance Events report displays all the current Performance Advisor events. By default, you can view the Performance Events reports from **Control Center ➤ Home ➤ Group Status ➤ Events ➤ Report**.
Quotas	The quota report shows you information about user quotas that you can use for chargeback reports. By default, you can view quota reports along with the group summary reports in the Group Status tab.

Report Outputs	The Report Outputs report shows you information about the report outputs that are generated by the report schedules. By default, you can view Report Outputs reports in the **Reports ➤ Schedule ➤ Saved Reports**.
Report Schedules	The Report Schedules report shows you information about the existing report schedules. By default, you can view Report Schedules reports in the **Reports ➤ Schedule ➤ Report Schedules**. A report schedule is an association between a schedule and a report for the report generation to happen at that particular time.
Resource Pools	The Resource Pools report shows you information about the storage capacity that is available and the capacity that is used by all the aggregates in the resource pool. This report also displays the time zone and the status of the resource pool.
SAN Host	The SAN host report shows you information about SAN hosts, including FCP traffic and LUN information, and the type and status of the SAN host. By default, you can view SAN host reports in the Member Details tab.
Schedules	The Schedules report shows you information about the existing schedules and the names of the report schedules that are using a particular schedule. By default, you can view Schedules reports in the **Reports ➤ Schedule ➤ Schedules** . The Schedules tab displays all the schedules. Schedules are separate entities which can be associated with reports. The Manage Schedules link in the Reports-Add a Schedule and Reports-**Edit a Schedule** page points to this page.
Scripts	The Scripts report shows you information about the script jobs and script schedules. By default, you can view the Scripts reports in the Member Details tab.
Spare Array LUNs	The Spare Array LUNs report shows you information about spare array LUNs of a V-series system, such as model, vendor, serial number of the LUN, and size. By default, you can view the Spare Array LUNs reports from **Control Center ➤ Home ➤ Member Details ➤ Appliances ➤ Report**.
SRM	The SRM report shows you information about the SRM files, paths, directories, and host agents. The file space statistics which is reported by an SRM path walk differ from the "volume space used" statistics that is provided by the file system reports. By default, you can view SRM reports in the Group Status tab.
Storage systems	The storage systems report shows you information about the capacity and operations of your storage systems, performance characteristics, and the releases and protocols running on them. By default, you can view storage system reports in the **Control Center ➤ Home ➤ Member Details ➤ Appliances tab**.
User Quotas	The User Quotas report shows you information about the disk space usage and user quota thresholds collected from the monitored storage systems. By default, you can view User Quotas reports along with the SRM reports in the Group Status tab.

vFiler The vFiler report shows you the status, available protocols, storage usage, and performance characteristics of vFiler units that you are monitoring with DataFabric Manager. By default, you can view the vFiler reports in the Member Details tab.

Volume The Volume report shows you all volumes with the following details, for the current month or for the past month:

- Name
- Capacity
- Available space
- Snapshot capacity
- Growth rates
- Expendability
- Chargeback by usage or allocation

The reports also show the performance characteristics of volumes. By default, you can view the volume reports along with the file system reports in the Member Details tab.

Note: The FC link and FC switch reports are available only when the SAN license for DataFabric Manager is installed. NetApp has announced the end of availability for the SAN license. To facilitate this transition, existing customers can continue to license the SAN option with DataFabric Manager.

What performance reports are

Performance reports in Operations Manager provide information regarding object's performance characteristics.

The following points describe the important features of performance reports:

- You can view the object's performance characteristics for the periods last, one day, one week, one month, three months, and one year.
- You can also view the performance counters related to various fields in catalogs.
- Data consolidation is available only if you select the option Performance. Data Consolidation is a statistical technique that helps you to analyze data. You can view the average, minimum, maximum, or median value for the performance metrics over a period; however, this field is set to Average by default.

Related concepts

Report fields and performance counters on page 313

Configuring custom reports

You can configure custom reports in Operations Manager.

Steps

1. Select **Custom** from the Reports menu.
2. Enter a (short) name for the report, as you want it to display in the CLI.
3. Optionally, enter a (long) name for the report, as you want it to display in Operations Manager.
4. Optionally, add comments to the report description.
5. Select the catalog from which the available report fields are based.
6. Select where you want DataFabric Manager to display this report in Operations Manager.
7. Select the related catalog from which you want to choose fields.

   You might need to expand the list to display the catalog you want to select.

8. You can view two types of information fields in the “Choose From Available Fields” section:
   - To view fields related to the usage and configuration metrics of the object, click **Usage**.
   - To view fields related to performance metrics of the object, click **Performance**.
9. Select a field from "Choose From Available Fields."
10. Optionally, enter the name for the field, as you want it displayed on the report.

    Make your field name abbreviated and as clear as possible. You must be able to view a field name in the reports and determine which field the information relates to.

11. Optionally, specify the format of the field.

    If you choose not to format the field, the default format displayed is used.

12. Click **Add** to move the field to the Reported Fields list.
13. Repeat Steps 8 to 12 for each field you want to include in the report.
14. Optionally, click **Move Up** or **Move Down** to reorder the fields.
15. If you clicked Performance, select the required data consolidation method from the list.
16. Click **Create**.
17. To view this report, locate this report in the list at the lower part of the page and click the **display** tab name. Find the report from the Report drop-down list.

Deleting custom reports

You can delete a custom report you no longer need, in Operations Manager.

Steps

1. Select **Custom** from the Reports menu.
2. Find the report from the list of configured reports and select the report you want to delete.
3. Click **Delete**.

Putting data into spreadsheet format

You can put data from any of the about LUNs, SAN hosts, and FCP targets reports into spreadsheet format.

Before You Begin

Reports about LUNs, SAN hosts, and FCP targets must be available on the **LUNs** page of Member Details tab.

Steps

1. Click **Member Details** on the **LUNs** page to view the reports.
2. You can view the data in report in a spreadsheet format, by clicking on the spreadsheet icon () on the right side of the Report drop-down list.

You can use the data in the spreadsheet to create your own charts and graphs or to analyze the data statistically.

What scheduling report generation is

Operations Manager allows you to schedule the generation of reports.

The report can include the following statistics:

- Volume capacity used
- CPU usage
- Storage system capacity
- Storage system up time

Next topics

What Report Archival Directory is on page 112
Additional capabilities for categories of reports on page 112
What Report Schedules reports are on page 112
Scheduling a report using the All submenu on page 112
Scheduling a report using the Schedule submenu on page 113

What Report Archival Directory is

Report Archival Directory is a repository where all the reports are archived.

You can modify the location of the destination directory by using the following CLI command: `dfm options set reportsArchiveDir=<destination dir>`

When you modify the Report Archival Directory location, DataFabric Manager checks whether the directory is writable to archive the reports.

In the case of a Windows operating system, if the directory exists on the network, then the destination directory must be a UNC path. Besides, to save the reports, the scheduler service must run with an account that has write permissions on the directory. The server service must run with an account that has read and delete permissions on the directory to view and delete report output, respectively. The permissions for a service can be configured using Windows Service Configuration Manager.

Note: You require the Database Write capability on the Global group to modify the Report Archival Directory option.

Additional capabilities for categories of reports

You require report-specific read capability on the object in addition to the Database Read capability, for categories of reports such as SRM Reports, Event Reports, and so on.

The capabilities that you require for the categories of reports are as follows:

Report category	Capabilities
SRM Reports	SRM Read capability
Event Reports	Event Read capability
Mirror Reports	Mirror Read capability
Policy Reports	Policy Read capability
BackupManager Reports	BackupManager Read capability

What Report Schedules reports are

The Report Schedules report shows you information about the existing report schedules. A report schedule is an association between a report and a schedule for the report to be generated at a particular time.

By default, Report Schedules reports display in **Reports ➤ Schedule ➤ Report Schedules**.

Scheduling a report using the All submenu

You can schedule a report using the All submenu from the Reports menu in Operations Manager.

Steps

1. From any page, click **Reports** ➤ **All** to display the **Report Categories** page.

   By default, the Recently Viewed category appears.

2. Select a report of your choice.
3. Click **Show** to display the selected report.
4. Click the **Schedule This Report** icon, , located in the upper right corner of the page.
5. In the **Reports - Add a Schedule** page, specify the report schedule parameters.

   For details about the report schedule parameters, see the *Operations Manager Help*.

6. Click **Add**.

Scheduling a report using the Schedule submenu

You can schedule a report using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports** > **Schedule** to display all the report schedules.
2. Click **Add New Report Schedule**.
3. In the **Reports - Add a Schedule** page, specify the report schedule parameters.

   For details about the report schedule parameters, see the *Operations Manager Help*.

4. Click **Add**.

Methods to schedule a report

You can schedule a report in two possible methods from the Reports menu.

Following are the two methods with which you can schedule a report:

- Using the Schedule submenu from the Reports menu
- Using the All submenu from the Reports menu

Next topics

Editing a report schedule on page 114
Deleting a report schedule on page 114
Enabling a report schedule on page 114
Disabling a report schedule on page 115

Running a report schedule on page 115
Retrieving the list of enabled report schedules on page 115
Retrieving the list of disabled report schedules on page 115
Listing all the run results of a report schedule on page 116

Editing a report schedule

You can edit a report schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Click the report schedule that you want to edit.

   Alternatively, click **Saved Reports** to list all the report outputs, and then click **Report Schedules** entry, that you want to edit.
3. In the Reports - Edit a Schedule page, edit the report schedule parameters.
4. Click **Update**.

Deleting a report schedule

You can delete a report schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Select the report schedule that you want to delete.
3. Click **Delete Selected**.

Enabling a report schedule

You can enable a report schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Select the report schedule that you want to enable.
3. Click **Enable Selected**.

Disabling a report schedule

You can disable a report schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Select the report schedule that you want to disable.
3. Click **Disable Selected**.

Running a report schedule

You can run a report schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Select the report schedule that you want to run.
3. Click **Run Selected**.

Retrieving the list of enabled report schedules

You can retrieve the list of enabled report schedules using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Select the Report Schedules, Enabled entry from the Report drop-down list.

Retrieving the list of disabled report schedules

You can retrieve the list of disabled report schedules using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Select the Report Schedules, Disabled entry from the Report drop-down list.

Listing all the run results of a report schedule

You can list all the run results of a report schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Click **Last Result Value** of a report schedule to display the run result for that particular report schedule.

What Schedules reports are

The Schedules report shows you information about the existing schedules and the names of the report schedules that are using a particular schedule.

By default, Schedules reports display in **Reports > Schedule > Schedules**. The Schedules tab displays all the schedules.

Schedules are separate entities that can be associated with reports.

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Editing a schedule on page 117
Deleting a schedule on page 117

Listing all the schedules

You can list all the schedules using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Click **Schedules**.

Adding a New Schedule

You can add a new schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Click the Schedules tab.

3. Click **Add New Schedule**.
4. In the Schedules - Add a Schedule page, specify the schedule parameters.

   For details about the schedule parameters, see the *Operations Manager Help*.

5. Click **Add**.

Editing a schedule

You can edit a schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Click **Schedules**.
3. Click the schedule you want to edit.
4. In the Schedules - Edit a Schedule page, edit the schedule parameters.
5. Click **Update**.

Deleting a schedule

You can delete a schedule using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports > Schedule** to display all the report schedules.
2. Click **Schedules**.
3. Select the schedule that you want to delete.

   Note: If the schedule is used by a report schedule, then the schedule cannot be selected for deletion.

4. Click **Delete Selected**.

What Saved reports are

The Saved reports display information about report outputs such as Status, Run Time, and the corresponding report schedule, which generated the report output.

By default, Saved reports display in **Reports > Schedule > Saved Reports**. The Saved Reports tab displays the list of all the report outputs that are generated by the report schedules.

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Listing the successful report outputs on page 118
Listing the failed report outputs on page 118
Viewing the output of report outputs from the status column on page 119
Viewing the output of report outputs from the Output ID column on page 119
Viewing the output details of a particular report output on page 119

Listing the report outputs

You can list the report outputs that are generated by all the report schedules using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports** > **Schedule** to display all the report schedules.
2. Click **Saved Reports** to display the list of report outputs.

Listing the successful report outputs

You can list the successful report outputs generated by all the report schedules using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports** > **Schedule** to display all the report schedules.
2. Click **Saved Reports**.
3. Select the Report Outputs, Successful entry from the Report drop-down list.

Listing the failed report outputs

You can list the failed report outputs that are generated by all the report schedules using the Schedule submenu from the Reports menu.

Steps

1. From any page, click **Reports** > **Schedule** to display all the report schedules.
2. Click **Saved Reports**.
3. Select the Report Outputs, Failed entry from the Report drop-down list.

Viewing the output of report outputs from the status column

There are two possible methods to view the output of a particular report output that is generated by a report schedule.

Following are the steps to view the output of report output:

You can also view the output of a report output from the Output ID column in Operations Manager.

Steps

1. From any page, select **Schedule** from the Reports menu.
2. Click **Saved Reports**.
3. Click the link under the Status column corresponding to the report output.

Viewing the output of report outputs from the Output ID column

here are two possible methods to view the output of a particular report output, which is generated by a report schedule.

Steps

1. From any page, select **Schedule** from the Reports menu.
2. Click **Saved Reports**.
3. Click the Output ID column entry of the report output.
4. Click the Output link to view the output.

Viewing the output details of a particular report output

You can view the output details of a particular report output, which is generated by a report schedule in Operations Manager.

Steps

1. From any page, select **Schedule** from the Reports menu.
2. Click **Saved Reports**.
3. Click the Output ID entry of the report output.

Data export in DataFabric Manager

By using third-party tools, you can create customized reports from the data you export from DataFabric Manager and Performance Advisor.

Operations Manager reports are detailed reports of storage system configuration and utilization. Many administrators create customized reports to accomplish the following tasks:

- Forecasting future capacity and bandwidth utilization requirements
- Presenting capacity and bandwidth utilization statistics
- Generating performance graphs
- Presenting monthly Service Level Agreement (SLA) reports

Data export provides the following benefits:

- Saves effort in collecting up-to-date report data from different sources
- Provides database access to the historical data collected by the DataFabric Manager server
- Provides database access to the information provided by the custom report catalogs in the DataFabric Manager server
- Provides and validates the following interfaces to the exposed DataFabric Manager views:
  - Open Database Connectivity (ODBC)
  - Java Database Connectivity (JDBC)
- Enables you to export the Performance Advisor and DataFabric Manager data to text files, easing the loading of data to user-specific database
- Allows you to schedule the export
- Allows you to customize the rate at which the performance counter data is exported
- Allows you to specify the list of the counters to be exported
- Allows you to consolidate the sample values of the data export Access to

Next topics

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Where to find the database schema for the views on page 121
Two types of data for export on page 122
Files and formats for storing exported data on page 122
Format for exported DataFabric Manager data on page 122
Format for exported Performance Advisor data on page 123
Format for last updated timestamp on page 123

How to access the DataFabric Manager data

You can access the DataFabric Manager data through views, which are dynamic virtual tables collated from data in the database. These views are defined and exposed within the embedded database of DataFabric Manager.

By default, access to the DataFabric Manager views is not provided. To gain access to the views that are defined within the embedded database of DataFabric Manager, you need to first create a database user and then enable database access to this user. Note that a database user is a user created and authenticated by the database server. Database users are not related to DataFabric Manager users.

Before you can create and give access to a database user, you must have the CoreControl capability. The CoreControl capability allows you to perform the following operations:

- Creating a database user
- Deleting a database user
- Enabling database access to a database user
- Disabling database access to a database user
  Disabling the database access denies the read permission on the DataFabric Manager views for the user account.
- Changing the password for the database user

All these operations can be performed only through the CLI. For more information about the CLI commands, see the DataFabric Manager manual (man) pages.

By using a third-party reporting tool, you can connect to the DataFabric Manager database for accessing views. Following are the connection parameters:

- Database name: monitordb
- User name: <database user name>
- Password: <database user password>
- Port: 2638
- dobroad: none
- Links: tcpip

Note: The .jar files required for iAnywhere and jConnect JDBC drivers are copied as part of DataFabric Manager installation. A new folder dbconn, under misc in the install directory, is created to hold the new jar files.

Where to find the database schema for the views

You can find the schema for the database views in the Operations Manager Help. Based on the database schema presented, you can choose the objects and the metrics you want to present.

Two types of data for export

Two types of data that you can export are DataFabric Manager data and Performance Advisor data.

- DataFabric Manager data

  DataFabric Manager data export is controlled at the global level through the `dfmDataExportEnabled` option. By default, the value of the `dfmDataExportEnabled global` option is No.
- Performance Advisor data

  Performance Advisor data export is controlled at the global level and at the host level through the `perfDataExportEnabled` option. By default, the value of the `perfDataExportEnabled` option is No.

  By default, in the first Performance Advisor data export run, the counter data for the last seven days is exported. The sampling rate for the counter data export is customizable at the global level. By default, one sample is exported at every 15 minutes.

  You can consolidate the sample values of the data export only if the sampling interval is greater than the interval with which the counter data is collected. By default, the average method is used to consolidate the sample values. For more information about the samples and counters, see the *Performance Advisor Administration Guide*.

You can export the data, either on-demand or on-schedule, to text files using the CLI. For more information about the CLI commands, see the DataFabric Manager manual (man) pages. To schedule the data export you must have the CoreControl capability.

Note: Database views are created within the DataFabric Manager embedded database. This might increase the load on the database server if there are many accesses from the third-party tools to the exposed views.

Related information

Performance Advisor Administration Guide - http://now.netapp.com/NOW/knowledge/docs/DFM_win/dfm_index.shtml

Files and formats for storing exported data

The exported DataFabric Manager and Performance Advisor data is stored in the export_<timestamp> directory located under the top-level directory specified by the `dataExportDir global` option. By default, the value of the `dataExportDir global` option is <DFM-install-dir>/dataExport.

Format for exported DataFabric Manager data

The exported DataFabric Manager data is stored in files that are named after the views.

For example, you can store all the iGroup information in the `iGroupView` file, in the following format:

```
File name: iGroupView
Contents:
```

```
<iGroupId> <hostId> <type> <OSType>
... ... ... ...
... ... ... ...
```

The fields in each line of the file correspond to the columns in iGroupView.

Format for exported Performance Advisor data

The exported Performance Advisor data is stored in different files such as perfHosts, perfCounters, and perfObjInstances.

- perfHosts
  This file contains information about the storage systems from which the counter data is collected.
- perfCounters
  This file contains information about the various Performance Advisor counters.
- perfObjInstances
  This file contains information about the performance object instances on storage systems for which the counter data is collected.
- samples_<objType>_<hostId>
  This file contains the sample values that are collected at various timestamps for different counters and object instances.

The format of these files is as follows:

```
File name: perfHosts
Contents:
host-id host-name
... ...
File name: perfCounters
Contents:
counter-id counter-name description obj-type counter-unit
... ... ... ... ...
File name: perfObjInstances
Contents:
instance-id instance-name host-id obj-type obj-id
... ... ... ... ...
File name: samples_<objType>_<hostId>
Contents:
instance-id counter-id sample-time sample-value
... ... ... ...
```

Format for last updated timestamp

The last updated timestamp for both DataFabric Manager and Performance Advisor data export is stored in a configuration file named `export.conf` under the `dataExport` directory.

The entries in the export.conf file are in the following format:

```
Database Format Version: 1.0
Export Type: [Scheduled | On-demand]
```

```
Export Status: [Success | Failed | Canceled | Running]
Delimiter: [tab | comma]
Sampling Interval: <secs>
Consolidation Method: [average | min | max | last]
History: <secs>
DataFabric Manager Data Export Completion Timestamp: <timestamp>
Last PA data Export for following hosts at time <timestamp>
------<host-name>-----
------<host-name>-----
```

Security configurations

You can configure Secure Sockets Layer (SSL) in DataFabric Manager to monitor and manage storage systems over a secure connection by using Operations Manager.

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Types of certificates in DataFabric Manager on page 125
Secure communications with DataFabric Manager on page 128
Managed host options on page 129
Changing password for storage systems in DataFabric Manager on page 131
Changing passwords on multiple storage systems on page 132
Issue with modification of passwords for storage systems on page 133
Authentication control in DataFabric Manager on page 133

Types of certificates in DataFabric Manager

DataFabric Manager uses the signed certificates for secure communication:

Signed certificates provide your browser with a way to verify the identity of the storage system.

DataFabric Manager uses the following types of signed certificates:

- Self-signed certificates
- Trusted CA-signed certificates

You can create self-signed certificate and add trusted CA-signed certificates with DataFabric Manager.

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Self-signed certificates in DataFabric Manager on page 125
Trusted CA-signed certificates in DataFabric Manager on page 126
Creating self-signed certificates in DataFabric Manager on page 126
Obtaining a trusted CA-signed certificate on page 127
Enabling HTTPS on page 127

Self-signed certificates in DataFabric Manager

You can generate self-signed certificates by using DataFabric Manager.

You can set up DataFabric Manager as a Certificate Authority (CA), and generate self-signed certificates. By issuing self-signed certificates, avoids the expense and delay of obtaining a certificate from an

external trusted CA. Self-signed certificates are not signed by a mutually trusted authority for secure Web services.

When the DataFabric Manager server sends a self-signed certificate to a client browser, the browser has no way of verifying the identity of DataFabric Manager. As a result, the browser displays a warning indicating to create an acception. After the browser accepts the certificate, the browser allows the user to permanently import the certificate into the browser.

If you decide to issue self-signed certificates, you must safeguard access to, and communications with, DataFabric Manager and the file system that contains its SSL-related private files.

Trusted CA-signed certificates in DataFabric Manager

You can generate trusted CA-signed certificates using DataFabric Manager.

You obtain a trusted CA-signed certificate by generating a Certificate Signing Request (CSR) in DataFabric Manager, and then submitting that request to a trusted authority for secure Web services. DataFabric Manager accepts certificates from Thawte, Verisign, and RSA.

When DataFabric Manager sends a trusted CA-signed certificate to the client browser, the browser verifies the identity of the server.

Creating self-signed certificates in DataFabric Manager

You can generate self-signed certificate from the command-line interface (CLI) of DataFabric Manager.

Steps

1. Log into DataFabric Manager server as DataFabric Manager administrator.
2. In the CLI, enter the following command: `dfm ssl server setup`.
3. Enter the following information when prompted:
   - Key Size
   - Certificate Duration
   - Country Name
   - State or Province
   - Locality Name
   - Organization Name
   - Organizational Unit Name
   - Common Name
   - Mail Address

   DataFabric Manager is initialized with a self-signed certificate and puts the private key in the `/conf/server.key` file in any DataFabric Manager directory.

4. Install the certificate in the browser.

Obtaining a trusted CA-signed certificate

You can obtain a certificate from a trusted CA by running commands at the DataFabric Manager command-line interface (CLI).

Steps

1. Enter the following command:

   dfm ssl server req -o *filename*

   DataFabric Manager creates a CSR file.

2. Submit the CSR to a CA for signing.
3. Import the signed certificate by entering the following command:

   dfm ssl import *cert_filename*

Enabling HTTPS

You can use the `httpsEnabled` option using DataFabric Manager CLI for the DataFabric Manager server to provide HTTPS services.

Before You Begin

You must set up the SSL server using the `dfm ssl server setup` command.

Steps

1. Enter the following command:

   dfm option set httpsEnabled=*Yes*

2. Optionally, change the HTTPS port by entering the following command:

   dfm option set httpsPort=*port_number*

   The default HTTPS port is 8443.

3. Stop the Web server by using the following command:

   dfm service stop http

4. Start the Web server by using the command:

   dfm service start http

   This restarts the service using the certificate.

Secure communications with DataFabric Manager

Secure communications require a secure connection at both ends of each communications link.

In DataFabric Manager, the two ends of a communication link consist of a secure server and secure managed host. Clients, including browsers and managed storage systems, must use a secure connection to connect to DataFabric Manager. DataFabric Manager, in turn, uses a secure connection to connect to a storage system.

Next topics

How clients communicate with DataFabric Manager on page 128
SecureAdmin for secure connection with DataFabric Manager clients on page 128
Requirements for security options in Operations Manager on page 128
Guidelines to configure security options in Operations Manager on page 129

How clients communicate with DataFabric Manager

DataFabric Manager and the clients use a set of protocols to communicate to each other.

The system on which DataFabric Manager is installed and clients use the following combination of protocols running over SSL:

- Browsers use HTTPS to connect to a secure DataFabric Manager server.
- DataFabric Manager connects to managed hosts using Secure Shell (SSH) for operations and to managed storage systems using HTTPS for monitoring purposes.

SecureAdmin for secure connection with DataFabric Manager clients

To enable secure connection, you must have SecureAdmin installed on your storage systems.

SecureAdmin is an add-on software module that enables authenticated, command-based administrative sessions between an administrative user and storage systems over an intranet or the Internet. For more information about SecureAdmin, see the *SecureAdmin Administrator's Guide* at *http://now.netapp.com/*.

This combination of SSL and SecureAdmin allows you to securely monitor and manage your storage systems in DataFabric Manager.

Requirements for security options in Operations Manager

The security options in DataFabric Manager have the following requirements:

- If you disable HTTP and enable HTTPS, all browsers must connect to DataFabric Manager through HTTPS.

- If you want to enable secure connections from any browser, you must enable HTTPS transport on the DataFabric Manager server.
- You cannot disable both HTTP and HTTPS transports. DataFabric Manager does not allow that configuration.

  To completely disable access to Operations Manager, stop the HTTP service at the CLI using the following command: `dfm service stop http`.
- You must select the default port for each transport type you have enabled. The ports must be different from each other.

Guidelines to configure security options in Operations Manager

You should configure security options in Operations Manager using secure protocol.

When configuring the DataFabric Manager server for SSL, you are responsible for safeguarding access to and communications with the DataFabric Manager server and the file system that contains the SSL-related private files. The DataFabric Manager server should not be accessed by not secure protocols, such as Telnet and RSH. Instead, use a secure, private network, or a secure protocol, such as SSH, to connect to the DataFabric Manager server.

Managed host options

Managed host options allow you to control how DataFabric Manager connects to storage systems.

You can configure managed host options to control connection between DataFabric Manager and storage systems.

You can select conventional (HTTP) or secure (HTTPS) administration transport and conventional (RSH) or secure (SSH) login protocol.

Next topics

Where to find managed host options on page 129
Guidelines for changing managed host options on page 130
Comparison between global and storage system-specific managed host options on page 131
Limitations in managed host options on page 131

Where to find managed host options

You can set managed host options by using both GUI and command-line interface.

The locations of managed host options are described in the following table.

Option type	GUI	Command-line interface
Global	Options page (**Setup ➤ Options**	`dfm option list` (to view) `dfm option set` (to set)
Appliance-specific	**Edit Appliance Settings** page (**Appliances ➤ appliance name ➤ Appliance Tools ➤ Edit Settings**	`dfm host get` (to view) `dfm host set` (to set)

Guidelines for changing managed host options

You can change managed host options, such as, login protocol, transport protocol, port, and hosts.equiv option.

Login protocol This option allows you to select a conventional (RSH) or secure (SSH) connection for the following operations:

- Active/active configuration operations
- The `dfm run` command for running commands on the storage system

Change the default value if you want a secure connection for active/active configuration operations, running commands on the storage system.

Administration transport This options allows you to select conventional (HTTP) or secure (HTTPS) connection to monitor and manage storage systems.

Change the default value if you want a secure connection for monitoring and displaying the storage system UI (FilerView).

Administration port This options allows you to configure the administration port to monitor and manage storage systems.

If you do not configure the port option at the appliance-level, the default value for the corresponding protocol is used.

hosts.equiv option This option allows users to authenticate storage systems when user name and password are not provided.

Change the default value if you have selected the global default option and you want to set authentication for a specific storage system.

Note: If you do not set the transport and port options for a storage system, then DataFabric Manager uses SNMP to get appliance-specific transport and port options for communication. If SNMP fails, then DataFabric Manager uses the options set at the global level.

Comparison between global and storage system-specific managed host options

You can set managed host options globally, for all storage systems, or individually, for specific storage systems.

If you set storage system-specific options, DataFabric Manager retains information about the security settings for each managed storage system. It references this information when deciding whether to use one of the following options to connect to the storage system:

- HTTP or HTTPS
- RSH or SSH
- Login password
- hosts.equiv authentication

If a global setting conflicts with a storage system-specific setting, the storage system-specific setting takes precedence.

Note: You must use storage system-specific managed host options if you plan to use SecureAdmin on some storage systems and not on others.

Limitations in managed host options

You can enable managed host options, but you must accept the following known limitations.

- DataFabric Manager cannot connect to storage systems without SecureAdmin installed or to older storage systems that do not support SecureAdmin.
- On storage systems, SecureAdmin is not mutually exclusive with HTTP access.
  Transport behavior is configurable on the storage system with the `httpd.admin.access` option. The `http.admin.ssl.enable` option enables HTTPS access. For more information, see the documentation for your storage system.
- If you have storage systems running SecureAdmin 2.1.2R1 or earlier, HTTPS options do not work with self-signed certificates. You can work around this problem by using a trusted CA-signed certificate.
- If the hosts.equiv option and login are set, then the `hosts.equiv` option takes precedence.

Changing password for storage systems in DataFabric Manager

You can change the password for an individual storage system on the **Edit Appliance Settings** page using Operations Manager.

Steps

1. Go to the **Appliance Details** page for the storage system or hosting storage system (of the vFiler unit) and choose **Edit Settings** from the **Appliance Tools** menu (at the lower left of Operations Manager).

   The **Edit Appliance Settings page** is displayed.

2. In the **Login** field, enter a user name that DataFabric Manager uses to authenticate the storage system or vFiler unit.
3. In the **Password** field, enter a password that DataFabric Manager uses to authenticate the storage system or vFiler unit.
4. Click **Update**.

Changing passwords on multiple storage systems

DataFabric Manager can set passwords on all storage systems when you use the same authentication credentials on each. Select the Global group to set the same passwords on all storage systems at once.

Steps

1. Log in to Operations Manager.
2. Depending on the type of storage system for which you want to manage passwords, select either of the following:

Type	Procedure
Storage system	Management > Storage System > Passwords
vFiler unit	Management > vFiler > Passwords

3. Enter the user name.
4. Enter the old password of the local user on the host.

   Note: This field is mandatory for storage systems running Data ONTAP version less than 7.0 and for all the vFiler units.

5. Enter a new password for the storage system or groups of storage systems.
6. Reenter the new password exactly the same way in the Confirm New Password field.
7. Select the target storage system or target groups.
8. Click **Update**.

Issue with modification of passwords for storage systems

When modifying passwords for a large number of storage systems, you might get an error message if the length of your command input exceeds the specified limit.

This error occurs only when you are using the Operations Manager graphical user interface and not the CLI. If this error occurs, you can take either of the following corrective actions:

- Select fewer storage systems
- Create a resource group and assign the selected storage systems to the group as members, then modify the password for the group

Authentication control in DataFabric Manager

DataFabric Manager 3.5 and later allows you to use the `hosts.equiv` file to authenticate storage system.

When the `hosts.equiv` option is set, you can authenticate storage system, vFiler unit, and active/active configuration controller without specifying the user name and password.

Note: If the storage system or vFiler unit is configured with IPv6 addressing, then you cannot use the `hosts.equiv` file to authenticate the storage system or vFiler unit.

Next topics

Using hosts.equiv to control authentication on page 133
Configuring http and monitor service to run as different user on page 134

Using `hosts.equiv` to control authentication

You can control authentication of storage system, vFiler units, and active/active configuration using `host.equiv` file.

Steps

1. Edit the `/etc/hosts.equiv` file on the storage system and provide either the host name or the IP address of the system running DataFabric Manager, as an entry in the following format:
   `<host-name-or-ip-address>`
2. You can edit the option on **Edit Appliance Settings** page in Operations Manager. Alternatively, provide the host name or the IP address of the system running DataFabric Manager, and the user name of the user running DataFabric Manager CLI, in the following format:
   `<host-name-or-ip-address> <username>`

3.

If the operating system is...	Then...
Linux	Provide the host name or the IP address of the system running DataFabric Manager, and the user name of the user running the HTTP service, in the following format: `<host-name-or-ip-address> <username>`
Windows	Provide the host name or the IP address of the system running DataFabric Manager, and the user name of the user running the HTTP, server, scheduler, and monitor services, in the following format: `<host-name-or-ip-address> <username>`

Note:

By default, the HTTP service runs as *nobody* user on Linux.

By default, the HTTP, server, scheduler, and monitor services run as *LocalSystem* user on Windows.

If DataFabric Manager is running on a host named *DFM_HOST*, and USER1 is running the `dfm` commands, then by default, on a Linux operating system, you need to provide the following entries:

```
DFM_HOST

DFM_HOST USER1

DFM_HOST nobody
```

On Windows operating system, you need to provide the following entries:

```
DFM_HOST

DFM_HOST USER1

DFM_HOST SYSTEM
```

For more information about configuring the `/etc/hosts.equiv` file, see the *Data ONTAP Storage Management Guide*.

Related information

Data ONTAP Storage Management Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Configuring http and monitor service to run as different user

You can configure http and monitor services using Operations Manager.

Step

1.

Operating system	Command
Linux	`dfm service runas -u <user-name> http`
Windows	`dfm service runas -u <user-name> -p <password>` [http] [monitor]

Note: For security reasons the <*user-name*> cannot be “root” on Linux. On Windows hosts, <*user-name*> should belong to the administrator group.

File Storage Resource Management

You can use File Storage Resource Manager (FSRM) to gather file-system metadata and generate reports on different characteristics of that metadata.

DataFabric Manager interacts with the NetApp Host Agent residing on remote Windows, Solaris, or Linux workstations or servers (called hosts) to recursively examine the directory structures (paths) you have specified.

For example, if you suspect that certain file types are consuming excessive storage space on your storage systems, you would perform the following tasks:

1. Deploy one or more host agents
2. Configure to walk a path

The host agents might be mounted on top of a NetApp LUN, volume, or qtree. FSRM can be configured to generate reports periodically. These reports contain the following details:

- Files that are consuming the most space
- Files that are old or have been accessed recently
- Types of files (.doc, .gif, .mp3, and so on) on the file system

You can then make an intelligent choice about how to efficiently use your existing space.

Note: The File SRM tab in the Operations Manager includes other storage monitoring utilities: for example, chargeback and quota reporting.

Next topics

How FSRM monitoring works on page 138
What capacity reports are on page 138
Difference between capacity reports and file system statistics on page 138
Prerequisites for FSRM on page 139
Setting up FSRM on page 139
NetApp Host Agent software overview on page 140
Managing host agents on page 142
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How FSRM monitoring works

DataFabric Manager monitors directory paths that are visible to the host agent. Therefore, if you want to enable FSRM monitoring of NetApp storage systems, the remote host must mount a NetApp share using NFS or CIFS, or the host must use a LUN on the storage system.

Note: DataFabric Manager cannot obtain FSRM data for files that are located in NetApp volumes, which are not exported by CIFS or NFS. Host agents can also gather FSRM data about other file system paths that are not on a NetApp storage system: for example, local disk or third-party storage systems.

What capacity reports are

Capacity reports provide you with information about the file space statistics.

You can determine the following using the capacity reports:

- Total capacity of the storage system
- Amount of used space in the storage system
- Amount or percentage of free space available in the storage system

For example, you can determine the capacity of a volume by viewing the corresponding volume capacity report (**Reports ➤ All ➤ Volumes ➤ Volume Capacity**).

Difference between capacity reports and file system statistics

The file space statistics that are reported by a path walk differ from the "volume space used" statistics reported by Operations Manager capacity reports.

This is due to the difficulty of determining how much space a file actually consumes on a volume. For example, most files consume slightly more space than the length of the file, depending on the block size. In addition, hard and soft links can cause a file to appear in more than one place and be counted twice. Therefore, do not use the results of a path walk to determine the amount of space used in a volume. Instead, use the DataFabric Manager capacity reports.

Prerequisites for FSRM

The prerequisites for FSRM include File SRM license, connection to TCP/IP network, NetApp Host Agent software, and visible directory paths.

Prerequisite	Description
File SRM license	You must have a valid File SRM license installed on your DataFabric Manager. If you do not have an File SRM license, contact your sales representative. After you install the File SRM license, the Quotas tab in the Operations Manager is renamed “File SRM” and all the FSRM features become available.
Connection to TCP/IP network	All FSRM hosts must be connected to a TCP/IP network that is either known to or discoverable by the DataFabric Manager. The hosts must be connected to the network through an Ethernet port and must have a valid IP address.
NetApp Host Agent software	Each workstation from which FSRM data is collected must have NetApp Host Agent 2.0 (or later) installed. The 2.5 and later versions are recommended. For more information about the NetApp Host Agent , see the *NetApp Host Agent Installation and Administration Guide*.
Visible directory paths	All directory paths to be monitored must be visible to the host agent. For example, to enable FSRM monitoring, the host agent must mount a NetApp system share (volume or qtree), using NFS or CIFS, or the host agent must use a LUN on the system.

Related concepts

How FSRM monitoring works on page 138

Related information

NetApp Host Agent Installation and Administration Guide - http://now.netapp.com/NOW/knowledge/docs/nha/nha_index.shtml

Setting up FSRM

To set up and configure FSRM, you should perform a set of tasks such as, identifying FSRM host agents, adding host agents, adding paths, and setting up path-walk schedules.

Steps

1. Identify FSRM host agents.

   Note: To use host agents for FSRM, you must set your "login" to admin.

2. Add new host agents manually if they have not been discovered.
3. Set up host agent administration access on the hosts to be monitored. You can verify the host administration access by checking the **SRM Summary** page.
4. Add paths.
5. Set up path-walk schedules.

Related concepts

How FSRM monitoring works on page 138

Related tasks

Configuring host agent administration settings on page 144
Enabling administration access for one or more host agents on page 145
Enabling administration access globally for all host agents on page 145
Adding SRM paths on page 148
Adding a schedule on page 154

Related references

Host Agent management tasks on page 142

NetApp Host Agent software overview

NetApp Host Agent is a software that runs on Windows, Solaris, or Linux systems. It enables DataFabric Manager to collect SAN host bus adapter (HBA) information and remote file system metadata.

You can perform the following tasks, by deploying NetApp Host Agent software on one or more hosts and licensing File SRM:

- Collect OS version and host name information.
- Collect storage usage data at the file and directory levels.
- Identify and categorize a variety of file-related information: for example, largest files, oldest files, files by owner, and files by type.
- Collect SAN host and SRM host data.

Note: A workstation or server running the NetApp Host Agent software is called a host.

Next topics

NetApp Host Agent communication on page 141
NetApp Host Agent software passwords on page 141
NetApp Host Agent software passwords for monitoring tasks on page 141
NetApp Host Agent software passwords for administration tasks on page 141

NetApp Host Agent communication

The DataFabric Manager server communicates with the NetApp Host Agent using HTTP or HTTPS.

You can specify the protocol to be used for communication in Operations Manager and when you install the NetApp Host Agent on your SAN host or SRM host agent. By default, both the NetApp Host Agent software and the DataFabric Manager server are configured to communicate with each other using HTTP.

NetApp Host Agent software passwords

Host agents have two user name and password pairs: one pair for monitoring and one pair for administration tasks.

NetApp Host Agent software passwords for monitoring tasks

The default host agent user name and password allows monitoring only. You cannot perform FSRM functions.

Following are the default values for user name and password of the Host Agent software for monitoring tasks:

- User name=guest
- Password=public

Any sessions initiated by the DataFabric Manager, by using this user name and password are limited to basic monitoring operations. If you later decide to change the guest password on the host agent, you must also set the same user name and password in Operations Manager, using the Host Agent Monitoring Password option on the **Options** page.

NetApp Host Agent software passwords for administration tasks

The administration user name and password allows read/write permission and is required for FSRM functions.

Following are the values for user name and password of the NetApp Host Agent for administration tasks:

- User name=admin
- Password=user-specified

You specify the password on the host agent's configuration UI (http://name-ofagent: 4092/). This user name and password allows full access to the host agent. After setting the administration user name and password in the host agent, you must also set the same user name and password in Operations Manager on the **Options** page (**Setup menu ➤ Options ➤ Host Agent link**).

Note: This process of password change is applicable globally. To change passwords for one or more host agents,

Managing host agents

DataFabric Manager can discover host agents automatically; however, it does not use SNMP to poll for new host agents. Instead, a special-purpose agent called NetApp Host Agent is required for discovering, monitoring, and managing SAN and SRM hosts. NetApp Host Agent must be installed on each host agent that you want to monitor and manage with DataFabric Manager.

Host Agent management tasks

These are common host agent management tasks and the location of the Operations Manager user-interface page that enables you to complete them.

If you want to...	**Go here...**
Add a new host agent	**Add Host Agents** or **Edit Host Agents** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Hosts**)
Edit host agent settings (including passwords)	**Edit Host Agent Settings** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ host agent name ➤ Edit Settings in Tools list**) OR **Edit Host Agents** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Hosts ➤ appliance host name edit**)
Edit host agent properties (for example, monitoring and management of API passwords, the HTTP port, and, HTTPS settings)	**Edit Agent Settings** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ host agent name ➤ Manage Host Agent in Host Tools list**)

If you want to...	**Go here...**
Configure host agent administration access	For one or more host agents: **Edit Agent Logins** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Edit Agent Logins**) OR Create a global default using the Host Agent Options page (**Setup menu ➤ Options ➤ Host Agent**)
List of available host agents	If you have enabled a File SRM license on the workstation, DataFabric Manager automatically discovers all hosts that it can communicate with. Communication between the host agent and DataFabric Manager takes place over HTTP or HTTPS (port 4092 or port 4093, respectively). Host Agents, SRM view (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Host Agents, SRM**)
Edit host agents	**Add Host Agents** or **Edit Host Agents** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Hosts link**)
Review host agent global settings	**Host Agent Options** page (**Setup menu ➤ Options ➤ Host Agent**)
Obtain SRM host agent information	**Host Agent Details** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ host agent name link**)
Change the SRM host agent monitoring interval	**Monitoring Options** page (**Setup menu ➤ Options link ➤ Monitoring Options link ➤ Agent monitoring interval option**)
Modify NetApp Host Agent software settings	**Edit Agent Settings** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ host agent name link ➤ Manage Host Agent in Host Tools list**)
Disable host agent discovery	`Host Agent Discovery` option on the **Options** page (**Setup menu ➤ Options link ➤ Discovery ➤ Host Agent Discovery field**)
Delete a host agent	**Add Host Agents** or **Edit Host Agents** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Hosts link**)

Configuring host agent administration settings

You can configure administration access such as, monitoring only and management access, to the host agents.

Before You Begin

You must enable administration access to your host agents before you can use the FSRM feature to gather statistical data.

Considerations

Global options apply to all affected devices that do not have individual settings specified for them. For example, the Host Agent Login option applies to all host agents. The host agent access and communication options are globally set for all storage systems using the values specified in the Host Agent Options section on the **Options** page. Default values are initially supplied for these options. However, you should review and change the default values as necessary.

To enable administration access, the passwords set in Operations Manager must match those set for the NetApp Host Agent software.

Steps

1. Specify the DataFabric Manager options:

Access type	DataFabric Manager options
Monitoring only	`Host Agent Login=`*`guest`* `Host Agent Monitoring Password`
Management (required for FSRM)	`Management Host Agent Login=`*`admin`* `Host Agent Management Password=`*`your-administration-password`*

2. Specify the NetApp Host Agent options:

Access type	NetApp Host Agent options
Monitoring only	Monitoring API Password
Management (required for FSRM)	Monitoring API Password

Next topics

Enabling administration access for one or more host agents on page 145

Enabling administration access globally for all host agents on page 145

Related concepts

NetApp Host Agent software passwords on page 141

Enabling administration access for one or more host agents

You can enable administration access for one or more host agents from the **SRM Summary** page.

Steps

1. From the **SRM Summary** page, click **Edit Agent Logins** in the Host Agents Total section.
2. Select the host agents for which you want to enable administration access.
3. Modify the fields, as needed, and then click **Update**.

Enabling administration access globally for all host agents

You can enable administration access globally for all host agents, from any **Summary** page.

Steps

1. From any **Summary** page, select **Options** from the Setup drop-down menu.
2. Select Host Agent from the **Edit Options list** (in the left pane).
3. Enter (or modify) the required information and then click **Update**.

   This option changes all host agent login names and passwords, unless the host agent has a different login name or password already specified for it. For example, if an administrator has specified a password other than Global Default in the Password field of the **Edit Host Agent Settings** page, changing the global password option does not change the storage system's password.

What FSRM paths are

File SRM paths define the location in the file system that is to be indexed for data.

Following are the properties of SRM paths:

- They must be defined for a specific host.
- They can be walked by managed host agents.
- They can be grouped like any other storage object.
- They can be mapped (linked) to volumes, qtrees, and LUNs.

Note: The FSRM path-walk feature can cause performance degradation. However, you can schedule your path walks to occur during low-use or non-business hours.

Next topics

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Adding SRM paths on page 148
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Adding CIFS credentials

To provide path names for CIFS, you must create a CIFS account.

Steps

1. Click **Setup ➤ Options ➤ Host Agent**.
2. In the **Host Agent Options** page, specify the CIFS account name in the **Host Agent CIFS Account** field.
3. In the **Host agent CIFS Password** field, type the password for the CIFS account.
4. Click **Update**.

Path management tasks

There are common path management tasks and the location of the Operations Manager user-interface page that enables you to complete them.

If you want to...	Go here..
Add paths	To use the automapping feature: Create new SRM Path for this object link (**Volume Details, Qtree Details, or LUN Details page ➤ Create an SRM path**) **Note:** The volume must be mounted on the managed Host Agent To manually add an SRM path: **Add SRM Paths** or **Edit SRM Paths** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Paths link**)
Create path-walk schedules	**Edit SRM Path Walk Schedules** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Schedules link**)
Specify path-walk times	**SRM Path Walk Schedules Times** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Schedules link ➤ schedule name ➤ Add Walk Times link**)
Manually start or stop an SRM path walk	**SRM Path Details** page (**SRM path name ➤ Start**) If an SRM path walk is in progress, the **Start** button changes to a **Stop** button.
Review SRM path details	**SRM Path Walk Schedule Details** page (schedule name)
Edit SRM paths	**Add SRM Paths** or **Edit SRM Paths** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Paths link**) OR **Edit SRM Path Settings** page (**SRM path name ➤ Edit Settings in Host Tools list**)
Review SRM path-walk schedule details	**SRM Path Walk Schedule Details** page (schedule name)
Edit SRM path-walk schedules	**SRM Path Walk Schedule Times** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Schedules link ➤ schedule name ➤ Add Walk Times link**)
Delete SRM paths	**Add SRM Paths** or **Edit SRM Paths** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Paths link**)
Delete SRM path-walk schedules	**Edit SRM Path Walk Schedules** page (**Group Status tab ➤ File SRM ➤ Report drop-down list: SRM Summary ➤ Add/Edit Schedules link ➤ schedule name**)

If you want to...	Go here..
Delete SRM path-walk schedule times	**SRM Path Walk Schedule Details** page (schedule name)

Adding SRM paths

You can add SRM paths from the **SRM Summary** page.

Steps

1. From the **SRM Summary** page, click the **Add/Edit Paths** in the SRM Paths Total section.
2. From the SRM Host drop-down list in the Add a New SRM Path section, select the name of the host agent that you want to monitor.
3. Type a path name, select a schedule, and then click **Add SRM Path**.

Valid path entries

`host:/u/earth/work`

`host:/usr/local/bin`

`host:/engineering/toi`

`host:C:\Program Files`

For CIFS, you must specify the path as a UNC path, as follows: `host:\\storage system\share\dir`

Path names for CIFS

For CIFS systems, always use Universal Naming Convention (UNC) path names.

In Windows operating systems, the UNC format is as follows:

`\\servername\sharename\path\filename`

The SRM feature does not convert mapped drives to UNC path names. For example, suppose that drive H: on the system host5 is mapped to the following path name:

`\\abc\users\jones`

The path entry `host5:H:\` fails because the FSRM feature cannot determine what drive H: is mapped to. The following path entry is correct:

`host5:\\abc\users\jones`

Conventions for specifying paths from the CLI

Unique conventions have to be followed for specifying paths from CLI in Windows and UNIX.

Windows requires that you use double quotation marks to enclose all strings that contain spaces. For example:

```
C:\dfm srm path add “inchon:C:\Program Files”
```

```
C:\dfm srm path add "oscar:/usr/home"
```

UNIX requires that you double all backslashes, unless the argument is enclosed in double quotation marks. This convention is also true for spaces in file names. For example:

```
$ dfm srm path add inchon:C:\\Program\ Files
```

```
$ dfm srm path add “inchon:C:\Program Files”
```

```
$ dfm srm path add oscar:/usr/local
```

Viewing file-level details for a path

You can view file-level details about an SRM path from the **SRM Summary** page.

Step

1. From the **SRM Summary** page, click a path name in the SRM Paths Total section.

Viewing directory-level details for a path

You can view directory-level details about an SRM path from the **SRM Summary** page.

Steps

1. From the **SRM Summary** page, click a path name in the SRM Paths Total section.
2. Click the **Browse Directories** link in the SRM Path Tools list (at the lower left of Operations Manager).
3. To view an expanded view of directory information that includes a listing of files by type and by user, click the **Extended Details** link (at the upper right corner of the File SRM tab window).

Editing SRM paths

You can edit SRM paths from the **SRM Summary** page.

Steps

1. From the **SRM Summary** page, click **Add/Edit Paths** in the SRM Paths Total section.

2. Select the SRM path you want to modify.
3. Modify the fields, as needed, and then click **Update**.

Deleting SRM paths

You can delete SRM paths from the **SRM Summary** page.

Steps

1. From the **SRM Summary** page, click **Add/Edit Paths** in the SRM Paths Total section.
2. Select the SRM path(s) you want to delete and then click **Delete**.

Automatically mapping SRM path

When you automatically map the SRM path, the initial path mapping will be correct. Subsequent changes on the host (running the NetApp Host Agent) or storage system can cause the path mapping to become invalid.

Note: Sometimes, you might not be able to do the following operations:

- When you cannot access SRM data, you cannot automatically map storage objects with an SRM path.
- If the SRM path is not on a storage device monitored by DataFabric Manager, you cannot associate an SRM path with a storage object.

Requirements for automatically mapping SRM path

You can automatically create a new path for an object using the “Create new SRM Path for this object” link on the details page for the object.

You must ensure the following, to create a new path for an object:

- The host agent is set up and properly configured.
- The host agent passwords match those set in DataFabric Manager.
- The host agent has access to the volume, qtree, or LUN:
  - If the host agent is a Windows host, you must ensure that the CIFS passwords match.
  - If the object is a LUN on a Windows host, SnapDrive must be installed and the LUN must be managed by SnapDrive.
  - If the host agent is a UNIX host, then the volume or qtree must be NFS mounted.
  - If the object is a LUN on a UNIX host, the LUN must be formatted and mounted directly into the file system (volume managers are not supported).
- The Host Agent Login and Management Password are set correctly.

You can also manually map SRM paths to volumes, qtrees, and LUNs.

What path walks are

A path walk is the process of recursively examining a directory path for file-level statistics. Path walks are scheduled using DataFabric Manager and executed by NetApp Host Agent software. The NetApp Host Agent scans all subdirectories of the specified directory path and gathers per-file and per-directory data.

SRM path-walk recommendations

SRM path walks can consume considerable resources on the SRM host agent and on DataFabric Manager. Therefore, schedule your SRM path walks to occur during off-peak hours. Also, do not schedule multiple, simultaneous SRM path walks on the same SRM host agent.

What File SRM reports are

Operations Manager provides three levels of file system statistics.

Following are the three levels of file system statistics provided by Operations Manager:

- Consolidated data gathered from all paths
- SRM path-specific data
  This is a summary of the data for all directories in the specified path.
- Directory-level data
  This contains the data for the specified directory only.

Note: If the host agent is installed on UNIX, File SRM feature tracks only the files having a file name extension that exactly matches the file type specification in Operations Manager. For example, files that end in .JPG will not match the .jpg file type if the host agent is on UNIX. Even though they would match if the agent were on Windows. Running the host agent on Windows avoids this problem.

Viewing file system statistics

You can view the File SRM report for a group by clicking on the File SRM tab.

Steps

1. Click the group for which you want a File SRM report.
2. Click **File SRM** and select a report from the Report drop-down list. The following reports are available:
   - SRM Paths, All
   - SRM Directories, Largest

- SRM Files, Largest
- SRM Files, Least Recently Accessed
- SRM Files, Least Recently Modified
- SRM Files, Recently Modified
- SRM File Types
- SRM File Owners

Each **FSRM report** page displays statistics for the users who have storage space that are allocated on the objects (storage systems, aggregates, volumes, or qtrees) in your selected group.

You can list reports by using the CLI `dfm report list` command (without arguments) to display all available reports.

Access restriction to file system data

To restrict access to private or sensitive file system information, remove the GlobalSRM role from the access privileges in the **Administrators** page (Setup menu > Administrative Users link).

Related concepts

How roles relate to administrators on page 53

Identification of oldest files in a storage network

You can find the oldest files residing in its storage network using File SRM (FSRM) and archive the files to a NearStore system.

There is a list of high-level tasks to be performed to use FSRM, for identifying oldest files in a storage network.

- Check FSRM prerequisites
- Verify administrative access
- Verify host agent communication
- Create a new group

  Group the host agents in a logical way. For example, group the engineering host agents together if you want to search for them separately.
- Add a FSRM path
- Add a schedule
- Group the FSRM paths
- View a report listing the oldest files

FSRM prerequisites

Before using the FSRM feature for the first time, you must verify that all prerequisites are met by referring to difference between, capacity reports and file system statistics.

Verifying administrative access for using FRSM

You must verify administrative access in Operations Manager for using FSRM.

Steps

1. Select **Options** from the Setup drop-down menu.
2. Click **Host Agent** in the Edit Options section.
3. Change the Host Agent Login to `Admin`.
4. Verify that the Host Agent Management Password is set.
5. Click **Update** to apply the changes.
6. Click **Home** to return to the Control Center.
7. Click **File SRM** to return to the SRM Summary page.

Verifying host agent communication

To verify that DataFabric Manager can communicate with the host agents, the ABC administrator must complete a certain list of tasks.

Steps

1. Click **File SRM** then select **SRM Summary** from the Report drop-down list.
2. Check the list of host agents to view the status.

   If the status is Unknown, the host agent login settings might not be properly configured.

3. If the status of one or more of the storage systems is Unknown, click **Edit Agent Logins**.
4. Select the host agents for engineering that the administrator wants to communicate with.
5. Edit the login or password information.
6. Click **Update**.
7. Click **File SRM** to return to the **SRM Summary** page.

Creating a new group of hosts

The ABC Company wants to find the oldest files in its engineering department first. To find these files, the ABC Company administrator groups together the host agents in the engineering domain. To create a new group of hosts, for which, the administrator must complete a certain list of tasks.

Steps

1. From the **SRM Summary** page, select **Host Agents, SRM** from the Report drop-down list.
2. Select the host agent in the engineering domain.
3. From the buttons at the bottom of the page, click **Add To New Group**.
4. When prompted, enter the name `Eng` and Click **Add**.

   DataFabric Manager refreshes.
5. Select **SRM Summary** from the Report drop-down list.

Adding an FSRM path

The administrator can add an FSRM path from the **SRM Summary** page.

Steps

1. From the **SRM Summary** page, **Add/Edit Paths**.
2. Select a host from the SRM Host drop-down list.
3. Enter the path to be searched in the Path field.
4. Click **Add A Schedule**.

Adding a schedule

To create the path-walk schedule, the administrator must complete a certain list of tasks.

Steps

1. Click the **Add/Edit Schedules** link in the **SRM Summary** page (File SRM tab).
2. In the Add a New Schedule section, enter a meaningful name for the schedule.
3. In the **Schedule Template** list, select a schedule or select None.
4. Click **Add**.
5. In the **SRM Path Walk Schedule Times** , select the days and times to start the SRM path walks.
6. Click **Update**.

7. Click **Home** to navigate back to the main window.
8. Click **File SRM**.
9. **SRM Summary** page, click **Add/Edit Paths**.
10. In the Add a New SRM Path section, select a host agent to associate the new schedule with.
11. In the Schedule field, select the schedule name the administrator just created.
12. Click **Add SRM Path**.

Grouping the FSRM paths

To view consolidated data, the administrator must group the FSRM path. To do so, the administrator completes a set of tasks.

Steps

1. Click **File SRM**.
2. Select **SRM Paths, All** from the Report drop-down list.
3. Select the SRM path that the administrator wants to group.
4. From the buttons at the bottom of the page, click **New Group**.
5. When prompted, enter a name for the group.

   DataFabric Manager adds the new group and refreshes.

Viewing a report that lists the oldest files

To view a report listing the oldest files in the SRM path, the ABC Company administrator must complete a set of tasks.

Steps

1. Click **Home**.
2. Click **File SRM**.
3. Select the engineering group in the Groups section at the left side of the tab window.
4. Select the report SRM Files, Least Recently Accessed from the Report drop-down list.
5. Review the data.

User quotas

You can use user quotas to limit the amount of disk space or the number of files that a user can use.

Next topics

About quotas on page 157
Why you use quotas on page 157
Overview of the quota process on page 158
Differences between hard and soft quotas on page 158
User quota management using Operations Manager on page 158
Where to find user quota reports in Operations Manager on page 159
Modification of user quotas in Operations Manager on page 160
Configuring user settings using Operations Manager on page 161
What user quota thresholds are on page 162

About quotas

Quotas provide a way to restrict or track the disk space and number of files that are used by a user, group, or qtree. Quotas are specified using the /etc/quotas file, and are applied to a specific volume or qtree.

Why you use quotas

You can use quotas to limit resource usage, to provide notification when resource usage reaches specific levels, or simply to track resource usage.

You specify a quota for the following reasons:

- To limit the amount of disk space or the number of files that can be used by a user or group, or that can be contained by a qtree
- To track the amount of disk space or the number of files used by a user, group, or qtree, without imposing a limit
- To warn users when their disk usage or file usage is high

Overview of the quota process

Quotas can cause Data ONTAP to send a notification (soft quota) or to prevent a write operation from succeeding (hard quota) when quotas are exceeded.

When Data ONTAP receives a request to write to a volume, it checks to see whether quotas are activated for that volume. If so, Data ONTAP determines whether any quota for that volume (and, if the write is to a qtree, for that qtree) would be exceeded by performing the write operation. If any hard quota would be exceeded, the write operation fails, and a quota notification is sent. If any soft quota would be exceeded, the write operation succeeds, and a quota notification is sent.

Differences between hard and soft quotas

Hard quotas (Disk and Files fields) impose a hard limit on system resources. Any operation that would result in exceeding the limit fails. The soft quotas (Threshold, Soft Disk, and Soft Files fields) enable you to receive a warning, when users reach a certain resource level without affecting their data access. Therefore, you can take appropriate action before the quota is exceeded.

User quota management using Operations Manager

You can view user quota summary reports, chargeback reports, user details, quota events, and so on.

You can perform the following user quota management tasks by using Operations Manager:

- View summary reports (across all storage systems) and per-quota reports with data, about files and disk space that is used by users, hard and soft quota limits, and the projected time when users exceed their quota limit
- View graphs of total growth and per-quota growth of each user
- View details about a user
- Obtain chargeback reports for users
- Edit user quotas when you edit user quotas through Operations Manager, the `/etc/quotas` file is updated on the storage system on which the quota is located.
- Configure and edit user quota thresholds for individual users, volumes, and qtrees. When you configure a user quota threshold for a volume or qtree, the settings apply to all user quotas on that volume or qtree.
- Notify users when they exceed the user quota thresholds configured in DataFabric Manager
- Configure the monitoring interval for user quota monitoring
- View and respond to user quota events

- Configure alarms to notify administrators of the user quota events

Related concepts

Where to find user quota reports in Operations Manager on page 159
Monitor interval for user quotas in Operations Manager on page 160
What user quota thresholds are on page 162

Prerequisites for managing user quotas using Operations Manager

To monitor and manage user quotas by using Operations Manager, ensure that your storage system meets certain prerequisites.

- The storage systems on which you want to monitor the user quotas must have Data ONTAP 6.3 or later installed.
- The storage systems on which you want to manage user quotas must have Data ONTAP 6.4 or later installed.
- Following are the prerequisites to monitor and edit user quotas assigned to vFiler units:
  - The hosting storage system must be running Data ONTAP 6.5.1 or later.
  - You should enable RSH or SSH access to the storage system and configure login and password credentials that are used to authenticate DataFabric Manager.
- You must use DataFabric Manager to configure the root login name and root password of a storage system on which you want to monitor and manage user quotas.
- You must configure and enable quotas for each volume for which you want to view the user quotas.
- You must log in to Operations Manager as an administrator with the quota privilege to view user quota reports and events so that you can configure user quotas for volumes and qtrees.
- Additional requirements for editing quotas:
  - Directives, such as QUOTA_TARGET_DOMAIN and QUOTA_PERFORM_USER_MAPPING must not be present in the `/etc/quotas` file on the storage system.
  - The `/etc/quotas` file on the storage system must not contain any errors.

Where to find user quota reports in Operations Manager

You can view user quota reports in Operations Manager at **Control Center ➤ Home ➤ File SRM (or Quotas) ➤ Report**.

If you have not installed a File SRM license, you cannot view the File SRM tab. However, you can access the reports from the Quotas tab. After you install the File SRM license, the Quotas tab is renamed as “File SRM.”

Monitor interval for user quotas in Operations Manager

You can use Operations Manager to view the monitoring interval at which DataFabric Manager is monitoring a user quota on a storage system.

The `User Quota Monitoring Interval` option on the **Options** page (**Setup ➤ Options ➤ Monitoring**) determines how frequently DataFabric Manager collects the user quota information from the monitored storage systems. By default, the user quota information is collected once every day; however, you can change this monitoring interval.

Note: The process of collecting the user quota information from storage systems is resource intensive. When you decrease the User Quota Monitoring Interval option to a low value, DataFabric Manager collects the information more frequently. However, decreasing the User Quota Monitoring Interval might negatively affect the performance of the storage systems and DataFabric Manager.

Modification of user quotas in Operations Manager

You can edit disk space threshold, disk space hard limit, disk space soft limit, and so on for a user quota in Operations Manager.

When you edit the options for a user quota, the `/etc/quotas` file on the storage system where the quota exists is appropriately updated.

- Disk space threshold
- Disk space hard limit
- Disk space soft limit
- Files hard limit
- Files soft limit

For more information about these fields, see the *Operations Manager Help*.

Next topics

Prerequisites to edit user quotas in Operations Manager on page 160
Editing user quotas using Operations Manager on page 161

Prerequisites to edit user quotas in Operations Manager

If you want to edit user quota in Operations Manager, ensure that your storage system meets the prerequisites.

- You must configure the root login name and root password in DataFabric Manager for the storage system on which you want to monitor and manage user quotas.
- You must configure and enable quotas for each volume for which you want to view the user quotas.

- Operations Manager conducts vFiler quota editing by using the jobs. If a vFiler quota editing job fails, verify the `quota` file on the hosting storage system.

  In addition, to protect the `quota` file against damage or loss, before starting a job, DataFabric Manager creates a backup file named `DFM (timestamp).bak`. If the job fails, you can recover data by renaming the `backup quota` file.

Editing user quotas using Operations Manager

You can edit user quotas using the **Edit Quota Settings** page in Operations Manager.

Before You Begin

Ensure that the storage system meets the prerequisites before you edit user quotas in Operations Manager.

Steps

1. Click **Control Center ➤ Home ➤ Group Status ➤ File SRM (or Quotas) ➤ Report ➤ User Quotas, All**.
2. Click on any quota related fields for the required quota.

Configuring user settings using Operations Manager

You can configure user settings such as, e-mail address of users and quota alerts, and set user quota threshold using Operations Manager.

Steps

1. Click **Control Center ➤ Home ➤ Group Status ➤ File SRM (or Quotas) ➤ Report ➤ User Quotas, All**
2. Click the **Edit Settings** link in the lower left corner.
3. You can edit **E-mail Address** of the user, **Send Quota Alerts Now**, **User Quota Full Threshold (%)**, **User Quota Nearly Full Threshold (%)**, **Owner E-mail**, **Owner Name**, and **Resource Tag**.

   You can leave the e-mail address field blank if you want DataFabric Manager to use the default e-mail address of the user.

4. Click **Update**.

What user quota thresholds are

User quota thresholds are the values that DataFabric Manager uses to evaluate whether the space consumption by a user is nearing, or has reached the limit that is set by the user's quota.

If these thresholds are crossed, DataFabric Manager generates user quota events.

By default, DataFabric Manager sends user alerts in the form of e-mail messages to the users who cause user quota events. Additionally, you can configure alarms that notify the specified recipients (DataFabric Manager administrators, a pager address, or an SNMP trap host) of user quota events.

DataFabric Manager can also send a user alert when users exceed their soft quota limit; however, no thresholds are defined in DataFabric Manager for the soft quotas. DataFabric Manager uses the soft quota limits set in the `/etc/quotas` file of a storage system to determine whether a user has crossed the soft quota.

Next topics

What DataFabric Manager user thresholds are on page 162
User quota thresholds in Operations Manager on page 162
Ways to configure user quota thresholds in Operations Manager on page 162
Precedence of user quota thresholds in DataFabric Manager on page 163

What DataFabric Manager user thresholds are

The DataFabric Manager user quota thresholds are a percentage of the Data ONTAP hard limits (files and disk space) configured in the `/etc/quotas` file of a storage system.

The user quota threshold makes the user stay within the hard limit for the user quota. Therefore, the user quota thresholds are crossed even before users exceed their hard limits for user quotas.

User quota thresholds in Operations Manager

You can set a user quota threshold to all the user quotas present in a volume or a qtree.

When you configure a user quota threshold for a volume or qtree, the settings apply to all user quotas on that volume or qtree.

DataFabric Manager uses the user quota thresholds to monitor the hard and soft quota limits configured in the `/etc/quotas` file of each storage system.

Ways to configure user quota thresholds in Operations Manager

You can configure user quota thresholds by applying the thresholds to all quotas of a specific user or on a specific file system or on a group of file systems using Operations Manager.

- Apply user quota thresholds to all quotas of a specific user

- Apply user quota thresholds to all quotas on a specific file system (volume or qtree) or a group of file systems

  You can apply thresholds using the **Edit Quota Settings** links on the lower left pane of the **Details** page for a specific volume or qtree. You can access the **Volume Details** page by clicking on a volume name at **Control Center ➤ Home ➤ Member Details ➤ File Systems ➤ Report ➤ Volumes, All**. Similarly, for the Qtree Details page, clicking on the qtree name at **Control Center ➤ Home ➤ Member Details ➤ File Systems ➤ Report ➤ Qtrees, All**

  To apply settings to a group of file systems, select the group name from the **Apply Settings To** list on the **quota settings** page.
- Apply user quota thresholds to all quotas on all users on all file systems: that is, all user quotas in the DataFabric Manager database

  You can apply thresholds at **Setup ➤ Options ➤ Edit Options: Default Thresholds**.

Precedence of user quota thresholds in DataFabric Manager

DataFabric Manager prioritizes user quota threshold based on a specific user, a specific volume or a qtree, and all users in DataFabric Manager.

The following list specifies the order in which user quota thresholds are applied:

1. User quota thresholds specified for a specific user
2. File systems (volumes and qtrees) user quota thresholds specified for a specific volume or qtree
3. Global user quota thresholds specified for all users in the DataFabric Manager database

Management of LUNs, Windows and UNIX hosts, and FCP targets

Operations Manager is used to monitor and manage LUNs, Windows and UNIX hosts, and, FCP targets in your SANs. SANs on the DataFabric Manager server are storage networks that have been installed in compliance with the specified SAN setup guidelines. For more information about setting up a SAN, see the *Data ONTAP Block Access Management Guide for iSCSI and FC*.

Note: NetApp has announced the end of availability for the SAN license for DataFabric Manager. Existing customers can continue to license the SAN option with DataFabric Manager. DataFabric Manager customers should check with their NetApp sales representative regarding other NetApp SAN management solutions.

Next topics

Management of SAN components on page 165
SAN and NetApp Host Agent software on page 166
List of tasks performed using NetApp Host Agent software on page 166
List of tasks performed to monitor targets and initiators on page 167
Reports for monitoring LUNs, FCP targets, and SAN hosts on page 169
Information available on the LUN Details page on page 169
Information about the FCP Target Details page on page 171
Information about the Host Agent Details page on page 171
How storage systems, SAN hosts, and LUNs are grouped on page 173
Introduction to deleting and undeleting SAN components on page 173
Where to configure monitoring intervals for SAN components on page 174

Related information

Data ONTAP Block Access Management Guide for iSCSI and FCP - http://now.netapp.com/NOW/knowledge/docs/san/#ontap_san

Management of SAN components

To monitor and manage LUNs, FCP targets, and SAN hosts, the DataFabric Manager server must first discover them.

The DataFabric Manager server uses SNMP to discover storage systems, but SAN hosts must already have the NetApp Host Agent software installed and configured on them before the DataFabric Manager server can discover them.

After SAN components have been discovered, the DataFabric Manager server starts collecting pertinent data—for example, which LUNs exist on which storage systems. Data is collected periodically and reported through various Operations Manager reports. (The frequency of data collection depends on the values that are assigned to the DataFabric Manager server monitoring intervals.)

The DataFabric Manager server monitors LUNs, FCP targets, and SAN hosts for a number of predefined conditions and thresholds. For example, when the state of an HBA port changes to online or offline or when the traffic on an HBA port exceeds a specified threshold. If a predefined condition is met or a threshold is exceeded, the DataFabric Manager server generates and logs an event in its database. These events can be viewed through the details page of the affected object. Additionally, you can configure the DataFabric Manager server to send notification about such events (also known as alarms) to an e-mail address. You can also configure DataFabric Manager server to send notifications to a pager, an SNMP trap host, or a script you write.

In addition to monitoring LUNs, FCP targets, and SAN hosts, you can use the DataFabric Manager server to manage these components. For example, you can create, delete, or expand a LUN.

SAN and NetApp Host Agent software

The DataFabric Manager server can automatically discover SAN hosts; however, it does not use SNMP to poll for new hosts.

NetApp Host Agent software discovers, monitors, and manages SANs on SAN hosts. You must install the NetApp Host Agent software on each SAN host that you want to monitor and manage with the DataFabric Manager server.

Note: To modify the global host agent monitoring interval for SAN hosts, you must change the SAN Host Monitoring Interval (**Setup ➤ Options ➤ Monitoring**).

List of tasks performed using NetApp Host Agent software

Once NetApp Host Agent software is installed on a client host along with DataFabric Manager server, you can perform various management tasks.

After the NetApp Host Agent software is installed on a client host and you have installed the DataFabric Manager server with the Operations Manager license, you can perform a variety of tasks:

- Monitor basic system information for SAN hosts and related devices
- Perform management functions such as creating, modifying, or expanding a LUN
- View detailed HBA and LUN information

Note: NetApp Host Agent is also used for File Storage Resource Management functions, with a File SRM license. For more information about the NetApp Host Agent software, see the *NetApp Host Agent Installation and Administration Guide*.

Related information

NetApp Host Agent Installation and Administration Guide - http://now.netapp.com/NOW/knowledge/docs/nha/nha_index.shtml

List of tasks performed to monitor targets and initiators

You can use Operations Manager to perform management tasks such as view reports; monitor, manage, and group LUNs; and respond to LUN and SAN host events.

Following is a list of tasks you can perform to monitor targets and initiators:

- View reports that provide information about LUNs, FCP targets, and SAN hosts.
- View details about a specific LUN, FCP target on a storage system, or SAN host.
- Group LUNs, storage systems in a SAN, or SAN hosts for efficient monitoring and management.
- Change the monitoring intervals for LUNs, and SAN hosts.
- View and respond to LUN and SAN host events.
- Configure DataFabric Manager server to generate alarms to notify recipients of LUN and SAN host events.

Next topics

Prerequisites to manage targets and initiators on page 167
Prerequisites to manage SAN hosts on page 168

Related concepts

Reports for monitoring LUNs, FCP targets, and SAN hosts on page 169
Information available on the LUN Details page on page 169
Tasks performed on the LUN Details page on page 170
Information about the FCP Target Details page on page 171
Information about the Host Agent Details page on page 171
List of tasks performed on the Host Agent Details page on page 172

Prerequisites to manage targets and initiators

Operations Manager does not report any data for your targets and initiators if you do not have the SAN set up according to the specified hardware and software requirements.

SAN deployments are supported on specific hardware platforms running Data ONTAP 6.3 or later. For more information about the supported hardware platforms, see the *Compatibility and Configuration Guide for FCP and iSCSI Products*. For more information about specific software requirements, see the *DataFabric Manager Installation and Upgrade Guide*.

Related information

DataFabric Manager Installation and Upgrade Guide - http://now.netapp.com/NOW/knowledge/docs/DFM_win/dfm_index.shtml

Compatibility and Configuration Guide for FCP and iSCSI Products - http://now.netapp.com/NOW/products/interoperability/

Prerequisites to manage SAN hosts

You must ensure a proper network connection and software installed on SAN hosts before you manage SAN hosts with DataFabric Manager server.

- All SAN hosts to be managed by the DataFabric Manager server must be connected to a TCP/IP network either known to or discoverable by the DataFabric Manager server.

  The SAN hosts must be connected to the network through an Ethernet port and must each have a valid IP address.
- Each SAN host must have the NetApp Host Agent software installed on it.

  The NetApp Host Agent software is required for discovering, monitoring, and managing SAN hosts. For more information about the NetApp Host Agent software, see the *NetApp Host Agent Installation and Administration Guide*.
- For LUN management using the DataFabric Manager server, Windows SAN hosts must have the proper version of SnapDrive software installed.

  To find out which SnapDrive version you received, see the DataFabric Manager server software download pages at the NOW site.

Note: LUN management on UNIX SAN hosts using the DataFabric Manager server is not available. LUNs inherit access control settings from the storage system, volume, and qtree they are contained in. Therefore, to perform LUN operations on storage systems, you must have appropriate privileges set up on those storage systems.

Related information

NetApp Host Agent Installation and Administration Guide - http://now.netapp.com/NOW/knowledge/docs/nha/nha_index.shtml

The NOW site - http://now.netapp.com/

Reports for monitoring LUNs, FCP targets, and SAN hosts

Reports about LUNs, SAN hosts, and FCP targets that the DataFabric Manager server monitors, are available on the **LUNs** page of **Member Details** tab.

You can view reports by selecting from the Report drop-down list. If you want to view a report about a specific group, click the group name in the left pane of Operations Manager. You can view the following reports from the **LUNs** page:

- FCP Targets
- SAN Hosts, Comments
- SAN Hosts, All
- SAN Hosts, FCP
- SAN Hosts, iSCSI
- SAN Hosts, Deleted
- SAN Hosts Traffic, FCP
- SAN Host Cluster Groups
- SAN Host LUNs, All
- SAN Hosts LUNs, iSCSI
- SAN Hosts LUNs, FCP
- LUNs, All
- LUNs, Comments
- LUNs, Deleted
- LUNs, Unmapped
- LUN Statistics
- LUN Initiator Groups
- Initiator Groups

For more information about descriptions of each report field, see the *Operations Manager Help*.

Information available on the LUN Details page

The **LUN Details** page for a LUN consists of information such as, status of the LUN, the LUN's storage system and so on.

You can access the **Details** page for a LUN by clicking the LUN path displayed in any of the reports. Following are the information about the **LUN Details** page:

- Status of the LUN

- Storage system on which the LUN exists
- Volume or qtree on which the LUN exists
- Initiator groups to which the LUN is mapped

You can access all LUN paths that are mapped to an initiator group by clicking the name of the initiator group.

Note: If a LUN is mapped to more than one initiator group, when you click an initiator group, the displayed page lists all the LUN paths that are mapped to the initiator group. Additionally, the report contains all other LUN mappings (LUN paths to initiator groups) that exist for those LUN paths.

- Size of the LUN
- Serial number of the LUN
- Description of the LUN
- Events associated with the LUN
- Groups to which the LUN belong
- Number of LUNs configured on the storage system on which the LUN exists and a link to a report displaying those LUNs
- Number of SAN hosts mapped to the LUN and a link to the report displaying those hosts
- Number of HBA ports that can access this LUN and a link to the report displaying those LUNs
- Time of the last sample collected and the configured polling interval for the LUN
- Graphs that display the following information:
  - LUN bytes per second—Displays the rate of bytes (bytes per second) read from and written to a LUN over time
  - LUN operations per second—Displays the rate of total protocol operations (operations per second) performed on the LUN over time

Related concepts

Reports for monitoring LUNs, FCP targets, and SAN hosts on page 169

Tasks performed on the LUN Details page

By using the **LUN Path Tools** links on the **LUN Details** page, you can perform various management tasks.

Following are the tasks you can perform on the **LUN Details** page:

Expand this LUN	Launches a wizard that helps you expand the LUN
Destroy this LUN	Launches a wizard that helps you destroy the LUN
Refresh Monitoring Samples	Obtains current monitoring samples from the storage system on which this LUN exists

Run a Command	Runs a Data ONTAP command on the storage system on which this LUN exists

Note: To manage a shared LUN on MSCS, perform the operation on the active controller. Otherwise, the operation fails.

You must have appropriate authentication to run commands on the storage system from the DataFabric Manager server.

Information about the FCP Target Details page

The **FCP Target Details** page contains information such as, name of the storage system, operational status of the target, adapter speed, and so on.

You can access the **FCP Target Details** page for a target by clicking its port number in the FCP Targets report (**LUNs ➤ View, FCP Targets**). The **FCP Target Details** page contains the following information:

- Name of the storage system on which target is installed
- Operational status of the target
- Adapter hardware and firmware versions
- Adapter speed
- FC topology of the target:
  - Fabric
  - Point-To-Point
  - Loop
  - Unknown
- Node name (WWNN) and port name (WWPN) of the target
- Name of the FC port to which the target connects
- Number of other FCP targets on the storage system on which the target is installed (link to report)
- Number of HBA ports (SAN host ports) that the target can access (link to report)
- Time of the last sample collected and the configured polling interval for the FCP target

Information about the Host Agent Details page

The Host Agent Details page contains information such as, status of SAN host, events that occurred on SAN host, devices related to SAN host, and so on.

You can access the Details page for a NetApp Host Agent by clicking its name in any of the SAN Host reports. The Details page for a Host Agent on a SAN host contains the following information:

- Status of the SAN host and the time since the host has been up
- The operating system and the NetApp Host Agent version, in addition to protocols and features running on the SAN host
- The MSCS configuration information about the SAN host, if any, such as the cluster name, cluster partner, and cluster groups to which the SAN host belongs
- The events that occurred on this SAN host
- The number of HBAs and HBA ports on the SAN host (links to report)
- The devices related to the SAN host, such as the FC switch ports connected to it and the storage systems accessible from the SAN host
- Graphs of information, such as the HBA port traffic per second or the HBA port frames for different time intervals

For more information about the SAN Host reports, see the *Operations Manager Help*.

List of tasks performed on the Host Agent Details page

The **Host Tools** list on the **Host Agent Details** page enables you to perform various tasks such as, edit settings, create a LUN, refresh monitoring samples, and so on.

Edit Settings	Displays the **Edit Host Agent Settings** page, where you configure login, password, administration transport, port information for the SAN host, and the user name and password for CIFS access in Operations Manager. The login and password information is used to authenticate the DataFabric Manager server to the NetApp Host Agent software running on the SAN host. Specify a value on this page only if you want to change the global setting.
Create a LUN	Takes you to a LUN creation page that help you create a LUN.
Diagnose Connectivity	Automates connectivity troubleshooting.
Refresh Monitoring Samples	Obtains current monitoring samples from the SAN host.
Manage Host Agent	Allows you to edit settings for the Host Agent. You can edit details such as, monitoring and management of API passwords, the HTTP and HTTPS ports. This enables remote upgrading and specifies a filewalk log path.

Related concepts

Where to configure monitoring intervals for SAN components on page 174

How storage systems, SAN hosts, and LUNs are grouped

You can group LUNs, storage systems, or SAN hosts for easier management and to apply access control.

When you create a group of storage systems or SAN hosts, the type of the created group is “Appliance resource group.” When you create a group of LUNs, the created group is “LUN resource group.”

Note: You cannot group HBA ports or FCP targets.

Related tasks

Creating groups on page 80

Granting access to storage systems, SAN hosts, and LUNs

You can allow an administrator access for managing all your SAN hosts and LUNs. The GlobalSAN role allows an administrator to create, expand, and destroy LUNs.

Before You Begin

The GlobalSan role must be enabled for LUN management.

Step

1. To allow administrator access, go to the **Administrator** page and select **Setup menu ➤ Administrative users**.

Option	Description
To create a new administrator	In the **Administrators** page, complete the `Add a New Administrator` option, and then select GlobalSAN from the Roles list.
To grant access to an existing administrator	In the **Administrator** page, from the List of administrators, click on the **Edit** column of the administrator to be granted access, and then select GlobalSAN from the Roles list.

Introduction to deleting and undeleting SAN components

You can stop monitoring a SAN component (a LUN, a storage system, or a SAN host) with the DataFabric Manager server by deleting it from the Global group.

When you delete a SAN component from the Global group, the DataFabric Manager server stops collecting and reporting data about it. Data collection and reporting is not resumed until the component is again added by performing the undelete operation.

You cannot stop monitoring a specific FCP target or an HBA port, unless you first stop monitoring the storage system (for the FCP target) or the SAN host (for the HBA port) on which the target or the port exists.

Note: When you delete a SAN component from any group except Global, the component is deleted only from that group. The DataFabric Manager server does not stop collecting and reporting data about it. You must delete the SAN component from the Global group for the DataFabric Manager server to stop monitoring it altogether.

Next topics

Deleting a SAN component on page 174

How a deleted SAN component delete is restored on page 174

Deleting a SAN component

You can delete a SAN component from any of the reports related to that component.

Steps

1. Select the component you want to delete by clicking the check boxes in the left-most column of a report.
2. Click the **Delete Selected** button at the bottom of each report to delete the selected component.

How a deleted SAN component delete is restored

You can restore a deleted object, by selecting it and then clicking the Undelete button from the Deleted report.

All deleted objects are listed in their respective Deleted reports. For example, all deleted LUNs are listed in the LUNs Deleted report.

Where to configure monitoring intervals for SAN components

You can configure the global options on the **Options** page (Setup menu > Options) in Operations Manager.

To configure local options (for a specific object), you must be on the **Edit Settings** page of that specific object (**Details page ➤ Tools list: Edit Settings**). For example, to access the **LUNs Details** page, click **Member Details ➤ LUNs ➤ Report drop-down list: LUNS, All ➤ LUN Path ➤ LUN Path Tools: Edit Settings**.

Related concepts

Where to find information about a specific storage system on page 204

File system management

You can manage storage on storage system by using the data displayed by Operations Manager storage reports and the options you use to generate storage-related events and alarms.

Next topics

Access to storage-related reports on page 175
Storage capacity thresholds in Operations Manager on page 175
Management of aggregate capacity on page 177
Management of volume capacity on page 182
Management of qtree capacity on page 187
Volumes and qtrees monitored on a vFiler unit on page 190
What clone volumes are on page 191
Why Snapshot copies are monitored on page 191
Storage chargeback reports on page 193
The chargeback report options on page 195
What deleting storage objects for monitoring is on page 198

Access to storage-related reports

You can view storage-related reports about storage objects that DataFabric Manager monitors.

The storage reports present information about a selected aspect of the storage object, such as chargeback, space availability, and status.

Note: The status specifies the current status of the selected storage object.

You can find storage-related reports on the tabs accessible from the Member Details tab: Appliances, vFilers, File Systems, Aggregates, SANs, and LUNs tabs. Each tab has a Report drop-down list from which you can select the report you want to display.

For information about specific storage-related reports, see the *Operations Manager Help*.

Storage capacity thresholds in Operations Manager

Storage capacity threshold is the point at which DataFabric Manager generates events to report capacity problem.

Storage capacity thresholds determine at what point you want DataFabric Manager to generate events about capacity problems. You can configure alarms to send notification whenever a storage event occurs.

When DataFabric Manager is installed, the storage capacity thresholds for all aggregates, volumes, and qtrees are set to default values. You can change the settings as needed for an object, a group of objects, or the Global group.

Next topics

Modification of storage capacity thresholds settings on page 176
Changing storage capacity threshold settings for global group on page 176
Changing storage capacity threshold settings for an individual group on page 176
Changing storage capacity threshold settings for a specific aggregate, volume, or qtree on page 177

Modification of storage capacity thresholds settings

You can change the storage capacity threshold settings globally, for a specific group, or for a specific aggregate, volume, or qtree. If you edit capacity threshold settings, the edited thresholds override the global thresholds.

Note: Changing storage capacity threshold settings for the Global group changes the default storage capacity settings for all groups and individual storage objects.

Changing storage capacity threshold settings for global group

Perform the following steps to change the storage capacity threshold settings for global group.

Steps

1. Select **Setup ➤ Options**.
2. Click **Default Thresholds** in the left pane.
3. Edit the Default settings as needed.
4. Click **Update**.

Changing storage capacity threshold settings for an individual group

Perform the following steps to change the storage capacity threshold settings for an individual group.

Steps

1. Select **Control Center ➤ Home ➤ Member Details**.
2. Click **Aggregates**, to change aggregate options or, **File Systems** to change volume or qtree options.
3. Click the name of an aggregate, volume, or qtree.

4. Click **Edit Settings** under the **Tools** section in the left pane.
5. Edit the settings as needed.
6. Select the name of the group from **Apply Settings to** drop-down list.
7. Click **Update**.
8. Approve the change by clicking **OK** on the **verification** page.

Changing storage capacity threshold settings for a specific aggregate, volume, or qtree

Perform the following steps to change the storage capacity threshold settings for specific aggregate, volume, or qtree.

Steps

1. Click **Aggregates** to change Aggregate options or **File Systems** to change volume or qtree options.
2. Click the name of an aggregate, volume, or qtree.
3. Click **Edit Settings** under the **Tools** section in the left pane.
4. Edit the desired settings.

   Note: To revert to the default settings, leave the fields empty.

5. Click **Update** and then click **OK**.

Management of aggregate capacity

You can manage aggregate capacity by gathering aggregate information and aggregate overcommitment information, by tracking aggregate space utilization, and by determining aggregate capacity threshold.

Next topics

Volume space guarantees and aggregate overcommitment on page 177
Available space on an aggregate on page 178
Considerations before modifying aggregate capacity thresholds on page 178
Aggregate capacity thresholds and their events on page 179

Volume space guarantees and aggregate overcommitment

You can use aggregate overcommitment to advertise more available space than the available space.

When managing storage resources, it is important to understand the role that aggregate overcommitment plays in space availability. To use aggregate overcommitment, you must create flexible volumes with

a space guarantee of `none` or `file` so that the aggregate size does not limit the volume size. Each volume can be larger than its containing aggregate. You can use the storage space that the aggregate provides, as needed, by creating LUNs, or adding data to volumes.

By using aggregate overcommitment, the storage system can advertise more available storage than actually exists in the aggregate. With aggregate overcommitment, you could provide greater amounts of storage that you know would be used immediately. Alternatively, if you have several volumes that sometimes need to grow temporarily, the volumes can dynamically share the available space with each other.

Note: If you have overcommitted your aggregate, you must monitor its available space carefully and add storage as needed to avoid write errors due to insufficient space

For details about volume space reservations, and aggregate overcommitment, see the *Data ONTAP Storage Management Guide*.

Related information

Data ONTAP Storage Management Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Available space on an aggregate

With Operations Manager, you can determine the available space on an aggregate.

To help you determine the space availability on an aggregate, Operations Manager displays three values on the **Aggregate Details** page for each aggregate:

Aggregate size	Total size of the aggregate.
Capacity used	The total amount of disk space in use by volumes present in the aggregate.
Total committed capacity	The total amount of committed disk space to volumes present in the aggregate. The total committed capacity can be larger than the total capacity by using aggregate overcommitment.

Considerations before modifying aggregate capacity thresholds

You must note the aggregate overcommitment point before changing aggregate capacity threshold.

Ensure that you take care of the following points when deciding whether to modify the aggregate capacity threshold:

Use of aggregate overcommitment strategy	If you use the aggregate overcommitment strategy, you would want to increase the Aggregate Overcommitted threshold to more than 100. To determine how far beyond 100 to set the threshold, you must decide at what point the aggregate is too overcommitted. Ensure that you note the difference between your storage commitments and actual storage usage.

	Also, review the capacity graphs of historical data to get a sense of how the amount of storage used changes over time.
Set the Aggregate Full and Aggregate Nearly Full thresholds	Set the Aggregate Full and Aggregate Nearly Full thresholds so that you have time to take corrective action if storage usage approaches capacity. Because the aggregate is overcommitted, you might want to set the Aggregate Full and Aggregate Nearly Full thresholds to values lower than the default. Lowering the thresholds generate an event well before completely filling the storage. Early notification gives you more time to take corrective action, such as installing more storage, before the storage space is full and write errors occur.
Non-usage of aggregate overcommitment	If you do not use aggregate overcommitment as a storage-management strategy, you must leave the Aggregate Overcommitted and Nearly Overcommitted threshold values unchanged from their default.
Set the Aggregate Nearly Full threshold	If an aggregate is routinely more than 80 percent full, set the Aggregate Nearly Full threshold to a value higher than the default.

Note: If you edit capacity thresholds for a particular aggregate, the edited thresholds override the global thresholds. You can edit thresholds for a particular aggregate, from the **Aggregate Details** page.

Aggregate capacity thresholds and their events

You can configure aggregate capacity threshold and their events from DataFabric Manager. You can set alarms to monitor capacity and monitor commitment of an aggregate.

DataFabric Manager features aggregate capacity thresholds and their events to help you monitor both the capacity and the commitments of an aggregate. You can configure alarms to send notification whenever an aggregate capacity event occurs. For the Aggregate Full threshold, you can also configure an alarm to send notification only when the condition persists over a specified time.

By default, if you have configured an alarm to alert you to an event, DataFabric Manager issues the alarm only once per event. You can configure the alarm to repeat until you receive an acknowledgment.

Note: If you want to set an alarm on a specific aggregate, you must create a group with that aggregate as the only member.

You can set the following aggregate capacity thresholds:

Aggregate Full (%)	Description: Specifies the percentage at which an aggregate is full. **Note:** To reduce the number of Aggregate Full Threshold events generated, you can set an Aggregate Full Threshold Interval (0 seconds). This causes DataFabric Manager to generate an Aggregate Full event only if the condition persists for the specified time. Default value: 90

Event generated: Aggregate Full

Event severity: Error

Corrective action: Take one or more of the following actions:

- To free disk space, ask your users to delete files that are no longer needed from volumes contained in the aggregate that generated the event.
- Add one or more disks to the aggregate that generated the event.
  Add disks with caution. Once you add a disk to an aggregate, you cannot remove it without first destroying all flexible volumes present in the aggregate to which the disk belongs. Destroy the aggregate itself once all the flexible volumes are removed from the aggregate.
- Temporarily reduce the `Snapshot reserve`.
  By default, the reserve is 20percent of disk space. If the reserve is not in use, reducing the reserve can free disk space, giving you more time to add a disk.
  There is no way to prevent Snapshot copies from consuming disk space greater than the amount reserved for them. It is, therefore, important to maintain a large enough reserve for Snapshot copies so that the active file system always has space available to create new files or modify existing ones. For more information about the `Snapshot reserve`, see the *Data ONTAP Data Protection, Online Backup and Recovery Guide*.

Aggregate Nearly Full (%)

Description: Specifies the percentage at which an aggregate is nearly full.

Default value: 80. The value for this threshold must be lower than the value for Aggregate Full Threshold for DataFabric Manager to generate meaningful events.

Event generated: Aggregate Almost Full

Event severity: Warning

Corrective action: Same as Aggregate Full.

Aggregate Overcommitted (%)

Description: Specifies the percentage at which an aggregate is overcommitted.

Default value: 100

Event generated: Aggregate Overcommitted

Event severity: Error

Corrective action:

Take one or more of the following actions:

- Create new free blocks in the aggregate by adding one or more disks to the aggregate that generated the event.

  Note: Add disks with caution. Once you add a disk to an aggregate, you cannot remove it without first destroying all flexible volumes present in the

aggregate to which the disk belongs. Destroy the aggregate itself once all the flexible volumes are destroyed.

- Temporarily free some already occupied blocks in the aggregate by taking unused flexible volumes offline.

  Note: When you take a flexible volume offline, it returns any space it uses to the aggregate. However, when you bring the flexible volume online again, it requires the space again.

- Permanently free some already occupied blocks in the aggregate by deleting unnecessary files.

Aggregate Nearly Overcommitted (%)

Description: Specifies the percentage at which an aggregate is nearly overcommitted.

Default value: 95. The value for this threshold must be lower than the value for Aggregate Full Threshold for DataFabric Manager to generate meaningful events.

Event generated: Aggregate Almost Overcommitted

Event severity: Warning

Corrective action: Same as Aggregate Overcommitted.

Aggregate Snapshot Reserve Nearly Full Threshold (%)

Description: Specifies the percentage of the Snapshot reserve on an aggregate that you can use before the system raises the Aggregate Snapshots Nearly Full event.

Default value: 80

Event generated: Aggregate Snapshot Reserve Almost Full

Event severity: Warning

Corrective action: There is no way to prevent Snapshot copies from consuming disk space greater than the amount reserved for them. If you disable the aggregate `Snapshot autodelete` option, it is important to maintain a large enough reserve. Disabling would ensure that there is always space available to create new files or modify present ones. Disabling would ensure that there is always space available to create new files or modify present ones. See the *Operations Manager Help* for instructions on how to identify Snapshot copies you can delete. For more information about the `Snapshot reserve`, see the *Data ONTAP Data Protection, Online Backup and Recovery Guide*.

Aggregate Snapshot Reserve Full Threshold (%)

Description: Specifies the percentage of the Snapshot reserve on an aggregate that you can use before the system raises the Aggregate Snapshots Full event.

Default value: 90

Event generated: Aggregate Snapshot Reserve Full

Event severity: Warning

Corrective action: There is no way to prevent Snapshot copies from consuming disk space greater than the amount reserved for them.

Note: A newly created traditional volume tightly couples with its containing aggregate so that the capacity of the aggregate determines the capacity of the new traditional volume. For this reason, synchronize the capacity thresholds of traditional volumes with the thresholds of their containing aggregates.

Related tasks

Creating alarms on page 95

Related information

Data ONTAP Data Protection Online Backup and Recovery Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Management of volume capacity

You can manage volume capacity by gathering volume information, by determining volume capacity threshold and events, by modifying volume capacity threshold, by setting volume Snapshot copy thresholds and events.

Next topics

Volume capacity thresholds and events on page 182
Normal events for a volume on page 186
Modification of the thresholds on page 187

Volume capacity thresholds and events

DataFabric Manager features thresholds to help you monitor the capacity of flexible and traditional volumes. You can configure alarms to send notification whenever a volume capacity event occurs. For the Volume Full threshold, you can also configure an alarm to send notification only when the condition persists over a specified period.

By default, if you have configured an alarm to alert you to an event, DataFabric Manager issues the alarm only once per event. You can configure the alarm to repeat until it is acknowledged.

Note: If you want to set an alarm on a specific volume, you must create a group with that volume as the only member.

You can set the following volume capacity thresholds:

Volume Full Threshold (%)

Description: Specifies the percentage at which a volume is considered full.

Note: To reduce the number of Volume Full Threshold events generated, you can set a Volume Full Threshold Interval to a non-zero value. By default, the Volume Full threshold interval is set to zero. This causes DataFabric Manager to generate a Volume Full event only if the condition persists for the specified period.

Default value: 90

Event generated: Volume Full

Event severity: Error

Corrective action: Take one or more of the following actions:

- Ask your users to delete files that are no longer needed, to free disk space.
- For flexible volumes containing enough aggregate space, you can increase the volume size.
- For traditional volumes containing aggregate with limited space, you can increase the size of the volume by adding one or more disks to the containing aggregate.

  Note: Add disks with caution. Once you add a disk to an aggregate, you cannot remove it without destroying the volume and its containing aggregate.

- For traditional volumes, temporarily reduce the Snapshot copy reserve. By default, the reserve is 20 percent of disk space. If the reserve is not in use, reducing the reserve frees disk space, giving you more time to add a disk. There is no way to prevent Snapshot copies from consuming disk space greater than the amount reserved for them. Therefore, it is important to maintain a large enough reserve for Snapshot copies. By maintaining the reserve for Snapshot copies, the active file system always has space available to create new files or modify existing ones. For more information about the Snapshot copy reserve, see the *Data ONTAP Data Protection Online Backup and Recovery Guide*.

Volume Nearly Full Threshold (%)

Description: Specifies the percentage at which a volume is considered nearly full.

Default value: 80. The value for this threshold must be lower than the value for the Volume Full Threshold in order for DataFabric Manager to generate meaningful events.

Event generated: Volume Almost Full

Event severity: Warning

	Corrective action: Same as Volume Full.
Volume Space Reserve Nearly Depleted Threshold (%)	Description: Specifies the percentage at which a volume is considered to have consumed most of its reserved blocks. This option applies to volumes with LUNs, Snapshot copies, no free blocks, and a fractional overwrite reserve of less than 100%. A volume that crosses this threshold is getting close to having write failures. Default value: 80 Event generated: Volume Space Reservation Nearly Depleted Event severity: Warning
Volume Space Reserve Depleted Threshold (%)	Description: Specifies the percentage at which a volume is considered to have consumed all its reserved blocks. This option applies to volumes with LUNs, Snapshot copies, no free blocks, and a fractional overwrite reserve of less than 100%. A volume that has crossed this threshold is getting dangerously close to having write failures. Default value: 90 Event generated: Volume Space Reservation Depleted Event severity: Error When the status of a volume returns to normal after one of the preceding events, events with a severity of Normal are generated. Normal events do not generate alarms or appear in default event lists, which display events of Warning or worse severity.
Volume Quota Overcommitted Threshold (%)	Description: Specifies the percentage at which a volume is considered to have consumed the whole of the overcommitted space for that volume. Default value: 100 Event generated: Volume Quota Overcommitted Event severity: Error Corrective action: Take one or more of the following actions: • Create new free blocks by increasing the size of the volume that generated the event. • Permanently free some of the already occupied blocks in the volume by deleting unnecessary files.
Volume Quota Nearly Overcommitted Threshold (%)	Description: Specifies the percentage at which a volume is considered to have consumed most of the overcommitted space for that volume. Default Value: 95

	Event generated: Volume Quota Almost Overcommitted Event Severity: Warning Corrective action: Same as that of Volume Quota Overcommitted.
Volume Growth Event Minimum Change (%)	Description: Specifies the minimum change in volume size (as a percentage of total volume size) that is acceptable. If the change in volume size is more than the specified value, and the growth is abnormal with respect to the volume-growth history, the DataFabric Manager server generates a Volume Growth Abnormal event. Default value: 1 Event generated: Volume Growth Abnormal
Volume Snap Reserve Full Threshold (%)	Description: Specifies the value (percentage) at which the space that is reserved for taking volume Snapshot copies is considered full. Default value: 90 Event generated: Volume Snap Reserve Full Event severity: Error Corrective action: There is no way to prevent Snapshot copies from consuming disk space greater than the amount reserved for them. If you disable the volume `Snapshot autodelete` option, it is important to maintain a large enough reserve. Disabling would ensure Snapshot copies that there is always space available to create new files or modify present ones. For instructions on how to identify Snapshot copies you can delete, see the *Operations Manager Help*.
User Quota Full Threshold (%)	Description: Specifies the value (percentage) at which a user is considered to have consumed all the allocated space (disk space or files used) as specified by the user's quota. The user's quota includes hard limit in the `/etc/quotas` file. If this limit is exceeded, the DataFabric Manager server generates a User Disk Space Quota Full event or a User Files Quota Full event. Default value: 90 Event generated: User Quota Full
User Quota Nearly Full Threshold (%)	Description: Specifies the value (percentage) at which a user is considered to have consumed most of the allocated space (disk space or files used) as specified by the user's quota. The users' quota includes hard limit in the `/etc/quotas` file. If this limit is exceeded, the DataFabric Manager server generates a User Disk Space Quota Almost Full event or a User Files Quota Almost Full event. Default value: 80 Event generated: User Quota Almost Full

Volume No First Snapshot Threshold (%)	Description: Specifies the value (percentage) at which a volume is considered to have consumed all the free space for its space reservation. This is the space that the volume needs when the first Snapshot copy is created. This option applies to volumes that contain space-reserved files, no Snapshots , a fraction of Snapshot copies overwrite reserve set to greater than 0, and where the sum of the space reservations for all LUNs in the volume is greater than the free space available to the volume. Default value: 90 Event generated: Volume No First Snapshot
Volume Nearly No First Snapshot Threshold (%)	Description: Specifies the value (percentage) at which a volume is considered to have consumed most of the free space for its space reservation. This is the space that the volume needs when the first snapshot is created. This option applies to volumes that contain space-reserved files, no snapshots, a fractional overwrite reserve set to greater than 0, and where the sum of the space reservations for all LUNs in the volume is greater than the free space available to the volume. Default value: 80 Event generated: Volume Almost No first Snapshot

Note: When a traditional volume is created, it is tightly coupled with its containing aggregate so that its capacity is determined by the capacity of the aggregate. For this reason, you should synchronize the capacity thresholds of traditional volumes with the thresholds of their containing aggregates.

Related concepts

Volume Snapshot copy thresholds and events on page 187

Related tasks

Creating alarms on page 95

Related information

Data ONTAP Data Protection Online Backup and Recovery Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Normal events for a volume

Normal events do not generate alarms or appear in default event lists, which display events of Warning or worst severity.

To view normal events for a volume, do either of the following:

- Display the **Volume Details** page for the volume.

- Click the Events tab; then go to the Report drop-down list and select the History report.

Modification of the thresholds

You can set the thresholds to a value, higher or a lower, than the default.

You might want to set the thresholds to a value higher than the default if storage space is routinely more than 80 percent full. Leaving the Nearly Full Threshold at the default value might generate events that notify you that storage space is nearly full more often than you want.

You might want to set the thresholds to a value lower than the default. Lowering the threshold ensures that DataFabric Manager generates the event well before completely filling the storage. An early notification gives you more time to take corrective action before the storage space is full.

Management of qtree capacity

You can manage qtree capacity by gathering qtree information, tracking qtree capacity utilization, and determining qtree capacity threshold and events.

Next topics

Volume Snapshot copy thresholds and events on page 187
Qtree capacity thresholds and events on page 189

Volume Snapshot copy thresholds and events

You can set alarms whenever a Snapshot copy is taken on a flexible or a traditional volume.

DataFabric Manager features thresholds to help you monitor Snapshot copy usage for flexible and traditional volumes. You can configure alarms to send notification whenever a volume Snapshot event occurs.

By default, if you have configured an alarm to alert you to an event, DataFabric Manager issues the alarm only once per event. You can configure the alarm to repeat until it is acknowledged.

Note: If you want to set an alarm on a specific volume, you must create a group with that volume as the only member.

You can set the following volume Snapshot thresholds:

Volume Snap Reserve Full Threshold (%)	Description: Specifies the percentage at which the space that is reserved for taking volume Snapshot copies is considered full. Default value: 90 Event generated: Snapshot Reserve Full Event severity: Warning

	Corrective action: **1.** Access the Volume Snapshot details report. **2.** Select the Snapshot copies. **3.** Click **Compute Reclaimable**.
Volume Nearly No First Snapshot Threshold (%)	Description: Specifies the percentage at which a volume is considered to have consumed most of the free space for its space reservation. This is the space that the volume needs when the first Snapshot copy is created. This option applies to volumes that contain space-reserved files, no Snapshot copies, a fractional overwrite reserve set to greater than 0, and where the sum of the space reservations for all LUNs in the volume is greater than the free space available to the volume. Default value: 80 Event generated: Nearly No Space for First Snapshot Event severity: Warning
Volume No First Snapshot Threshold (%)	Description: Specifies the percentage at which a volume is considered to have consumed all the free space for its space reservation. This is the space that the volume needs when the first Snapshot copy is created. This option applies to volumes that contain space-reserved files, no Snapshot copies , a fractional overwrite reserve set to greater than 0, and where the sum of the space reservations for all LUNs in the volume is greater than the free space available to the volume. Default value: 90 Event generated: No Space for First Snapshot Event severity: Warning
Volume Snapshot Count Threshold	Description: Specifies the number of Snapshot copies, which, if exceeded, is considered too many for the volume. A volume is allowed up to 255 Snapshot copies. Default value: 250 Event generated: Too Many Snapshots Event severity: Error
Volume Too Old Snapshot Threshold	Description: Specifies the age of a Snapshot copy, which, if exceeded, is considered too old for the volume. The Snapshot age can be specified in seconds, minutes, hours, days, or weeks. Default value: 52 weeks Event generated: Too Old Snapshots

Event severity: Warning

Related concepts

Volume capacity thresholds and events on page 182

Related references

Configuration guidelines on page 95

Qtree capacity thresholds and events

Operations Manager enables you to monitor qtree capacity and set alarms.

DataFabric Manager features thresholds to help you monitor the capacity of qtrees. Quotas must be enabled on the storage system. You can configure alarms to send notification whenever a qtree capacity event occurs.

By default, if you have configured an alarm to alert you to an event, DataFabric Manager issues the alarm only once per event. You can configure the alarm to repeat until it is acknowledged. For the Qtree Full threshold, you can also configure an alarm to send notification only when the condition persists over a specified period.

Note: If you want to set an alarm on a specific qtree, you must create a group with that qtree as the only member.

You can set the following qtree capacity thresholds:

- Qtree Full (%)
  Description: Specifies the percentage at which a qtree is considered full.

  Note: Note To reduce the number of Qtree Full Threshold events generated, you can set a Qtree Full Threshold Interval (0 seconds). This causes DataFabric Manager to generate a Qtree Full event only if the condition persists for the specified period.

  Default value: 90
  Event generated: Qtree Full
  Event severity: Error
  Corrective action: Take one or more of the following actions:

  - Ask users to delete files that are no longer needed, to free disk space.
  - Increase the hard disk space quota for the qtree.

- Qtree Nearly Full Threshold (%)
  Description: Specifies the percentage at which a qtree is considered nearly full.
  Default value: 80. The value for this threshold must be lower than the value for Qtree Full Threshold for DataFabric Manager to generate meaningful events.
  Event generated: Qtree Almost Full
  Event severity: Warning

Corrective action: Take one or more of the following actions:

- Ask users to delete files that are no longer needed, to free disk space.
- Increase the hard disk space quota for the qtree.

Related tasks

Creating alarms on page 95

Volumes and qtrees monitored on a vFiler unit

By using Operations Manager, you can monitor volumes and qtrees on a vFiler unit.

DataFabric Manager monitors storage resources (volumes and qtrees) that are configured on a vFiler unit.

During initial discovery, DataFabric Manager uses SNMP to discover the volumes and qtrees as a hosting storage system's objects. After it discovers a configured vFiler unit on the hosting storage system, DataFabric Manager assigns the resource objects to the vFiler unit.

DataFabric Manager maintains information in its database about volumes and qtrees that are removed or destroyed from a vFiler unit. As the volumes and qtrees are reassigned to other vFiler units, DataFabric Manager uses the stored information to update resource ownership.

Next topics

How qtree quotas are monitored on page 190
Where to find vFiler storage resource details on page 190

How qtree quotas are monitored

You can monitor qtree quotas by using Operations Manager.

As DataFabric Manager monitors hosting storage systems for vFiler unit storage resources, it also provides information about qtree quotas.

Where to find vFiler storage resource details

With Operations Manager, you can view the volumes and qtrees on a vFiler unit in the **vFiler Details** page.

The **vFiler Details** page (**Member Details** ➤ **vFilers***`vFiler_name`*) provides you with a link to the volumes and qtrees assigned to a vFiler unit.

The **Volume Details** and **Qtree Details** pages provide you with details about the volumes and qtrees that are assigned to a vFiler unit.

What clone volumes are

Clone volumes are fully functional volumes that always exist in the same aggregate as their parent volumes.

Data ONTAP enables you to create writable copy of a volume, known as volume clone.

A clone is a point-in-time, writable copy of the parent volume. Changes made to the parent volume after the clone is created are not reflected in the clone. Clone volumes can themselves be cloned.

Clone volumes and their parent volumes share the same disk space for any data common to the clone and parent. This means that creating a clone is instantaneous and requires no additional disk space (until changes are made to the clone or parent). If you later decide you want to sever the connection between the parent and the clone, you can split the clone. This removes all restrictions on the parent volume and enables the space guarantee on the clone. For general information about clone volumes and clone parents, see the *Data ONTAP 7.x Storage Management Guide*.

DataFabric Manager helps you manage clone hierarchies by making it easier to view clone relationships between volumes. By using Operations Manager, you can view clone volume and the parent volume information.

Related information

Data ONTAP 7.x Storage Management Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Identification of clones and clone parents

By using Operations Manager, you can view details of clones and their parents.

You can display the **Volumes, Clone List** report by selecting **Member Details ➤ File Systems ➤ Report drop-down list**. Cloned volumes have an entry in the Clone Parent column of the report, indicating the name of the parent. Volumes that have clone children have the names of those children, which are included in the Clones column. Each clone name links to the **Volume Details** page for the clone child.

Alternatively, the **Volume Details** page for a clone child includes the name of the clone parent, which is a link to the Volume Details page for the parent volumes.

If a volume is a clone parent, the **Related Storage** section of its **Volume Details** page includes a link to a list of its direct clone children.

Why Snapshot copies are monitored

The Snapshot copy monitoring and space management help you monitor, alert, and report on Snapshot copies and how they influence your space management strategy.

Use DataFabric Manager to answer the following questions about Snapshot copies:

- How much aggregate and volume space is used for Snapshot copies?
- Is there adequate space for the first Snapshot copy?
- Which Snapshot copies can be deleted?
- Which volumes have high Snapshot growth rates?
- Which volumes have Snapshot copy reserves that are nearing capacity?

See the *Operations Manager Help* for instructions.

Next topics

Snapshot copy monitoring requirements on page 192
Detection of Snapshot copy schedule conflicts on page 192
Dependencies of a Snapshot copy on page 192
Thresholds on Snapshot copies on page 193

Snapshot copy monitoring requirements

To use the Snapshot copy monitoring features, DataFabric Manager requires a valid login name and password for each system being monitored.

The features that help you track space-usage issues (space reservations, overwrite rates, and so on) are available for systems running on Data ONTAP 7.0 or later. The list of Snapshot copies on the **Volume Details** page is available for systems running Data ONTAP 6.4 or later.

Detection of Snapshot copy schedule conflicts

By using Operations Manager, you can monitor conflicts between the Snapshot copy schedule and SnapMirror and SnapVault schedules.

When Snapshot copies are scheduled for a volume, DataFabric Manager monitors for conflicts between the Snapshot copy schedule and SnapMirror and SnapVault schedules on the same volume. Conflicts can cause scheduled Snapshot copies to fail. The **Aggregate Details** and **Volume Details** pages both feature a Protection area that indicates whether scheduled Snapshot copies and SnapMirror are enabled.

DataFabric Manager generates a schedule conflict event if a volume is configured with both Snapshot copy and SnapVault copy schedules. An event is also generated if a Snapshot copy is scheduled at the same time as a SnapMirror transfer. DataFabric Manager generates these events only if the SnapVault or SnapMirror relationships are monitored on the volume.

Dependencies of a Snapshot copy

You can view the dependencies of a Snapshot copy, whether you can delete a Snapshot copy, and the steps to delete it using Operations Manager.

The Snapshots area of the **Volume Details** page displays information about, up to 10 of the most recent Snapshot copies for the volume. This includes the last time the Snapshot copies that were accessed and their dependencies, if any. This information helps you determine whether you can delete a Snapshot copy or, if the Snapshot copy has dependencies, what steps you need to take to delete the Snapshot copy.

To generate a page that lists dependent storage components for a Snapshot copy, and the steps you would need to take to delete the copy, click the hyperlinked text in the Dependency column for that Snapshot copy. The link is not available when the dependency is due to SnapMirror or SnapVault or to a FlexClone volume, that is offline.

Thresholds on Snapshot copies

You can set a threshold of a maximum number of Snapshot copies to determine when to delete a Snapshot copies.

You can avoid the problem of Snapshot failures due to inadequate space. The thresholds that address the number and age of volume Snapshot copies let you know when you must delete Snapshot copies. Set the Volume Snapshot Count threshold to define the maximum number of Snapshot copies for a volume.

Set the Volume Snapshot Too Old threshold to indicate the maximum allowable age for copies of the volume. DataFabric Manager generates events when it exceeds the thresholds.

Storage chargeback reports

You can create storage chargeback report using Operations Manager to collect the amount of space used or allocated in specific storage objects (storage system, volume, qtree) or a group of storage objects.

These reports can be generated in various formats, such as Perl, .txt, Comma-separated values (.csv), Excel (.xls), and .xml.

The storage chargeback feature of DataFabric Manager provides billing reports for the amount of space used or allocated in specific storage objects, or a group of storage objects. The storage objects include storage system, volume, qtree, or user. The billing reports contain information such as average use, length of billing cycle, rate per GB of space used, and charges based on the rate and use.

You can specify the day when the billing cycle starts, the rate, and the format for currency in the report.

Storage chargeback reports provide an efficient way to track space used and space that is allocated for generating bills based on your specifications. Chargeback reports are useful if your organization bills other organizations, groups, or users in your company for the storage services they use.

Next topics

When is data collected for storage chargeback reports on page 194

Determine the current month's and the last month's values for storage chargeback report on page 194
Chargeback reports in various formats on page 194

When is data collected for storage chargeback reports

You can collect data for chargeback reports for a specific period.

The data reported by the chargeback feature on a specific day is based on the last data sample that is collected before midnight GMT of the previous night. For example, if the last data sample before midnight on April 17 was collected at 11:45 p.m. GMT, the chargeback reports viewed on April 18 display details about average use, charges, and other data based on the sample collected on April 17 at 11:45 p.m.

Determine the current month's and the last month's values for storage chargeback report

You can calculate the current and previous month's chargeback report.

When you select a Chargeback, This Month or Last Month view, the data displayed pertains to the current or the last billing cycles, respectively. The Day of the Month for Billing option determines when the current month begins and the last month ends, as described in the following example.

Company A's DataFabric Manager system is configured for the billing cycle to start on the fifth day of every month. If Chris (an administrator at Company A) views the Chargeback, this Month report on April 3, the report displays data for the period of March 5 through midnight (GMT) of April 2. If Chris views the Chargeback, Last Month report on April 3, the report displays data for the period of February 5 through March 4.

All chargeback reports contain Period Begin and Period End information that indicates when the billing cycle begins and ends for the displayed report.

Chargeback reports in various formats

You can generate chargeback report in various formats by running `dfm report view -F <format> <report-name>` command.

DataFabric Manager does not integrate with any specific billing program. However, the report does provide data in a spreadsheet form that you can use for other billing applications. The data is accessible through the spreadsheet icon () on the right side of the Report drop-down list.

You can also generate chargeback data in other formats, such as Perl, .txt, Comma-separated values (.csv), Excel (.xls), and .xml by using the `dfm report` command. For example, to generate the chargeback reports in Perl format so that other billing applications can use the chargeback data, you would issue the following command: `dfm report view -F perl report_name`.

In this command, *`report_name`* is one of the following:

- groups-chargeback-this-month

- groups-chargeback-last-month
- groups-chargeback-allocation-this-month
- groups-chargeback-allocation-last-month
- filers-chargeback-this-month
- filers-chargeback-last-month
- filers-chargeback-allocation-this-month
- filers-chargeback-allocation-last-month
- volumes-chargeback-this-month
- volumes-chargeback-last-month
- volumes-chargeback-allocation-this-month
- volumes-chargeback-allocation-last-month
- qtrees-chargeback-this-month
- qtrees-chargeback-last-month
- qtrees-chargeback-allocation-this-month
- qtrees-chargeback-allocation-last-month

For more information about using the `dfm report` command, see the DataFabric Manager man pages.

The chargeback report options

The chargeback report options enable you to specify the chargeback increment, the currency format, the chargeback rate, and the day when the billing cycle starts.

You can specify storage chargeback option at a global or a group level. The global level can be chargeback increment, the currency format, the chargeback rate, or specify an annual charge rate for objects in a specific group.

In addition to these global settings, you can specify an annual charge rate (per GB) for objects in a specific group. The annual charge rate specified for a group overrides the setting specified at the global level.

Next topics

Specifying storage chargeback options at the global or group level on page 196
The storage chargeback increment on page 196
Currency display format for storage chargeback on page 196
Specification of the annual charge rate for storage chargeback on page 197
Specification of the Day of the Month for Billing for storage chargeback on page 197
The formatted charge rate for storage chargeback on page 198

Specifying storage chargeback options at the global or group level

By using Operations Manager, you can set chargeback options at a global or group level.

Step

1.

To apply changes to...	Go to...
All objects that DataFabric Manager manages	The **Options** page (**Setup ➤ Options** link); then select **Chargeback** in the **Edit Options** section.
Objects in a specific group	The **Edit Group Settings** page (click **Edit Groups** in the left pane); then click the **Edit** column for the group for which you want to specify an annual charge rate.

The storage chargeback increment

The storage chargeback increment indicates how the charge rate is calculated.

You can specify storage chargeback increment using Operations Manager. You can specify this setting only at the global level. By default, the chargeback increment is Daily. The following values can be specified for this option:

Daily	Charges are variable; they are adjusted based on the number of days in the billing period. DataFabric Manager calculates the charges as follows: Annual Rate / 365 * number of days in the billing period.
Monthly	Charges are fixed; there is a flat rate for each billing period regardless of the number of days in the period. DataFabric Manager calculates the charges as follows: Annual Rate/12.

Currency display format for storage chargeback

You can specify currency formats to display in Operations Manager.

The Currency Format setting indicates the format to use for displaying currency amounts in Operations Manager.

By default, the format is $ #,###.##, where # indicates a digit. If you need to specify any other format, use the following guidelines:

- You must specify four # characters before the decimal point.

  A decimal point separates the integer part of a number from its fractional part. For example, in the number 5.67, the period (.) is the decimal point.

  The symbol used as a decimal point depends on the type of currency. For example, a period (.) is used for US dollars and a comma (,) is used for Danish Kroner

- Although a decimal separator is optional in the currency format, if you use it, you must specify at least one # character after the decimal separator. For example, $ #,###.# and JD #,###.###.
- You can optionally specify a thousands-separator.

  A thousands-separator separates digits in numbers into groups of three. For example, the comma (,) is the thousands-separator in the number 567,890,123. The symbol used as a thousands-separator depends on the type of currency. For example, a comma (,) is used for US dollars and a period (.) is used for Danish Kroner.
- You can use any currency symbol, such as EUR or ¥, to suit your needs.

  If the currency symbol you want to use is not part of the standard ASCII character set, use the code specified by the HTML Coded Character Set. For example, use ¥ for the Yen (¥) symbol.
- You can specify only one currency format per DataFabric Manager.

  For example, if you specify $ #, ###.## as your currency format for a specific installation, this format is used for all chargeback reports generated by that installation.

Specification of the annual charge rate for storage chargeback

You can set annual charge rate for storage chargeback at a global level or a specific group.

The Annual Charge Rate (per GB) setting indicates the amount to charge for storage space used per GB per year. You can specify this setting at the global level, in addition to specific groups.

By default, no rate is specified. You must specify a value for this option for DataFabric Manager to generate meaningful chargeback reports.

Specify this value in the x.y format, where x is the integer part of the number and y is the fractional part. For example, to specify an annual charge rate of $150.55, enter 150.55.

Note: You must use a period (.) to indicate the fractional part of the number in the Annual Charge Rate box. Even if you are specifying a currency format that uses a comma (,) as the decimal separator. For example, to specify 150,55 Danish Kroner, enter 150.55.

Specification of the Day of the Month for Billing for storage chargeback

You can specify the day of the month from which the billing cycle begins.

The Day of the Month for Billing setting indicates the day of the month on which the billing cycle begins.

By default, this value is set to 1. The following values can be specified for this option:

1 through 28	These values specify the day of the month. For example, if you specify 15, it indicates the fifteenth day of the month.

-27 through 0	These values specify the number of days before the last day of the month. Therefore, 0 specifies the last day of the month. For example, if you want to bill on the fifth day before the month ends every month, specify -4.

The formatted charge rate for storage chargeback

Operations Manager displays the annual charge rate for storage chargeback in the specified format.

The Formatted Charge Rate setting displays the annual charge rate value in the currency format. The value is automatically generated and displayed based on the currency format and the annual charge rate you specify. You cannot set or change this option.

For example, if the currency format is $ #,###.## and the annual charge rate is 150.55, the Formatted Charge Rate option displays $150.55.

What deleting storage objects for monitoring is

With Operations Manager, you can stop monitoring a storage object (aggregate, volume, or qtree) with DataFabric Manager by deleting it from the Global group.

When you delete an object from the Global group, DataFabric Manager stops collecting and reporting data about it. Data collection and reporting is not resumed until the object is added back to the database.

Note: When you delete a storage object from any group other than Global, the object is deleted only from that group; DataFabric Manager does not stop collecting and reporting data about it. You must delete the object from the Global group for DataFabric Manager to stop monitoring it.

Next topics

Reports of deleted storage objects on page 198
Undeleting a storage object for monitoring on page 199

Reports of deleted storage objects

All storage objects deleted from the DataFabric Manager database are listed in various reports.

Following are the reports of deleted storage objects:

- Storage Systems, Deleted
- vFilers, Deleted
- File Systems, Deleted
- Volumes, Deleted
- Qtrees, Deleted

- Aggregates, Deleted
- Fibre Channel Switches, Deleted
- SAN Hosts, Deleted
- LUNs, Deleted

Note: These reports are accessible from the Report drop-down list on the **Member Details** tab for each storage object (**Storage Systems**, **vFiler units**, **File Systems**, **Aggregates**, **SANs**, and **LUNs**).

Undeleting a storage object for monitoring

You can undelete a storage object using Operations Manager

Steps

1. Select the check box next to each object you want to return to the database.
2. Click **Undelete**.

Storage system management

You can use Operations Manager to view the status of and report of groups, view configuration status, view and respond to events, configure alarms, and, so on.

Next topics

Management tasks performed using Operations Manager on page 201
Operations Manager components for managing your storage system on page 202
Storage system groups on page 202
Custom comment fields in Operations Manager on page 203
Consolidated storage system and vFiler unit data and reports on page 203
Where to find information about a specific storage system on page 204
Managing active/active configurations with DataFabric Manager on page 207
Remote configuration of a storage system on page 210
Storage system management using FilerView on page 212
Introduction to MultiStore and vFiler units on page 213

Management tasks performed using Operations Manager

You can use Operations Manager to manage your storage system.

As soon as DataFabric Manager is installed, it begins the process of discovering, monitoring, and gathering data about your supported storage systems. However, before you can use the data to simplify your network administration tasks, you need to understand the different ways you can use Operations Manager to manage your storage systems.

By using Operations Manager, you can do the following:

- Create groups
- View the status of and obtain reports and information for a group of systems
- View information for individual systems
- Access the console of a storage system
- View the active/active configuration status and perform takeover and giveback operations if the storage system is an active/active controller
- View and respond to events
- Configure alarms that send you notification if DataFabric Manager logs a specific type of event or severity of event
- Edit the configuration settings of a storage system

- Link to FilerView for a selected storage system or vFiler unit
- Insert values into custom comment fields
- View user, qtree, and group quotas
- Edit user quotas

Operations Manager components for managing your storage system

By using Operations Manager you can create or modify groups, view information about vFiler units, configure alarms, and so on.

You can perform the following tasks by using Operations Manager to manage your storage systems:

- Create new groups or modify, move, copy, or delete existing groups—**Control Center ➤ Home ➤ Edit Groups**.
- View information about all or a group of storage systems and access details of specific storage systems—**Control Center ➤ Member Details ➤ Appliances**.
- View information about vFiler units that are configured on hosting storage systems and access details of specific vFiler units —**Control Center ➤ Member Details ➤ vFilers**.
- View and respond to system events—**Control Center ➤ Group Status ➤ Events**.
- Configure alarms for generated events, manage DataFabric Manager administrators, establish roles to manage DataFabric Manager access, and configure custom reports—**Control Center ➤ Setup ➤ Alarms**.
- Modify passwords for one or multiple storage systems, manage storage system configurations, and manage all scripts installed on DataFabric Manager—**Control Center ➤ Management** .
- Compare storage system configurations and configuration files against a template and modify storage system global options—**Control Center ➤ Management**.
- Configure host users and roles—**Control Center ➤ Management ➤ Host Users**.

Storage system groups

Using Operations Manager you can create and manage groups of storage systems.

Operations Manager is designed around the concept of groups. When a group is selected in the left pane of the Operations Manager main window, the pages change to display information relating to that group.

To display information about all your storage systems, select the Global group in the Groups pane on the left side of Operations Manager. The Global group is the default group containing the superset of all storage systems.

To display information about a specific group of systems, select the desired group name in the Groups pane on the left side of Operations Manager.

To manage your storage systems effectively, you should organize them into smaller groups so that you can view information only about objects in which you are interested. You can group your storage systems to meet your business needs, for example, by geographic location, operating system version, and storage system platform.

Custom comment fields in Operations Manager

You can create custom comment fields and associate them with specific storage systems, SAN hosts, FC switches, aggregates, volumes, qtrees, LUNs, groups, and quota users.

You can use the custom comment fields for any purpose. One example would be to associate a department code with a quota user, for use in chargeback for business accounting. You can use the Search function in Operations Manager to display every object that contains specific data in a custom comment field.

Using custom comment fields in Operations Manager has three aspects: creating the field, inserting data to create specific comments, and viewing comments.

Creating the comment field: You create the custom comment field using **Setup menu ➤ Options ➤ Custom Comment Fields**

Inserting data: You insert data into the custom comment field in the **Edit Settings** page for the object you want to associate with the comment. For example, to associate a comment with a qtree, use the **Edit Qtree Settings** page for that qtree.

Viewing comments: You view custom comment data for multiple objects in the Comments report for the type of object, for example, the Qtrees Comments report.

You can also view the comments for a single object in its **Details** page—for example, the **Qtree Details** page for a specific qtree.

For detailed instructions on creating custom comment fields, see the *Operations Manager Help* for the Options page.

Consolidated storage system and vFiler unit data and reports

By using Operations Manager, you can view storage system and vFiler unit reports.

You can view storage system related information from **Control Center tab ➤ Member Details tab ➤ Appliances ➤ Report list**.

You can view vFiler-related information from **Control Center tab ➤ Member Details tab ➤ vFilers ➤ Report list**.

You can view global and group information and select individual system data in detail using the **Member Details** report pages.

Next topics

Tasks performed by using the storage systems and vFiler unit report pages on page 204
What Appliance Tools of Operations Manager is on page 204

Tasks performed by using the storage systems and vFiler unit report pages

You can view system data for all groups, generate spreadsheet reports, get information about storage systems and launch FilerView.

Similar to the other Operations Manager **Control Center** tab pages, the Appliances and vFiler reports enable you to view a wide variety of details in one place. You can perform the following tasks:

- View system data for all or a group of monitored systems
- Generate spreadsheet reports
- Obtain detailed information about a specific storage system
- Launch FilerView

What Appliance Tools of Operations Manager is

You can view storage system details using Appliance Tools of Operations Manager.

Appliance Tools enables you to set up parameters needed to communicate with a specific storage system. You can access **Appliance Tools** from the **Details** page for the storage system or hosting storage system (of a vFiler unit). The tools menu is located at the lower left display of Operations Manager.

Where to find information about a specific storage system

By using Operations Manager, you can view information about a specific storage system or a vFiler unit, and view or modify configurations of a storage system or a vFiler unit.

You can view the details by clicking the storage system or vFiler unit name on the Operations Manager reports.

DataFabric Manager regularly refreshes monitoring data for the entire group within which a storage system or vFiler unit resides, or you can click Refresh Group Monitors to manually refresh the data.

Next topics

Tasks performed from a Details page of Operations Manager on page 205
Editable options for storage system or vFiler unit settings on page 205
What the Diagnose Connectivity tool does on page 206
The Refresh Monitoring Samples tool on page 206

The Run a Command tool on page 206
The Run Telnet tool on page 207
Console connection through Telnet on page 207

Tasks performed from a Details page of Operations Manager

You can view and modify storage system or vFiler unit configurations, view and check active/active configuration, View events related to the storage system or vFiler unit, and, so on.

You can perform the following storage system management tasks from the **Appliance Details** or **vFiler Details** page:

- View specific storage system or vFiler unit details
- Edit the storage system or vFiler unit configuration using FilerView
- View the active/active configuration status and perform takeover and giveback operations by using the cluster console (on active/active controllers only)
- Access the vFiler units that are hosted on a storage system
- Check active/active controller configurations
- Edit the storage system configuration using FilerView
- Edit Remote LAN Module (RLM) port settings for the storage system
- View events related to the storage system or vFiler unit
- View graphing information specific to each type of storage system

Editable options for storage system or vFiler unit settings

You can specify or change the storage system or vFiler unit settings using Operations Manager.

You can use the **Edit Appliance Settings** page to specify or change storage system or vFiler unit settings. Note, however, that you can set global values for many settings using the **Options** page. You do not need to modify storage system or vFiler-level settings unless they differ from your global values.

You can use the **Edit Appliance Settings** page to modify the following information:

IP address	This is the IP address of the storage system that DataFabric Manager monitors. You might want to change the storage system IP address if you want to use a different interface for administrative traffic.
Login and password	You should configure a login and password if you want to use Operations Manager to run a command on a system. Operations Manager uses this information to authenticate itself to the storage system on which the command is run. Configuration of login and password is mandatory.
Authentication	You can also set up authentication by using the `/etc/hosts.equiv` file on the storage system. For information about configuring the `/etc/hosts.equiv` file, see the *Data ONTAP Storage Management Guide*.

Threshold values	The threshold values indicate the level of activity that must be reached on the storage system before an event is triggered. By using these options, you can set specific storage system or group thresholds. For example, the Appliance CPU Too Busy threshold indicates the highest level of activity the CPU can reach before a CPU Too Busy event is triggered. Threshold values specified on this page supersede any global values specified on the **Options** page.
Threshold intervals	The threshold interval is the period of time during which a specific threshold condition must persist before an event is triggered. For example, if the monitoring cycle time is 60 seconds and the threshold interval is 90 seconds, the event is generated only if the condition persists for 2 monitoring cycles. You can configure threshold intervals only for specific thresholds, as listed on the **Options** page.

Related information

Data ONTAP Storage Management Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

What the Diagnose Connectivity tool does

By using the Diagnose Connectivity tool, you can perform connectivity tests and review test outcome.

The Diagnose Connectivity tool queries the DataFabric Manager database about a selected storage system, runs connectivity tests, and displays information and test outcomes. The sequence of steps depends on whether the storage system is managed or unmanaged. A managed storage system is one that is in the DataFabric Manager database. An unmanaged storage system is one that is not in the DataFabric Manager database.

The Refresh Monitoring Samples tool

You can view updated storage system details using Refresh Monitoring Samples in Operations Manager.

You can specify the frequency at which Operations Manager collects information by using the system information-monitoring interval.

The Run a Command tool

By using the Run a Command tool in Operations Manager, you can run commands on storage systems.

The Run a Command tool provides you with an interface to do the following:

- Run Data ONTAP commands on storage systems
- Run any Remote LAN Module (RLM) command on the RLM card that is installed on a storage system

Prerequisite

DataFabric Manager uses the following connection protocols for communication:

- Remote Shell (RSH) connection for running a command on a storage system
  To establish an RSH connection and run a command on a storage system, DataFabric Manager must authenticate itself to the storage system. Therefore, you must enable RSH access to the storage system and configure login and password credentials that are used to authenticate Data ONTAP.
- Secure Socket Shell (SSH) connection for running a command on an RLM card, if the installed card provides a CLI.

Restrictions

The following restrictions exist:

- There are several Data ONTAP run commands that are available on storage systems, but are restricted in DataFabric Manager. For a list of restricted commands, see the *Operations Manager Help*.
- You cannot run a command on the Global group.

Related concepts

Remote configuration of a storage system on page 210
DataFabric Manager CLI to configure storage systems on page 210
Prerequisites for running remote CLI commands from Operations Manager on page 211
What remote platform management interface is on page 259

Related tasks

Running commands on a specific storage system on page 211
Running commands on a group of storage systems from Operations Manager on page 211

The Run Telnet tool

You can connect to the storage system using the Run Telnet tool in Operations Manager.

Console connection through Telnet

By using Operations Manager, you can connect the storage system console.

Use the Connect to Device Console tool to connect to the storage system console. The storage system must be connected to a terminal server for DataFabric Manager to connect to the storage system console.

Note: Before initiating the console connection, you must set the Console Terminal Server Address in the **Edit Settings** page for the storage system.

Managing active/active configurations with DataFabric Manager

You can monitor and manage active/active configuration with the cluster console of Operations Manager.

The cluster console enables you to view the status of an active/active configuration (controller and its partner) and perform takeover and giveback operations between the controllers.

For detailed information about active/active configurations, see the *Data ONTAP Storage Management Guide*.

Next topics

Requirements for using the cluster console in Operations Manager on page 208
Accessing the cluster console on page 208
What the Takeover tool does on page 208
What the Giveback tool does on page 209
DataFabric Manager CLI to configure storage systems on page 210

Related information

Data ONTAP Storage Management Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Requirements for using the cluster console in Operations Manager

You can use the cluster console in Operations Manager to view the status of an active/active configuration.

An authentication method must be set up for DataFabric Manager to authenticate to the controller on which takeover and giveback operations are to be performed. Login and password must be set for the storage system.

Accessing the cluster console

You can access the cluster console from Operations Manager to view the status of an active/active configuration.

Steps

1. Click **Control Center ➤ Home ➤ Member Details ➤ Appliances**.
2. Click the **Report** drop-down list and select **Active/Active Controllers, All**.
3. Click on the appliance.
4. Click **View Cluster Console** under Appliance Tools.

What the Takeover tool does

You can use the Takeover tool from the Tools list to initiate a manual takeover of the controller's partner. The Takeover tool is available in the Tools list only when the controller whose Tools list you are viewing can take over its partner.

Once you select Takeover, the **Takeover** page is displayed. The **Takeover** page enables you to select the type of takeover you want the controller to perform. You can select from one of the following options:

Take Over Normally	This option is the equivalent of running the `cf takeover` command in which the controller takes over its partner in a normal manner. The controller allows its partner to shut down its services before taking over. This option is used by default.
Take Over Immediately	This option is the equivalent of running the `cf takeover -f` command in which the controller takes over its partner without allowing the partner to gracefully shut down its services.
Force a Takeover	This option is the equivalent of running the `cf forcetakeover -f` command in which the controller takes over its partner even in cases when takeover of the partner is normally not allowed. Such a takeover might cause data loss.
Takeover After a Disaster	This option is for MetroClusters only and is the equivalent of running the `cf forcetakeover -f -d` command. Use this option if the partner is unrecoverable.

Note: The `Force a Takeover` and `Takeover After a Disaster` options, are also available in circumstances when the interconnect between the controller, and its partner is down. It enables you to manually take over the partner.

Once you have made a selection, the `Status` option on the **Cluster Console** page displays the status of the takeover operation. Once the takeover operation is complete, the **Cluster Console** page displays the updated controller-icon colors. The **Cluster Console** page also displays the status of each controller. The Tools list of each controller is adjusted appropriately to indicate the active/active configuration operation each controller can now perform.

What the Giveback tool does

You can use the Giveback tool to initiate a giveback operation from a controller that has taken over its partner. The Giveback tool is available in the Tools list only when the controller whose Tools list you are viewing can give back to its partner.

Once you select Giveback for the controller, the **Giveback** page is displayed. You can select from one of the following giveback options:

Give Back Normally	This option is the equivalent of the `cf giveback` command in which the controller performs a graceful shutdown of services and aborts CIFS operations. The controller also shuts down long-running jobs that are running on the controller on behalf of the taken over controller.

Give Back Immediately	This option is the equivalent of the `cf giveback -f` command in which the controller does not gracefully shut down the services of the taken over controller.

Once you have selected an option, the Status option on the **Cluster Console** page displays the status of the giveback operation. Once the giveback operation is complete, the **Cluster Console** page displays the updated controller-icon colors. The **Cluster Console** page also displays status of each controller. The Tools list of each controller is adjusted appropriately to indicate the active/active configuration operation each controller can now perform.

DataFabric Manager CLI to configure storage systems

DataFabric Manager enables you to run storage system commands such as `sysconfig`, `version`, and `install`, on a specific storage system or a group of storage systems.

You can run all commands, except for a few administrator commands. For a list of unsupported commands, see the *Operations Manager Help*.

Remote configuration of a storage system

You can remotely configure a storage system using DataFabric Manager.

As you monitor your storage systems, you might find that you need to alter the configuration settings on one or more storage systems. DataFabric Manager provides three methods by which you can remotely configure your storage systems:

- Accessing the storage system CLI
- Accessing FilerView
- Using the DataFabric Manager multiple-storage system remote configuration feature

You can remotely configure the following DataFabric Manager features:

- Host users management
- User quota management
- Password management
- Roles management

Next topics

Prerequisites for running remote CLI commands from Operations Manager on page 211
Running commands on a specific storage system on page 211
Running commands on a group of storage systems from Operations Manager on page 211

Prerequisites for running remote CLI commands from Operations Manager

Your storage systems must meet certain prerequisites to run remote CLI from Operations Manager

The Command operation uses `rsh` to run a command on storage systems. Therefore, you must have `rsh` access to your storage system enabled to run CLI commands from DataFabric Manager. By default, `rsh` access to a storage system is enabled.

For more information about enabling `rsh` on your storage system, see the *Data ONTAP System Administration Guide*.

Running commands on a specific storage system

You can run a command for a specific storage system using Operations Manager.

Steps

1. Click **Control Center ➤ Home ➤ Member Details ➤ Appliances**
2. Click on the appliance to go to the **Appliance Details** page for the storage system or hosting storage system (of a vFiler unit) that you want to run a command on.
3. Select **Run a Command** under **Appliance Tools**.
4. Enter the command in the **Appliance Command** box.
5. Click **Run**.

Running commands on a group of storage systems from Operations Manager

By using Operations Manager, you can run a command on a group of storage systems.

Steps

1. In the left pane of the Operations Manager window, select the group that you want to run a command on.

   The **Group Summary** page is displayed.

2. Select **Run a Command** from the **Appliance Tools** menu.

   The **Run Command** page is displayed.

3. Enter the command in the **Appliance Command** box.
4. Click **Run**.

Storage system management using FilerView

With Operations Manager, you can connect to a storage system using FilerView.

In addition to providing access to the storage system, Operations Manager enables you to log in to the FilerView management UI of the storage system. When you invoke FilerView, Operations Manager spawns a new window. By using FilerView, you can edit the configuration settings of a storage system.

Note: You cannot remotely configure more than one storage system using this method.

Next topics

What FilerView is on page 212
Configuring storage systems by using FilerView on page 212

What FilerView is

Operations Manager enables you to view information about storage systems and vFiler units from a Web-based UI called FilerView.

In DataFabric Manager 2.3 and later, pages displaying information about storage systems and vFiler units provide access to the Web-based UI, FilerView. You can access FilerView by clicking the icon next to the storage system or vFiler unit name in the details pages for events, storage systems, vFiler units, aggregates, LUNs, qtrees, and volumes.

To access FilerView for a selected storage system or vFiler unit, click the storage system icon next to the storage system or vFiler unit name in the respective details page.

Configuring storage systems by using FilerView

You can configure a storage system by using FilerView.

Steps

1.

If...	Then...
You are running DataFabric Manager 3.3 or later	In the **Appliance Details** or **vFiler Details** page, click the icon before the system name. Go to Step 3.
You are running DataFabric Manager 2.3 or later	On the **Appliances** page, click the FilerView next to the name of the storage system you want to configure. Go to Step 3.
You are running DataFabric Manager 2.2 or earlier	On the **Appliances** page, select the name of the storage system that you want to configure.

2. On the **Appliance Details** page, click on the FilerView icon.
3. When prompted, provide your user name and the password.

4. Edit the settings.

Introduction to MultiStore and vFiler units

MultiStore is a software product that enables you to partition storage and network resources of a single storage system so that it appears as multiple storage units on the network.

Each “virtual filer” created as a result of the logical partitioning of the hosting storage system’s network and storage resources is called a vFiler unit. A vFiler unit , using the resources assigned, delivers storage system services to its clients as a storage system does.

You can create multiple vFiler units using MultiStore.

The storage resource assigned to a vFiler unit can be one or more qtrees or volumes. The network resource assigned can be one or more base IP addresses or IP aliases associated with network interfaces.

A vFiler unit can participate in a distinct IP address space called the IPspace. IP addresses defined for an IPspace are meaningful only within that space. A distinct routing system is maintained for each IPspace; no cross-IPspace traffic is routed.

For information about configuring and using vFiler units in your storage network, see the *Data ONTAP MultiStore Management Guide*.

Next topics

Why monitor vFiler units with DataFabric Manager on page 213
Requirements for monitoring vFiler units with DataFabric Manager on page 213
vFiler unit management tasks on page 214

Related information

Data ONTAP MultiStore Management Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Why monitor vFiler units with DataFabric Manager

You can monitor vFiler units using Operations Manager.

DataFabric Manager provides Storage Service Providers (SSPs) the same management interface for monitoring vFiler units and hosting storage systems. Hosting storage systems are physical storage systems on which a vFiler unit is configured.

Requirements for monitoring vFiler units with DataFabric Manager

Requirements like Data ONTAP release support, network connectivity, NDMP discovery, and so on, must be met for monitoring vFiler units.

You must meet the following requirements prior to monitoring vFiler units with DataFabric Manager.

- Data ONTAP release support: The Manager MultiStore monitoring feature supports hosting storage systems running Data ONTAP 6.5 or later.

  Note: To run a command on a vFiler unit using a Secure Socket Shell (SSH) connection, the vFiler unit must be running Data ONTAP 7.2 or later.

- Network connectivity: To monitor a vFiler unit, DataFabric Manager and the hosting storage system must be part of the same routable network that is not separated by firewalls.
- Hosting storage system discovery and monitoring: You must first discover and monitor the hosting storage system before discovering and monitoring vFiler units. If you do not have access to the hosting storage system (by acquiring a vFiler unit through an SSP), you are unable to monitor your vFiler unit using DataFabric Manager.
- NDMP discovery: DataFabric Manager uses NDMP as the discovery method to manage SnapVault and SnapMirror relationships between vFiler units. To use NDMP discovery, you must first enable SNMP and HTTPS discovery.
- Monitoring the default vFiler unit: When you license Operations Manager, which includes MultiStore, Data ONTAP automatically creates a default vFiler unit on the hosting storage system unit called vFiler0. Operations Manager does not provide vFiler0 details.
- Editing user quotas: To edit user quotas that are configured on vFiler units, you must have Data ONTAP 6.5.1 or later installed on the hosting storage systems of vFiler units.
- Monitoring backup relationships: DataFabric Manager collects details of vFiler unit backup relationships from the hosting storage system. DataFabric Manager then displays them if the secondary storage system is assigned to the vFiler group, even though the primary system is not assigned to the same group.
- Monitoring SnapMirror relationships: DataFabric Manager collects details of vFiler SnapMirror relationships from the hosting storage system and displays them if the destination vFiler unit is assigned to the vFiler group, even though the source vFiler unit is not assigned to the same group.

vFiler unit management tasks

You can perform management tasks on a vFiler unit using DataFabric Manager.

- Discover vFiler units of a hosting storage system
- Group vFiler units for consolidated reporting
- Monitor vFiler health and general status
- Obtain vFiler network and storage resource details
- Obtain vFiler performance and usage reports
- Control vFiler administrative access
- Run commands on vFiler units
- Monitor and manage SnapVault relationships
- Monitor and manage SnapMirror relationships
- User quota management

- Host admin management
- Configuration management

Configuration of storage systems

You can remotely configure multiple storage systems using Operations Manager.

By creating configuration resource groups and applying configuration settings to them, administrators can remotely configure multiple storage systems from the server on which DataFabric Manager is installed.

Next topics

Management of storage system configuration files on page 217
What a configuration resource group is on page 220
Configuring multiple storage systems or vFiler units on page 223

Management of storage system configuration files

Many administrators prefer to centrally manage their storage system and vFiler configuration /etc files and registry options. With Operations Manager, you can create and manage configuration files that contain configuration settings you want to apply to a storage system and vFiler unit or groups of storage systems and vFiler units.

By using the storage system configuration management feature, you can pull configuration settings from one storage system and vFiler unit and push the same, or a partial set of settings to other storage systems or groups of storage systems and vFiler units. You can also ensure that storage system and vFiler configuration conforms with the configuration that is pushed to it from Operations Manager.

Next topics

Prerequisites to apply configuration files to storage systems and vFiler units on page 217
List of access roles to manage storage system configuration files on page 218
List of tasks for configuration management on page 218
What configuration files are on page 219
What a configuration plug-in is on page 219
Comparison of configurations on page 219
Verification of a successful configuration push on page 220

Prerequisites to apply configuration files to storage systems and vFiler units

You must meet a set of requirements before applying configuration files to a group of storage systems and vFiler units.

- Ensure that you are assigned the Global Write and Global Delete access roles to add or delete a configuration file from a group.

- Set the login and password for the storage system or vFiler unit before you set up configuration groups.
- Obtain a Data ONTAP plug-in for each version of the configuration file that you use in DataFabric Manager. You must have write privileges for a group to push configurations to it. You can download the plug-ins from the NOW site.

Note: The DataFabric Manager storage system configuration management feature supports storage systems running Data ONTAP 6.5.1 or later when you install the appropriate Data ONTAP plug-in with DataFabric Manager.

Related information

The Now Site -- http://now.netapp.com/

List of access roles to manage storage system configuration files

You need specific access roles to perform management tasks with the storage system configuration files.

Task	Access role
Create configuration files	Global Write
Delete configuration files	Global Delete
Edit configuration files	Global Write
Export configuration files	Global Read
Import configuration files	Global Write
Upgrade or revert configuration file versions	Global Write

List of tasks for configuration management

You can complete a set of configuration management tasks by using the storage system configuration management feature.

- Pull a configuration file from a storage system or a vFiler unit
- View the contents of each configuration file
- Edit the configuration file settings (`registry` options and `/etc` files)
- Copy or rename configuration files
- Edit a configuration file to create a partial configuration file
- Compare configuration files against a standard template
- View the list of existing configuration files
- Upgrade or revert file versions
- Delete a configuration file

- Import and export configuration files
- Remove an existing configuration file from a group's configuration list
- Change the order of files in the configuration list
- Specify configuration overrides for a storage system or a vFiler unit assigned to a group
- Exclude configuration settings from being pushed to a storage system or a vFiler unit
- View Groups configuration summary for a version of Data ONTAP
- Push configuration files to a storage system or a group of storage systems, or to vFiler units or a group of vFiler units
- Delete push configuration jobs
- View the status of push configuration jobs

Related concepts

What a configuration resource group is on page 220

What configuration files are

A configuration file is a set of configuration settings that you want the storage systems in one or more groups to share. Configuration files exist independently of groups and can be shared between groups. Use Operations Manager to pull a configuration file from storage systems and save it.

Following are the contents of a configuration file:

What a configuration plug-in is

A configuration plug-in is an add-on library in a zip file that is required by DataFabric Manager, to manage Data ONTAP. For each Data ONTAP version, a Data ONTAP plug-in is provided.

Configuration plug-ins provide the capability to upgrade or revert a configuration file that is stored in DataFabric Manager database to a different version.

Comparison of configurations

Operations Manager enables you to compare your configuration file settings against those of a template configuration.

You can also compare storage systems, vFiler units or groups of storage systems, vFiler units against a configuration file, and create jobs to obtain comparison results. Use Operations Manager to access the comparison job results.

You can view the configuration comparison results in a report format. Use this report to identify the configuration settings that do not conform to those of the standard template.

Verification of a successful configuration push

After you have initiated a configuration push, you can review the status of the push operation for each storage system or vFiler unit to which you pushed a configuration.

When you push a configuration to a storage system or vFiler unit, DataFabric Manager logs the push operation on the storage system, or vFiler unit. DataFabric Manager logs this operation as a message that contains information about the DataFabric Manager server station, and the administrator who started the push job.

What a configuration resource group is

A configuration resource group is a group of storage systems that share a set of common configuration settings.

You can designate groups of managed storage systems that can be remotely configured to share the same configuration settings.

A configuration resource group must contain some number of storage systems and have one or more files containing the desired configuration settings. These configuration settings are listed in files called configuration files.

Next topics

List of tasks for managing configuration groups on page 220
Considerations when creating configuration groups on page 221
Creating configuration resource groups on page 221
Parent configuration resource groups on page 222

List of tasks for managing configuration groups

After you have added configuration files to a group, you can manage your configuration groups by completing a set of tasks.

- Remove an existing configuration file from a group's configuration list
- Change the order of files in the configuration list
- Specify configuration overrides for a storage system or a vFiler unit assigned to a group

  Note: DataFabric Manager attempts to contact the storage system or vFiler unit, five times (default), to complete the configuration push job. You cannot reconfigure the number of retries from Operations Manager, but you can use the following CLI command to specify a new retry limit: `dfm config push -R`.
- Exclude configuration settings from being pushed to a storage system or a vFiler unit
- View Groups configuration summary for a version of Data ONTAP

- Push configuration files to a storage system or a group of storage systems, or to vFiler units or a group of vFiler units
- Delete push configuration jobs
- View the status of a push configuration jobs

Considerations when creating configuration groups

Before you create configuration groups, you must consider versions of operating systems and Data ONTAP, and storage systems belonging to configuration resource groups.

- Storage systems running on Data ONTAP 6.5.1 or later can be included in configuration resource groups.
- Storage systems running different operating system versions can be grouped in the same configuration resource group.
- A storage system can belong to only one configuration resource group, but can also belong to other non-configuration resource groups.
- A storage system that is a member of a configuration resource group can also belong to one or more groups.

Creating configuration resource groups

You can create configuration resource groups by creating an empty group and populate the group with storage systems.

Steps

1. Create an empty group.
2. From the Groups pane, select the group you want to edit.
3. From the Current Group pane, select **Edit Membership**.
4. Populate the group from the available members.
5. From the Current Group pane, select **Edit Storage System Configuration** to add one or more configuration files to the group.

After configuration files have been associated with the group, the following icon is attached to the group name so that you can identify the group as a configuration resource group:

Parent configuration resource groups

You can specify a parent configuration resource group from which one can acquire configuration settings.

Assigning a parent group enables you to quickly set the majority of the configuration settings of a storage system. You can then add any other configuration files that you might need to meet your deployment requirements. When you assign a parent group, you inherit only the parent group's configuration files, not the storage systems in the parent group.

Next topics

Parent group considerations on page 222
When to assign parent groups on page 222
Properties of configuration files acquired from a parent on page 223

Parent group considerations

You should follow a set of considerations when before assigning a parent group.

Before assigning a parent group, consider the following:

- When you assign a parent, you inherit only the parent group's configuration files. You do not inherit the storage systems in the member group.
- Parent groups can have parents of their own. A parent group might also have its own parent, and so on. The configuration settings of all parents are added to the beginning of the child's configuration settings. There is no limit to the potential length of these parent "chains."

Note: Ensure to review the settings in a parent group to ensure that they do not have unintended consequences on your storage systems.

When to assign parent groups

You should assign a parent group if you want to control all or most of the configuration settings of a storage system from Operations Manager.

Remember that when you assign a parent group, you inherit all configuration settings in the parent group. Therefore, you should carefully scan a parent's configuration for any undesirable settings before assigning a parent.

You would probably not want to assign a parent if you want to use only a few of a parent group's settings. For example, if an existing group contains most of the access control list (ACL) rules you require, you cannot assign the group as a parent. You also cannot add more ACL rules in another configuration file.

Properties of configuration files acquired from a parent

One of the properties of configuration files acquired from parent groups is that they are initially read-only.

When you include configuration files from another group, consider the following points:

- A configuration resource group can include configuration files from only one parent group.
- Configuration files acquired from parent groups are always read first. You cannot change the order in which the acquired files are read unless you re-order the configuration files from within the parent group.

Configuring multiple storage systems or vFiler units

To configure storage systems or vFiler units, you must have enabled SNMP on the storage systems and DataFabric Manager must have already discovered them.

Steps

1. Pull a configuration file from a storage system or a vFiler unit.
2. Click (**Management ➤ Storage System or vFiler ➤ Configuration Files ➤ Edit Configuration File**.
3. Edit the file settings.
4. Click **Compare Configuration Files** to compare your storage system or vFiler configuration file against a standard template configuration.
5. Create a configuration resource group by adding a configuration file.
6. If necessary, click (**Edit Storage System Configuration or Edit vFiler Configuration ➤ Edit Configuration Pushed for Appliance**) to specify configuration overrides for a specific storage system or vFiler unit, or exclude configuration settings from being pushed to the storage system or vFiler units.
7. Click **Edit Storage System Configuration** or **Edit vFiler Configuration** and push the configuration file or files out to the storage systems or to the group.
8. Verify that the configuration changes have taken effect by reviewing the status of the push jobs.

Backup Manager

You can manage disk-based backups for your storage systems using Backup Manager.

You can access it from the Backup tab in Operations Manager. Backup Manager provides tools for selecting data for backup, scheduling backup jobs, backing up data, and restoring data.

Note: Backup Manager does not support IPv6.

Next topics

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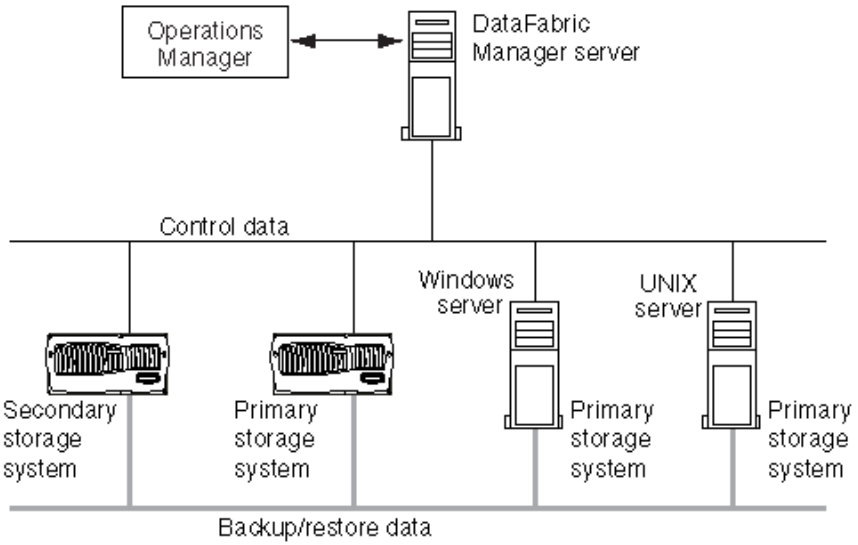
System requirements for backup on page 226
What backup scripts do on page 263
What the Backup Manager discovery process is on page 227
SnapVault services setup on page 229
Management of SnapVault relationships on page 230
What backup schedules are on page 232
Management of discovered relationships on page 235
What lag thresholds are on page 235
List of CLI commands to configure SnapVault backup relationships on page 237
Primary directory format on page 240
Secondary volume format on page 240

Backup management deployment scenario

The DataFabric Manager server uses the SnapVault technology of Data ONTAP to manage the backup and restore operations.

The following figure shows a sample configuration for backup management by using a DataFabric Manager server:



The configuration provides data protection between two NetApp storage systems and from a NetApp storage system to a UNIX or a Windows storage system.

System requirements for backup

You must meet a set of requirements for DataFabric Manager, primary storage system, and secondary storage system, for data backup.

The following table lists the requirements for each system.

System	Requirements
The DataFabric Manager server station	Protection Manager license
Primary storage system	• Data ONTAP 6.4 or later for storage systems and Data ONTAP 6.5 or later for vFiler units • SnapVault primary license • SnapVault and NDMP enabled (configured using Data ONTAP commands or FilerView) • Open Systems SnapVault module for open systems platforms, such as UNIX, Linux, and Windows

System	Requirements
Secondary storage system	• Data ONTAP 6.4 or later for storage systems and Data ONTAP 6.5 or later for vFiler units • SnapVault secondary license • SnapVault and NDMP enabled (configured using Data ONTAP commands or FilerView) • Licenses for open systems platforms that are backing up data to secondary volumes on the secondary storage system

What backup scripts do

The prebackup and postbackup scripts help in bringing the databases in to hot backup mode before a backup is performed.

DataFabric Manager provides the ability to run prebackup and postbackup scripts on specific primary directories, before and after data has been backed up from those directories. For more information about the process of setting up such scripts to run on primary directories, see the DataFabric Manager Backup man pages.

What the Backup Manager discovery process is

The Backup Manager performs three kinds of discovery process—storage system discovery, SnapVault relationship discovery, and New directories and qtree discoveries.

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Methods of storage system discovery on page 227
What SnapVault relationship discovery is on page 228
New directories for backup on page 228
Viewing directories that are not backed up on page 228

Methods of storage system discovery

Backup Manager provides two methods for discovering storage systems: SNMP and NDMP.

DataFabric Manager uses Simple Network Management Protocol (SNMP) to discover and monitor storage systems. DataFabric Manager uses Network Data Management Protocol (NDMP) primarily to communicate with primary and secondary storage systems.

When DataFabric Manager discovers a storage system, it adds the storage system to its database with the NDMP authentication credentials used for the connection. NDMP credentials are used to identify

if the discovered storage system is a primary or a secondary storage system. If DataFabric Manager attempts to connect to an NDMP server, and the NDMP server rejects the authentication credentials, DataFabric Manager does not add the storage system to its database. Therefore, DataFabric Manager avoids spamming NDMP servers with “Login failed” errors.

When DataFabric Manager cannot authenticate a storage system with NDMP, it uses SNMP to discover primary and secondary storage systems. DataFabric Manager then adds the storage systems to its database without NDMP authentication credentials.

On authentication, Backup Manager communicates with the primary and secondary storage systems to perform backup and restore operations.

What SnapVault relationship discovery is

DataFabric Manager discovers and imports existing SnapVault relationships by using NDMP.

SnapVault relationship discovery is possible only if you have NDMP credentials for the primary and secondary storage systems.

New directories for backup

Backup administrators should know when new directories appear on primary storage systems so that they can schedule them for backup.

An Open Systems SnapVault monitor checks whether all Open Systems SnapVault hosts for which DataFabric Manager has valid NDMP authentication credentials are running. If DataFabric Manager discovers directories that are not backed up on Open Systems SnapVault hosts, it generates an Unprotected Item Discovered event.

Viewing directories that are not backed up

You can use either the CLI or the GUI to view the directories that are not backed up on Open Systems SnapVault hosts.

Steps

1. You can view the directories that are not backed up either by CLI or using the GUI.

Option	Description
By using the Command-Line Interface (CLI), execute the command...	`dfbm report primary-dirs-discovered`
By using Graphic User Interface (GUI), go to...	Directories not scheduled for backup view

2. To disable the discovery of directories that are not backed up on Open Systems SnapVault hosts, execute the `dfbm primary dir ignore all` command at the CLI.

SnapVault services setup

Before you can use Backup Manager to back up your data using SnapVault relationships, you must prepare the primary storage system and the secondary storage system to use SnapVault.

The initial setup includes installing licenses, enabling SnapVault and NDMP services, and setting up DataFabric Manager access permissions.

To use SnapVault, you must have separate SnapVault licenses for both the primary and secondary storage systems—SnapVault primary license for primary storage system and SnapVault secondary license for secondary storage system. The Open Systems SnapVault agent does not require a license on the agent itself, but the secondary storage system requires Linux, UNIX, or Windows licenses.

Note: The setup procedure requires that you use the CLI of the storage system. If you want to use the Run a Command tool, you must first enable RSH on the storage system.

Next topics

Configuring the SnapVault license on page 229
Enabling NDMP backups on page 229

Configuring the SnapVault license

You must configure SnapVault license on your storage systems before you begin the backup operation.

Steps

1. Enter `license add sv_primary_license`.
2. Enter `license add sv_secondary_license`.
3. Enter `options snapvault.enable on`.
4. Enter `options snapvault.access host=`*`snapvault_secondary`* to name the secondary storage systems that you want to designate for backups.
5. Enter `options snapvault.access host=`*`snapvault_primary`* to name the primary storage systems that you want to back up.

Enabling NDMP backups

You must enable the NDMP service and specify the DataFabric Manager server to enable NDMP backups on your storage systems.

Steps

1. Enter `ndmpd on` to enable NDMP service on each primary and secondary storage system.

2. Enter `options ndmpd.access host=`*`dfm_server_host`* to let DataFabric Manager perform backup and restore operations.

Management of SnapVault relationships

You can configure DataFabric Manager to manage SnapVault relationships.

The configuration involves tasks such as, adding primary and secondary storage systems, adding secondary volumes, and selecting primary directories or qtrees for backup.

When DataFabric Manager discovers a primary or secondary storage system, Backup Manager lists the storage system in its backup reports. You can use either Operations Manager or the `dfbm` command to add a storage system.

Note: DataFabric Manager cannot discover Open systems platforms. Although you can add open systems platforms to the DataFabric Manager database for backup management, you cannot manage these platforms with DataFabric Manager.

Next topics

Adding secondary storage systems on page 230
Adding secondary volumes on page 231
Adding primary storage systems on page 231
Selecting primary directories or qtrees for backup on page 232

Adding secondary storage systems

You can add a secondary storage system to Backup Manager, from the **Backup Summary** page.

Before You Begin

The SnapVault server feature must be licensed on the secondary storage system.

Steps

1. Click **Backup ➤ Storage Systems**.
2. Click All Secondary Storage System from the **View** drop-down list.
3. In the **Secondary Storage Systems** page, enter the name (or IP address) of the secondary storage system.
4. Enter the NDMP user.
5. Obtain the NDMP password by entering the following command on the storage system:

   `ndmpd password` ***`username`***

   .

6. From the **Secondary Storage Systems** page, type the NDMP password.
7. Click **Add**.

Adding secondary volumes

You can select a secondary volume from a list of discovered volumes to add secondary volumes.

Before You Begin

Ensure that you have added a secondary storage system to Backup Manager, so that the volumes of secondary storage system are automatically discovered by DataFabric Manager and are added to its database.

Steps

1. Click **Backup ➤ Backup** and then the icon next to Secondary Volume.
2. From the **Secondary Volumes** page, select the secondary storage system.
3. Select a volume on the secondary storage system.

   Note: If DataFabric Manager has not yet discovered a volume, you might need to click **Refresh**.

4. Click **Add**.

Adding primary storage systems

You can add a primary storage system to Backup Manager from the **Primary Storage Systems** page.

Steps

1. From the **Primary Storage Systems** page, enter the name (or IP address) of the primary storage system.
2. Enter the NDMP user name used to authenticate the primary storage system in the NDMP User field.
3. Obtain the NDMP password by entering the following command on the storage system:

   `ndmpd password` ***`username`***

   .
4. If the primary storage system you are adding is an Open Platform system, you can configure a non-default value for the NDMP port on which DataFabric Manager will communicate with the system.
5. From the **Primary Storage Systems** page, enter the NDMP password.
6. Click **Add**.

After you have added a primary storage system to Backup Manager, DataFabric Manager automatically discovers the primary directories, and adds them to its database. DataFabric Manager also discovers primary qtrees, in the case of primary storage systems that support qtrees.

Selecting primary directories or qtrees for backup

You can schedule a primary directory or qtree for backup using the **Storage Systems** tab.

Before You Begin

Before baseline transfers can start, you must add the primary directory to Backup Manager and configure its volumes or qtrees for backups to the secondary volume.

Steps

1. Click **Backup** ➤ **Storage Systems**.
2. Select **Qtrees Not Scheduled For Backup** from the View drop-down list.
3. Select the qtree that you want to back up.
4. Click **Back Up**.

What backup schedules are

A backup schedule specifies how frequently data transfers are made from a primary directory or qtree to a secondary volume and how many Snapshot copies are retained on the secondary volume.

You must associate a backup schedule with a secondary volume before automatic backups can occur.

Note: Only one backup schedule can be associated with a secondary volume. Therefore, all backup relationships associated with a secondary volume must use the same backup schedule.

Next topics

Best practices for creating backup relationships on page 232
Snapshot copies and retention copies on page 233
Requirements to create a backup schedule on page 233
Creating backup schedules on page 233
Local data protection with Snapshot copies on page 234
Snapshot copy schedule interaction on page 234

Best practices for creating backup relationships

Backups typically involve large amounts of data. Therefore, you might want to follow certain recommendations before creating backup relationships.

Following are the recommendations for creating backup relationships:

- Create backup relationships during off-peak hours so that any performance impact does not affect users.

  Alternatively, you can specify a limit on the amount of bandwidth, a backup transfer can use.

  Note: If a baseline backup transfer starts on a storage system when it is busy providing file services (NFS and CIFS), then the performance of file services is not impacted. These services are given higher priority than the backup. However, the backup takes longer to complete, because the storage system's resources are being consumed by services of higher priority.

- Avoid creating multiple backup relationships at the same time to avoid initiating multiple baseline transfers.

Snapshot copies and retention copies

If a scheduled or manual backup occurs, DataFabric Manager directs each primary storage system to create a Snapshot copy of its current data. Then, DataFabric Manager directs the secondary storage system to initiate a backup to its secondary volume, based on the Snapshot copy made on the primary storage system.

After a transfer to the secondary volume occurs, DataFabric Manager directs the secondary storage system to create a Snapshot copy of the entire secondary volume. This Snapshot copy is retained if a retention count other than zero is specified in the backup schedule. Otherwise, the copy is overwritten the next time a Snapshot copy of the secondary volume is created as a result of a new backup. If the number of Snapshot copies of the secondary volume being retained exceeds the number specified in the retention count, the oldest copy is purged.

Note: Unlike on supported NetApp primary storage systems, Snapshot copies of current data are not created on open systems platforms. Instead, entire changed files are transferred.

Requirements to create a backup schedule

Before you create a backup schedule, you must ensure that you have a name for the schedule, and have information about the weekly, nightly, and hourly schedules.

Creating backup schedules

To create a backup schedule, either use a template or customize an existing schedule. You can modify the schedule later and create a custom template.

Before You Begin

When you create a backup schedule, you can identify it as the default backup schedule. Any secondary volumes subsequently added to Backup Manager are then automatically associated with this default backup schedule.

Steps

1. From the **Backup** page, click to open the **Backup Schedules** page.
2. Type a name for the schedule.
3. Create a schedule using one of the following methods:
   - Select a template.
   - Select **None** to create a schedule without using a template.
4. Click **Add** to add the schedule to the DataFabric Manager database. The **Schedule Details** page is displayed.
5. Optionally, check the **Use as Default for New Secondary Volumes** check box to apply the schedule to all secondary volumes subsequently added to Backup Manager.
6. Optionally, enter the retention count for the hourly, weekly, and nightly schedule.
7. Optionally, click **Add a schedule** to open the **Edit Schedule** page and configure backup times for each hourly, weekly, and nightly schedule.
8. Click **Update**.

Local data protection with Snapshot copies

If you want to keep several Snapshot copies of your data on supported primary storage systems for local data protection, you must not rely on the Snapshot copies created for backup transfers with DataFabric Manager.

Use the Data ONTAP `snap sched` command or FilerView to provide local data protection on primary storage systems. However, you should turn off Snapshot copy scheduling configured with the `snapvault snap sched` command, to save resources.

You can also generate events to avoid conflict between Snapshot and SnapVault.

Snapshot copy schedule interaction

The backup schedules defined in DataFabric Manager do not affect the Snapshot copy schedules defined on the secondary storage systems.

Because, the backup schedules created in DataFabric Manager are independent of any Snapshot copy schedules that are defined on the secondary storage systems using the Data ONTAP `snapvault snap sched` and `snap sched` commands or FilerView.

Although all types of schedules can exist simultaneously, turn off all Snapshot copy creation and retention schedules configured with Data ONTAP commands on the secondary storage systems.

If you do not turn "off" the backup schedules that are defined for a relationship on a secondary storage system, backup transfers and retention of backups as defined by the commands continue to occur on

the secondary storage system. Although such a situation does not lead to any data loss, it causes the primary and secondary storage systems to make unnecessary transfers, thus consuming resources on those storage systems. Hence, uses network bandwidth required for the backup transfers.

Management of discovered relationships

DataFabric Manager uses the following storage systems information to manage discovered relationships: system type, OS version, and NDMP credentials.

DataFabric Manager does not always have the basic information it needs to authenticate itself with discovered primary storage systems. Whenever you update the NDMP credentials of a storage system, DataFabric Manager contacts the storage system using NDMP to get this information. This also enables DataFabric Manager to verify the NDMP credentials.

Enabling DataFabric Manager to manage discovered relationships

You can enable DataFabric Manager to manage a discovered relationship by enabling NDMP, entering NDMP credentials, and associating a backup schedule.

Steps

1. Enable NDMP on the primary and secondary storage systems.
2. Enter the NDMP credentials for the primary and the secondary storage systems.
3. Associate a backup schedule with the secondary volume.

   Note: Turn off all Snapshot copy schedules and policies defined for the imported backup relationship that were created using the Data ONTAP `snapvault snap sched` command.

What lag thresholds are

Lag thresholds are limits set on the time elapsed since the last successful backup. When those limits are exceeded, DataFabric Manager generates events of specific severity that indicates the acuteness of the event.

After you add a secondary volume to Backup Manager, the default values for lag thresholds are applied. However, you can change these lag thresholds, either for all volumes or for specific secondary volumes.

You can specify time in weeks, days, hours, minutes, or seconds. For example, to specify 20 hours and 15 minutes, enter 20.25 hours or 20:15:00 as the value for the threshold.

Next topics

Setting global thresholds on page 236
Setting local thresholds on page 236
Bandwidth limitation for backup transfers on page 237
Configuring backup bandwidth on page 237

Setting global thresholds

The lag thresholds are applied by default to all secondary volumes in Backup Manager. To set a global option, you must complete a list of tasks.

Steps

1. Select **Setup ➤ Options** and choose **Backup Default Thresholds** from the **Edit Options** menu at the left side of Operations Manager.
2. In the **SnapVault Replica Nearly Out of Date Threshold** field, enter the limit at which the backups on a secondary volume are considered nearly obsolete.
3. In the **SnapVault Replica Out of Date Threshold** field, enter the limit at which the backups on a secondary volume are considered obsolete.
4. Click **Update**.

Setting local thresholds

You must complete a list of tasks to change the lag thresholds for a specific secondary volume.

Steps

1. From any Backup Manager report, click the **secondary volume** name to access the **Secondary Volume Details** page.
2. In the **Lag WarningThreshold** field, specify the lag warning threshold limit in weeks, days, hours, minutes, or seconds.

   Lag Warning threshold specifies the lag time after which the DataFabric Manager server generates the SnapVault Replica Nearly Out of Date event.

3. In the **Lag ErrorThreshold** field, specify the lag warning threshold limit in weeks, days, hours, minutes, or seconds.

   Lag Error threshold specifies the lag time after which the DataFabric Manager server generates the SnapVault Replica Out of Date event.

4. Click **Update**.

Bandwidth limitation for backup transfers

You can specify a limit on the amount of bandwidth used when a backup transfer occurs. You specify this limit when you create a backup relationship or later when a need arises.

When you specify a limit for a backup relationship, the limit applies to all backup transfers—baseline and incremental—that occur for the relationship. However, if you do not want to apply a bandwidth limit permanently to a backup relationship, but still want to limit the amount of bandwidth that is used for the baseline transfer, you can apply the limit when you create a backup relationship. By doing this, the baseline transfer does not use more bandwidth than you specify. After a baseline transfer has occurred, you can remove the limit.

If you do not specify a limit for a backup relationship, the maximum available bandwidth for a transfer is used.

Note: The bandwidth limit applies only to the backup operations and not to the restore operations. For the restore operations, the maximum available bandwidth is always used.

Configuring backup bandwidth

You cannot specify a global bandwidth limit for backup relationships. You must specify a limit for each relationship individually.

Steps

1. Select the directory for which you want to configure a bandwidth limit by doing one of the following:
   - For a new backup relationship, select the **Backup** tab to open the **Backup** page.
   - For an existing backup relationship, select a primary directory name from any view to open the **Primary Directory Details** page.
2. Enter the bandwidth limit that you want to impose on the backup transfers for this relationship.
3. Click **Update**.

List of CLI commands to configure SnapVault backup relationships

To configure SnapVault backup relationships, you must execute a set of CLI commands.

CLI command	Description

`dfbm backup list`
`dfbm backup ls`
`dfbm backup start`
	Initiates and browses backups for a secondary.

dfbm event list	Lists the backup events.

`dfbm job abort`
`dfbm job detail`
`dfbm job list`
`dfbm job purge`
	Manages backup jobs.

`dfbm ndmp add`
`dfbm ndmp delete`
`dfbm ndmp modify`
`dfbm ndmp list`
	Manages the list of user names and passwords used for Network Data Management Protocol (NDMP) discovery.

`dfbm option list` `dfbm option set`	Manages the global backup options that control the operation of Backup Manager.

`dfbm primary dir add`
`dfbm primary dir delete`
dfbm primary dir discovered
dfbm primary dir ignore
dfbm primary dir list
dfbm primary dir modify
dfbm primary dir relinquish
dfbm primary dir unignore
dfbm primary host add
dfbm primary host delete
dfbm primary host list
dfbm primary host modify
	Manages primary directories that DataFabric Manager discovers.

CLI command	Description
dfbm reports events dfbm reports events-error dfbm reports events-unack dfbm reports events-warning	Runs reports on backup events.
dfbm reports jobs dfbm reports jobs-1d dfbm reports jobs-30d dfbm reports jobs-7d dfbm reports jobs-aborted dfbm reports jobs-aborting dfbm reports jobs-completed dfbm reports jobs-failed dfbm reports jobs-running	Runs reports on backup jobs.
dfbm reports backups-by-primary dfbm reports backups-bysecondary	Runs backup reports based on primary or secondary relationships.
dfbm schedule add dfbm schedule create dfbm schedule delete dfbm schedule destroy dfbm schedule diag dfbm schedule modify	Manages backup schedules.
dfbm secondary host add dfbm secondary host delete dfbm secondary host list dfbm secondary host modify dfbm secondary volume add dfbm secondary volume delete dfbm secondary volume list dfbm secondary volume modify	Manages hosts and volumes used as backup destinations.

Primary directory format

If you want to add a primary directory to Backup Manager without browsing through Operations Manager, use the following format: `system_name:{drive_letter | volume_name}{path_name}`.

Note: The parameters are case-sensitive for UNIX systems, but not for Windows.

Supported storage systems

For a primary directory called `engineering/projects` in volume `vol1` of a storage system named `jupiter`, enter:

`jupiter:/vol1/engineering/projects.`

Windows system

For a primary directory called `engineering\projects` on the `D` drive of a Windows system named `mars`, enter:

`mars:D:\engineering\projects`

(although your capitalization could be different).

UNIX system

For a primary directory `/usr/local/share` on a UNIX system named `mercury`, enter:

`mercury:/usr/local/share`

Secondary volume format

If you need to add a secondary volume to Backup Manager, use the following format: `system_name:volume_name` For example, `pluto:/vol1.`

Disaster Recovery Manager

Disaster Recovery Manager is an application within DataFabric Manager that enables you to manage and monitor multiple SnapMirror relationships from a single interface.

Note: Disaster Recovery Manager does not support IPv6.

A SnapMirror relationship is the replication relationship between a source storage system or a vFiler unit and a destination storage system or a vFiler unit by using the Data ONTAP SnapMirror feature. Disaster Recovery Manager provides a simple, Web-based method of monitoring and managing SnapMirror relationships between volumes and qtrees on your supported storage systems and vFiler units. You can view and manage all SnapMirror relationships through the Disaster Recovery tab of Operations Manager. You can also configure SnapMirror thresholds, so that Disaster Recovery Manager generates an event and notifies the designated recipients of the event.

For more information about SnapMirror, see the *Data ONTAP Data Protection Online Backup and Recovery Guide*.

Next topics

Prerequisites for using Disaster Recovery Manager on page 241
Tasks performed by using Disaster Recovery Manager on page 242
What a policy is on page 242
Connection management on page 245
Authentication of storage systems on page 247
Volume or qtree SnapMirror relationship on page 248
What lag thresholds for SnapMirror are on page 252

Related information

Data ONTAP Data Protection Online Backup and Recovery Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Prerequisites for using Disaster Recovery Manager

Before you use Disaster Recovery Manager to monitor SnapMirror relationships, ensure that certain prerequisites are met.

- The Business Continuance Management license key must be installed.

  Note: The SnapMirror monitoring and management features are available only with the Business Continuance Management license. If you do not have this license, contact your sales representative.

- The SnapMirror destination storage systems must be running Data ONTAP 6.2 or later.

Note: Disaster Recovery Manager can discover and monitor only volume and qtree SnapMirror relationships in which the SnapMirror destinations have Data ONTAP 6.2 or later installed.

- The source and destination storage systems must have Data ONTAP 6.5 installed to perform any of the SnapMirror management tasks.
- The source and destination storage systems configured with vFiler units must be running Data ONTAP 6.5 or later to perform any of the SnapMirror relationship management and monitoring tasks.

Tasks performed by using Disaster Recovery Manager

You can manage policies, connections, and SnapMirror relationships; and authenticate storage systems using the Disaster Recovery Manager.

The **Disaster Recovery Manager** Home Page is the default page that appears when you click the **Disaster Recovery** tab. The page lists all the existing SnapMirror relationships.

What a policy is

A policy is a collection of configuration settings that you can apply to one or more SnapMirror relationships. The ability to apply a policy to more than one SnapMirror relationship makes a policy useful when managing many SnapMirror relationships.

There are two types of policies that you can create and apply to SnapMirror relationships:

- Replication
- Failover

Next topics

What a replication policy does on page 242
What a failover policy does on page 244
Policy management tasks on page 244

What a replication policy does

A replication policy affects the way in which a source storage system replicates data to a destination storage system or a vFiler unit.

SnapMirror replication can occur asynchronously or synchronously; therefore, based on the type of replication, there are two policies:

- Asynchronous replication policy
- Synchronous replication policy

Next topics

List of parameters for an asynchronous replication policy on page 243
List of parameters for a synchronous replication policy on page 243

List of parameters for an asynchronous replication policy

You must set a list of parameters for an asynchronous replication policy.

Schedule	Specifies when an automatic update occurs. You can specify the schedule using Operations Manager or you can enter the schedule in the cron format. **Note:** For more information about scheduling using the cron format, see the na_snapmirror.conf(5) man page for Data ONTAP.
Maximum Transfer Speed	Specifies the maximum transfer speed, in kilobytes per second.
Restart	Specifies the restart mode that SnapMirror uses to continue an incremental transfer from a checkpoint if it is interrupted.
Lag Warning Threshold	Specifies the limit at which the SnapMirror destination contents are considered nearly obsolete. If this limit is exceeded, Disaster Recovery Manager generates a SnapMirror Nearly Out of Date event.
Lag Error Threshold	Specifies the limit at which the SnapMirror destination contents are considered obsolete. If this limit is exceeded, Disaster Recovery Manager generates a SnapMirror Out of Date event.
TCP Window Size	Specifies, in bytes, the amount of data that a source can send on a connection before it requires acknowledgment from the destination that the data was received.
Checksum	Specifies the use of a Cyclic Redundancy Check (CRC) checksum algorithm. Use the checksum option if the error rate of your network is high enough to cause an undetected error.

List of parameters for a synchronous replication policy

You must set a list of parameters for a synchronous replication policy.

Fully synchronous	Specifies full synchronicity between the source and the destination.
Semi-synchronous	Specifies the level of synchronicity between the source and the destination. The destination can be behind the source by 0 to 60 seconds or by 0 to 500 write operations.
Visibility interval	Specifies a time interval after which the transferred data becomes visible on the destination.

TCP Window Size	Specifies the amount of data that a source can send on a connection before it requires acknowledgment from the destination that the data was received.
Checksum	Specifies the use of a Cyclic Redundancy Check (CRC) checksum algorithm. Use the checksum option if the error rate of your network is high enough to cause an undetected error.

What a failover policy does

A failover policy affects the process used by a SnapMirror relationship to recover from a disaster.

Failover policies consist of a path to a user-installed script that would be called when a disaster occurs before and after the following events:

- SnapMirror break
- SnapMirror resynchronization

Policy management tasks

This table describes policy management tasks and provides the location of the user-interface page that enables you to complete the task.

If you want to...	**Click...**
Create a new replication policy	**Disaster Recovery ➤ Add a Mirror ➤ Manage Replication Policies icon**) OR **Disaster Recovery ➤ Mirrors-Mirrored ➤ SnapMirror Relationship Source ➤ Manage Replication Policies icon**
Edit an existing replication policy	**Disaster Recovery ➤ Add a Mirror ➤ Edit Replication Policy icon** OR **Disaster Recovery ➤ Mirrors-Mirrored ➤ SnapMirror Relationship Source ➤ Policy name ➤ Manage Replication Policies icon**
Delete an existing replication policy **Note:** Remove the policy from SnapMirror relationships before deleting it; otherwise, Disaster Recovery Manager sends an error message.	**Disaster Recovery ➤ Add a Mirror ➤ Manage Replication Policies icon** OR **Disaster Recovery ➤ Mirrors-Mirrored ➤ SnapMirror Relationship Source ➤ Manage Replication Policies icon**

If you want to...	Click...
Create a new failover policy	**Disaster Recovery ➤ Add a Mirror ➤ Manage Failover Policies icon** OR **Disaster Recovery ➤ Mirrors-Mirrored ➤ SnapMirror Relationship Source ➤ Manage Failover Policies icon**
Edit an existing failover policy	**Disaster Recovery ➤ Add a Mirror ➤ Edit Selected Failover Policy icon** OR **Disaster Recovery ➤ Mirrors-Mirrored ➤ SnapMirror Relationship Source ➤ Policy name ➤ Manage Failover Policies icon**
Delete an existing failover policy **Note:** Remove the policy from SnapMirror relationships before deleting it; otherwise, Disaster Recovery Manager sends an error message.	**Disaster Recovery tab ➤ Add a Mirror link ➤ Manage Failover Policies icon** OR **Disaster Recovery ➤ Mirrors-Mirrored ➤ SnapMirror Relationship Source ➤ Manage Failover Policies icon**

Note: All the replication policies in the earlier versions that are not assigned to any mirror relationships are deleted, while upgrading DataFabric Manager from versions earlier than 3.2 to 3.2 or later.

Connection management

You can specify one or two specific network paths between a source storage system or a vFiler unit, and a destination storage system or a vFiler unit using connection management.

The advantages of multiple paths between source and destination storage systems or vFiler units are as follows:

- Increased transfer bandwidth
- Networking failover capability

Note: Asynchronous SnapMirror does not support multiple paths in Data ONTAP 6.5.

For more information, see the *Data ONTAP Data Protection Online Backup and Recovery Guide*.

Next topics

Connection management tasks on page 246
What the connection describes on page 246

What multipath connections are on page 247

Related information

Data ONTAP Data Protection Online Backup and Recovery Guide - http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml

Connection management tasks

The table describes connection management tasks and provides the location of the user-interface page that enables you to complete the task.

If you want to...	Go here...
Create a connection	**Connections** page (**ConnectionsDisaster Recovery tab ➤ Add a Mirror link ➤ Manage Connections icon**) OR (**Disaster Recovery tab ➤ Mirrors-Mirrored link ➤ SnapMirror Relationship Source ➤ Manage Connections icon**)
Edit a connection	**Edit Connections** page (**Disaster Recovery tab ➤ Add a Mirror link ➤ Manage Connections icon ➤ View drop-down list, connection name**) OR (**Disaster Recovery tab ➤ Mirrors-Mirrored link ➤ View drop-down list, connection name**)
Delete a connection	**Connections** page (**Disaster Recovery tab ➤ Mirrors-Mirrored link ➤ SnapMirror Relationship Source ➤ Manage Connections icon**)

What the connection describes

A connection specifies the parameters for one or two network paths between the source and the destination storage system or a vFiler unit.

The parameters that are specified by the connection are as follows:

Connection name Name of the connection.

Connection mode Defines the mode, that the paths use.

IP address pairs IP addresses of the source and destination storage systems and vFiler units that define the path that are used by the SnapMirror relationship. You must define one path, and you can define up to two paths.

What multipath connections are

Synchronous SnapMirror supports up to two paths for a particular SnapMirror relationship. The paths can be Ethernet, Fibre Channel, or a combination of Ethernet and Fibre Channel.

You can set the two paths to use one of the following two modes:

- Multiplexing mode—SnapMirror uses both paths at the same time, essentially load balancing the transfers. If one path fails, the transfers occur on the other path. After the failed path is repaired, the transfers resume using both paths.
- Failover mode—SnapMirror uses the first specified path as the desired path and uses the second specified path only if the first path fails.

Authentication of storage systems

DataFabric Manager uses the NDMP protocol to manage SnapMirror relationships, and therefore authentication of the storage systems is necessary.

Before you can perform any SnapMirror management task, DataFabric Manager must know the NDMP credentials for the source and destination storage systems.

Next topics

Authentication of discovered and unmanaged storage systems on page 247
Addition of a storage system on page 248
Modification of NDMP credentials on page 248
Deletion of a storage system on page 248

Authentication of discovered and unmanaged storage systems

If you try to perform management tasks on a SnapMirror relationship in which a storage system is unauthenticated, Disaster Recovery Manager redirects you to the authentication page where you need to enter NDMP credentials (user name and password).

Disaster Recovery Manager discovers storage systems enabled with SnapMirror on your network.

Disaster Recovery Manager might not identify the NDMP credentials for storage systems on your network. Storage systems for which the Disaster Recovery Manager fails to recognize the NDMP credentials are listed on the **Authenticate Storage Systems** page (**Disaster Recovery tab ➤ Authenticate Storage systems link**)

Note: Disaster Recovery Manager can manage only storage systems running on Data ONTAP 6.5 or later.

Addition of a storage system

Before you manage the SnapMirror relationship using Disaster Recovery Manager, you must add NDMP credentials.

When creating SnapMirror relationships by using storage systems that have not been SnapMirror enabled before, you must add NDMP credentials. You can add NDMP credentials on the Storage systems page when you create the new SnapMirror relationship (**Disaster Recovery tab ➤ Add a Mirror link ➤ Manage SnapMirror Hosts icon**).

Modification of NDMP credentials

You can edit the NDMP credentials of a storage system, for a selected SnapMirror relationship from the **Edit a storage system** page.

You might have to edit the NDMP credentials for selected SnapMirror relationships.

Change administrators and passwords as a security precaution

You can edit the NDMP credential for a selected SnapMirror relationship from the **Edit a storage system** page (**Disaster Recovery tab ➤ Mirrors-Mirrored link ➤ SnapMirror Relationship source ➤ storage system**).

Note: The NDMP credentials are shared with the Backup Manager.

Deletion of a storage system

You can delete one or more storage systems from the managed storage system list if you do not use them in a SnapMirror relationship.

You must not delete a storage system if you are changing its NDMP password. Instead, you must change the NDMP password by editing the storage system.

Volume or qtree SnapMirror relationship

To create a new SnapMirror relationship, which is either a volume replication or a qtree replication, you must create the volume (restricted or not restricted) on the destination storage system.

If the new SnapMirror relationship is a volume replication, you must create the volume on the destination storage system and mark the volume as restricted before you can create the SnapMirror relationship. The FilerView link provides a shortcut to do this.

Note: Monitor must be running for you to be able to access the FilerView interface for a storage system.

If the new SnapMirror relationship is a qtree replication, ensure that the volume on the destination storage system where you want to replicate a qtree with SnapMirror is online and not restricted. Do not manually create a destination qtree.

On upgrading to DataFabric Manager3.3, in a qtree SnapMirror relationship, you can select a qtree directly belonging to the vFiler unit, by selecting the volume belonging to the storage system.

Next topics

Decisions to make before adding a new SnapMirror relationship on page 249
Addition of a new SnapMirror relationship on page 250
Modification of an existing SnapMirror relationship on page 250
Modification of the source of a SnapMirror relationship on page 250
Reason to manually update a SnapMirror relationship on page 250
Termination of a SnapMirror transfer on page 251
SnapMirror relationship quiescence on page 251
View of quiesced SnapMirror relationships on page 251
Resumption of a SnapMirror relationship on page 251
Disruption of a SnapMirror relationship on page 251
View of a broken SnapMirror relationship on page 251
Resynchronization of a broken SnapMirror relationship on page 252
Deletion of a broken SnapMirror relationship on page 252

Decisions to make before adding a new SnapMirror relationship

You can add a new SnapMirror relationship by specifying the Relationship type, Source, Destination, Volume, Connection, and Policies.

Relationship type	If the new SnapMirror relationship is a volume replication, you must create the volume on the destination storage system and mark the volume as restricted before you can create the SnapMirror relationship. If the new SnapMirror relationship is a qtree replication, ensure that the volume on the destination storage system where you want to replicate a qtree with SnapMirror is online and not restricted.
Connection	Specifying a defined connection is optional. If you do not specify a defined connection, the default network route is used.
Policies	Replication and failover policies are optional. If you do not specify a replication policy, only a baseline transfer is performed. You can add a replication policy later to schedule when incremental transfers occur. If you do not specify a failover policy, no user scripts are called during a SnapMirror break or resynchronization.

Related concepts

Connection management on page 245
What a policy is on page 242

Addition of a new SnapMirror relationship

You can use the **SnapMirror Relationships** page to create a new SnapMirror relationship.

Adding a new SnapMirror relationship involves the following:

- By selecting the type of SnapMirror relationship, volume or qtree
- By selecting the source storage system and source volume or qtree

  Note: If the SnapMirror relationship is a qtree replication, you select the volume and the qtree.

- Selecting the destination storage system and destination volume or qtree
- Selecting the connection
- Selecting the type of replication and failover policy

Modification of an existing SnapMirror relationship

You can edit an existing SnapMirror relationship, from the **Edit SnapMirror Relationship** page.

To edit an existing SnapMirror relationship, use **Edit SnapMirror Relationship** page. Editing an existing SnapMirror relationship involves the following tasks:

- Creating or editing replication policies and failover policies
- Assigning a connection for a relationship

Related concepts

Connection management on page 245
What a policy is on page 242

Modification of the source of a SnapMirror relationship

You can change the source of a SnapMirror relationship, from the **Edit SnapMirror Relationship** page.

To change the source of a SnapMirror relationship, use **Edit SnapMirror Relationship** page (**Disaster Recovery tab ➤ Home ➤ SnapMirror relationship source**).

Reason to manually update a SnapMirror relationship

You can update an existing SnapMirror relationship from the **Edit SnapMirror Relationship** page.

Use the **Edit SnapMirror Relationship** page (**Disaster Recovery tab ➤ Home ➤ SnapMirror relationship source**) to update a SnapMirror relationship in between scheduled incremental updates

By updating a SnapMirror relationship manually is useful because you might need to run an unscheduled update to prevent data loss. Data loss occurs due to scheduled or threatened power outage or from a destination volume being taken offline for maintenance, repair, upgrade, or data migration.

Termination of a SnapMirror transfer

You can abort a SnapMirror transfer from the **Edit SnapMirror Relationship** page.

The **Abort** button on the **Edit SnapMirror Relationship** page is available only when SnapMirror transfers are in progress.

SnapMirror relationship quiescence

You can quiesce SnapMirror relationship, from the **Edit SnapMirror Relationship** page.

Use the **Edit SnapMirror Relationship** page (**Disaster Recovery tab ➤ Home ➤ SnapMirror relationship source**) to quiesce a SnapMirror relationship.

You can quiesce a SnapMirror relationship to block updates to the destination storage system after existing volume or qtree updates are complete. If a qtree is not in a stable state (is in transition), quiescing the SnapMirror relationship forces it into a stable state.

You can quiesce only volumes and qtrees that are online and that are SnapMirror destinations. You cannot quiesce a restricted or offline volume or a qtree in a restricted or offline volume.

View of quiesced SnapMirror relationships

You can use the **Disaster Recovery** Home page or the **Quiesced SnapMirror Relationships** page to view all quiesced SnapMirror relationships.

Resumption of a SnapMirror relationship

You can resume a SnapMirror relationship from the **Edit SnapMirror Relationship** page or **Quiesced SnapMirror Relationships** page.

Disruption of a SnapMirror relationship

You can break a quiesced SnapMirror relationship from the **Edit SnapMirror Relationship** page or the **Quiesced SnapMirror Relationships** page.

You can break SnapMirror relationships if you want to temporarily end a SnapMirror relationship between a source and a destination volume or qtree. When you break a relationship, the source from a destination volume or qtree releases, allowing the source to delete its base Snapshot copy for the SnapMirror relationship.

View of a broken SnapMirror relationship

You can view all the broken SnapMirror relationships from the **Disaster Recovery** Home page or the **Broken SnapMirror Relationships** page.

Resynchronization of a broken SnapMirror relationship

Use the **Edit SnapMirror Relationship** page or the **Broken SnapMirror Relationships** page to perform resynchronization tasks related to SnapMirror relationships.

You can resynchronize a source and a destination volume or qtree in one of the following ways:

- You can resynchronize the SnapMirror relationship that you broke.
- You can reverse the functions of the source and the destination when you resynchronize.

Deletion of a broken SnapMirror relationship

You can delete a broken SnapMirror relationship from the **Edit SnapMirror Relationship** page or the **Broken SnapMirror Relationships** page.

Note: The only way to restore a deleted SnapMirror relationship is to initialize the relationship.

What lag thresholds for SnapMirror are

After Operations Manager is installed, the lag thresholds of all the SnapMirror sources and destinations are set to default values; however, you might want to change these thresholds.

You can change the threshold values of the following:

- All SnapMirror sources and destinations in the Disaster Recovery Manager database
- All SnapMirror sources and destinations of a specific group
- All mirrors of a SnapMirror source
- A specific SnapMirror source or destination

For more information on the thresholds and the default values, see *Operations Manager Help*.

Disaster Recovery Manager automatically generates SnapMirror events based on these thresholds. If you want to receive notifications in the form of e-mail messages, pager alerts, or SNMP traps when a SnapMirror event occurs, you can set up alarms.

Note: Disaster Recovery Manager does not generate events when lag thresholds of SnapMirror sources are crossed. Only lag thresholds of SnapMirror destinations are used for generating events.

Next topics

Where to change the lag thresholds on page 253
Lag thresholds you can change on page 253
Reasons for changing the lag thresholds on page 253
What the job status report is on page 253

Where to change the lag thresholds

You can change the lag thresholds from the **Edit Policy** page (Disaster Recovery tab > Home link > SnapMirror relationship Source > Manage Replication Policies icon > Policy name).

Lag thresholds you can change

You can change SnapMirror Lag Warning Threshold and SnapMirror Lag Error Thresholds.

You can change the following lag thresholds:

- SnapMirror Lag Warning Threshold
  This option specifies the limit at which the SnapMirror destination contents are considered nearly obsolete. If this limit is exceeded, Disaster Recovery Manager generates a SnapMirror Nearly Out of Date event.
  You can specify the lag warning threshold limit in weeks, days, hours, minutes, or seconds. For example, to specify 20 hours and 15 minutes, enter 20.25 hours or 20:15:00 as the value for this option.
- SnapMirror Lag Error Threshold
  This option specifies the limit at which the SnapMirror destination contents are considered obsolete. If this limit is exceeded, Disaster Recovery Manager generates a SnapMirror Out of Date event.
  You can specify the lag error threshold limit in weeks, days, hours, minutes, or seconds. For example, to specify 20 hours and 15 minutes, enter 20.25 hours or 20:15:00 as the value for this option.

Reasons for changing the lag thresholds

You can change the default values of the lag thresholds to a lower value, to be notified at an earlier time than the specified time.

If you use your SnapMirror destination to distribute data to remote sites, you must keep the latest data at the destination. Now, you must set the SnapMirror schedule to transfer data from the source to the destination frequently. In such a case, Disaster Recovery Manager can generate an event sooner than the default lag time so that you can take corrective action sooner.

What the job status report is

The Job Status report displays the status of SnapMirror jobs along with information such as, the time at which the jobs were started and their job IDs. The Job Status report is identical in appearance and function to the Job Status report for Backup Manager.

Maintenance and management

You can configure and maintain DataFabric Manager through the CLI.

Next topics

Accessing the CLI on page 255
Where to find information about DataFabric Manager commands on page 256
What audit logging is on page 256
What remote platform management interface is on page 259
Scripts overview on page 260
What the DataFabric Manager database backup process is on page 263
What the restore process is on page 269
Disaster recovery configurations on page 270

Accessing the CLI

The CLI is accessible by way of Telnet to or access to the console of the system on which DataFabric Manager is installed.

Step

1. Access the CLI on local or remote systems.

If you want to access the CLI on a...	Then...
Local Windows system	Use the command prompt window of the Windows workstation through **Start ➤ Run**.
Local Linux system	Use any shell prompt on your workstation.
Remote Windows or Linux system	1. Make a Telnet connection from the remote host to DataFabric Manager you want to access by entering the following command: `telnet` ***`hostname`*** ***`hostname`*** is the host name or IP address of the system running DataFabric Manager. When connected to a terminal server, use the host name or IP address, and the port number of the terminal server, to access the console of the workstation: `telnet {term_server}: port_number` 2. Initiate authentication with your user name and password.

Where to find information about DataFabric Manager commands

There are two ways to find information about DataFabric Manager commands, by accessing the help and by using the `dfm help` command.

- Access the man pages through the table of contents of the *Operations Manager Help* or the following URL: `http://server_ipaddress:8080/man/`. On a Linux system, you can access the man pages running the command `source /opt/NTAPdfm/bin/vars.sh` and then `man dfm`.
- Use the `dfm help` command, which has the following syntax: `dfm help command`.

What audit logging is

Audit logging is the process of logging every activity performed by DataFabric Manager for a later review. DataFabric Manager logs all the activities in the `audit log` file.

System administrators view the `audit log` file for following reasons:

- Determine the recently changed configurations to understand why a problem is occurring.
- Determine when a specified change to the configuration of the system was made.
- Determine who made the specified change to the configuration of the system and ask them why the change was made.
- Identify attempts to subvert the security of the system.

The `audit log` file resides in the default log directory of DataFabric Manager.

Next topics

Events audited in DataFabric Manager on page 256
Global options for audit log files and their values on page 257
Format of events in audit log file on page 257
Permissions for accessing the audit log file on page 259

Events audited in DataFabric Manager

DataFabric Manager logs events and each of these events are recorded.

The events that can be audited in DataFabric Manager and the information that is recorded about each event are described here:

Authentication events	DataFabric Manager logs each authentication action that succeeded or failed. The user name associated with the authentication attempt is also recorded.

Authorization events	DataFabric Manager logs each authorization failure and the user name associated with it.
Command execution	DataFabric Manager logs execution of each command. The complete command line (including options and arguments) is recorded in the `audit log` file. DataFabric Manager also logs the name of the user who executed the command; the failure status of the command, if any; and the type of request: Web or CLI.
API calls	DataFabric Manager logs invocation of any API by using DataFabric Manager service. The complete details of the API call and the authenticated user's name, on whose behalf, the API was invoked, are recorded in the `audit log` file.
Scheduled actions	When the scheduler starts a job by invoking a CLI, DataFabric Manager logs the scheduled action and the user affiliated with it in the `audit log` file.

In addition, a timestamp is recorded for each event. In the case of APIs, the IP address of the appliance from which the requests are received is logged. In the case of CLI requests, the IP address is always that of DataFabric Manager .

Global options for audit log files and their values

A global option `auditLogForever` is used to keep the audit log files forever. The valid values for this option are `yes` and `no` and the default value is `noauditLogEnabled`.

Note: When you set the `auditLogForever` global option to yes, the number of audit log files (each 3 MB in size) can grow excessively. You have to ensure that you have enough space on DataFabric Manager to keep the audit log files forever.

For audit logging, the `dfm option list` command requires global read capability and the `dfm option set` command requires global write capability.

You must have Core Control Capability to modify `auditLogEnable` and `auditLogForever` global option. License features required: The `dfm option set` command requires an Operations Manager license.

Format of events in audit log file

The format of events in the `audit log` file is as follows: <timestamp> [<application-name>:<priority>]:<username>:<protocol> <label>:[ip-address]:<intent>:<message>.

Example of events in the `audit log` file:

Apr 11 00:04:19 [dfm:NOTIC]:root:LOG:action:::Added new

administrator "testu1":

Apr 20 11:57:27 [dfm:NOTIC]:root:API:in:[10.72.1.2]:Listing database

Apr 23 14:56:40 [dfm:NOTIC]:root:WEB:in:[ABCD:EF01:2345:6789:ABCD:EF01:2345:6789]:dfm report view

backups:

<ss><dfm-backup-directory>opt

<dfm-backup-directory><dfm-backup-verify-settings>

The <application-name> value denotes the application invoking the audit log facility. For example, it can be `dfm/dfbm/dfdrm/dfcm` if a CLI or Operations Manager request is being audit logged from the `dfm/dfbm/dfsrm/dfcm` executable.

In the case of APIs, <application-name> is the actual name of the application that called the API (for example, dfm and sdu). If the API was called by an external application other than dfm and it does not pass the name of the application in the API input parameters, the field :: is not printed in the log message.

The message priority field <priority> can have one of the following values:

- EMERG: unusable system
- ALERT: action required
- CRIT: critical conditions
- ERROR: error conditions
- WARN: warning conditions
- NOTIC: normal, but significant condition
- INFO: informational messages
- DEBUG: debug-level messages

The <username> field logs names of the users who invoked the CLIs and APIs.

The <protocol> field describes the source of the event being logged. The protocol label can have one of the following values:

- API: In the case of an API invocation
- CMD: In the case of CLI commands
- LOG: When an event is explicitly logged by the system
- WEB: In the case of an Operations Managers request

The <label> field describes the type of the event being logged. The message label can have one of the following values:

- IN: for input
- OUT: for output (for example, in the case of API calls)
- ERR: for error (for example, in the case of LOG in failures)
- ACTION: for actions initiated by the user

The <ip-address> value for APIs is the IP address of the system from which the API is invoked. In the case of the CLI, it is the IP address of the DataFabric Manager server. For requests coming through Operations Manager, it is the IP address of the workstation on which Operations Manager is installed.

The <intent> field describes the following information:

- If the protocol is API, it conveys the intention of the API.
- If the protocol is CMD, it is the actual command used.
- If the protocol is WEB, it is the URL of the Web page.
- If audit-log API is called, this field remains blank.

The <message> field content depends on the value of <protocol>, as follows:

- If <protocol> is API, the XML input to the API is logged, excluding the <netapp> element.
- If <protocol> is CMD, it contains output or an error message.
- If <protocol> is WEB, it is empty.

Following is an example:

July 04 22:11:59 [dfm:NOTIC]:NETAPP\tom:CMD:in:127.0.0.1:dfm host

password set -p ****** jameel:Started job:2

July 06 13:27:15 [dfm:NOTIC]:NETAPP\tom:WEB:in:127.0.0.1:dfm user

login username = tom password=******:Logged in as<B>NETAPP\tom

<\B>

July 06 14:42:55[dfm:NOTIC]:NETAPP\tom:API:in:127.0.0.1:Add a role

to a user:<rbac-admin-role-add> <role-name-or-id>4</role-name-orid>

<admin-name-or-id>TOM-XP\dfmuser</admin-name-or-id></rbacadmin-

role-add>

Permissions for accessing the audit log file

For accessing the `audit log` file, Windows and UNIX users have separate permissions.

- Linux: -rw - - root root “root” users on Linux have both read and write permissions.
- Windows Users in the Administrators group have both read and write permissions.

What remote platform management interface is

The remote platform management interface enables you to remotely perform the routine system maintenance tasks such as resetting a system with backup firmware.

Following maintenance tasks can be performed using the interface on DataFabric Manager:

- Control system power, such as powering on or off the storage system
- Reset system firmware
- View system and event logs
- Obtain system sensor status

You can use the Run a Command tool in Operations Manager or use the `dfm run cmd -r` command on the CLI of DataFabric Manager to execute the remote platform management commands.

By using the interface, you can access the Remote LAN Module (RLM) cards on the 30xx, 31xx, and 60xx storage systems.

Next topics

RLM card monitoring in DataFabric Manager on page 260
Prerequisites for using the remote platform management interface on page 260

RLM card monitoring in DataFabric Manager

DataFabric Manager monitors the RLM card installed on your storage system and obtains its status by issuing an ICMP ECHO request. When the card responds to the request, Operations Manager displays the card status as Online in the **Appliance Details** page.

By default, DataFabric Manager pings the card every 15 minutes. You can change this monitoring interval using the Operations Manager Tools menu.

Prerequisites for using the remote platform management interface

Before performing remote maintenance, by using the remote platform management interface, you must configure the RLM card IP address on the storage system.

After you have configured the card's IP address, you must set the following parameters in Edit Appliance Settings for the target storage system:

Remote Platform Management IP address	This is the IP address of the RLM card on the storage system.
Appliance login	This is the login user name.
Appliance password	This is the login password.

For procedures to configure an RLM card IP address, see the *Operations Manager help*.

Scripts overview

The installation, management, and execution of your scripts are supported by DataFabric Manager.

You begin creating a script by writing the script. You can use any scripting language, but keep in mind that your choice impacts your network administrators. The network administrator needs to install the interpreter you require on the system where DataFabric Manager is installed. It is recommended that you use a scripting language such as Perl. Perl is typically installed with the operating system on Linux and Windows workstations.

Besides, the `dfm report –F Perl` command in DataFabric Manager, generates reports for direct inclusion in Perl scripts. You have a way of importing information from DataFabric Manager reports into a Perl script. For more information, see the dfm report command man page.

See the *Operations Manager Help* for task procedures and option descriptions.

Next topics

Commands that can be used as part of the script on page 261
Package of the script content on page 261
What script plug-ins are on page 261
What the script plug-in directory is on page 262
What the configuration difference checker script is on page 263
What backup scripts do on page 263

Commands that can be used as part of the script

Because scripts are executed by DataFabric Manager, your script is able to execute any of the commands available as part of the DataFabric Manager CLI.

Your script can complete the following tasks:

- Use the `dfm run` command to execute commands on storage systems for which your DataFabric Manager server has been specified the credentials.
- Use the `dfm report` command to import information from Operations Manager's reports into a Perl script.
- Use the `dfm event` generate command to enable your scripts to generate events.

Package of the script content

Once you have written your script, you need to package it as a ZIP file.

The ZIP file must contain the script, any data files that are needed by the script, and a file called `package.xml`.

For more information about `package.xml` and the XML schema information, see the *Operations Manager Help*.

What script plug-ins are

By using script plug-in framework, you can perform several tasks in Operations Manager.

Scripts are installed using a ZIP file that must contain the script, any data files that are needed by the script, and a file named `package.xml`.

The `package.xml` file contains information about the script, and might optionally contain definitions of new event types that your script generates.

Once you have your ZIP file ready, you can install it on the DataFabric Manager server to verify that your packaging functions correctly. Once you verify the functionality, you can use, or distribute the script.

Following tasks can be performed using the script plug-in framework:

- Manage the scripts you add to DataFabric Manager
- Create and manage script jobs
- Create and manage schedules for the script jobs you have created
- Define new event classes during script installation or generate these events during script execution.

For more information about creating scripts and the contents of the script ZIP file, see the *Operations Manager Help*.

Configuration difference checker script

You can use the Configuration Difference Checker script to detect when the configuration of a storage system changes from a previous known configuration. You can manage the Configuration Difference Checker script with the functionality that is provided to you as part of the script plug-in framework.

When the Configuration Difference Checker script runs, if a configuration change is detected, DataFabric Manager generates an event notifying you of the configuration changes. Using job reports, it stores a history of the configuration changes and stores one configuration obtained from the last time the script ran.

A Configuration Difference Checker script called config_diff.zip is provided for you. You can obtain this script from the ToolChest accessible from *http://now.netapp.com/*. The ToolChest contains many frequently used tools, including downloadable tools and utilities, Web applications, third-party tools, and miscellaneous useful links.

You can add, schedule, and run the Configuration Difference Checker script using the script plug-in pages and commands listed in

What the script plug-in directory is

By default, scripts are installed in the script-plugins subdirectory of the installation directory.

You can change the location of this directory by using the `scriptDir` option of the `dfm option` command. The option value must conform to the following requirements:

- The value must be an absolute Linux or Windows path.
- The value must include an existing directory on the DataFabric Manager server.

What the configuration difference checker script is

You can use the Configuration Difference Checker script to detect when the configuration of a storage system changes from a previous known configuration. You can manage the Configuration Difference Checker script with the functionality that is provided to you as part of the script plug-in framework.

When the Configuration Difference Checker script runs, if a configuration change is detected, DataFabric Manager generates an event to notify you of, the configuration changes. By using job reports, it stores a history of the configuration changes and stores one configuration obtained from the last time the script ran.

A Configuration Difference Checker script called config_diff.zip is provided for you. You can obtain this script from the ToolChest accessible from *http://now.netapp.com/*. The ToolChest contains many frequently used tools, including downloadable tools and utilities, Web applications, third-party tools, and miscellaneous useful links.

What backup scripts do

The prebackup and postbackup scripts help in bringing the databases in to hot backup mode before a backup is performed.

DataFabric Manager provides the ability to run prebackup and postbackup scripts on specific primary directories, before and after data has been backed up from those directories. For more information about the process of setting up such scripts to run on primary directories, see the DataFabric Manager Backup man pages.

What the DataFabric Manager database backup process is

DataFabric Manager database backup is simple and powerful. You can back up the DataFabric Manager database, script plug-ins, and performance data without stopping any DataFabric Manager services. However, data collection and view modifications of Performance Advisor are suspended during the backup process.

There are two types of backups:

- Archive: The backup process backs up your critical data in compressed form using the ZIP format. DataFabric Manager server automatically converts the DataFabric Manager data to an archive format and stores the backup in a local or remote directory. You can easily move an archive-based backup to a different system and restore it. But the backup process is time-consuming.
- Snapshot-based: In the Snapshot-based approach, the backup process uses the Snapshot technology to back up the database. You can quicken the backup process through this approach. But you cannot easily move a Snapshot-based backup to a different system and restore it.

Next topics

When to back up data on page 264
Where to back up data on page 264
Recommendations for disaster recovery on page 265
Backup storage and sizing on page 265
Limitation of Snapshot-based backups on page 265
Access requirements for backup operations on page 265
Changing the directory path for archive backups on page 266
Starting database backup from Operations Manager on page 266
Scheduling database backups from Operations Manager on page 267
Specifying backup retention count on page 267
Disabling database backup schedules on page 267
Listing database backups on page 268
Deleting database backups from Operations Manager on page 268
Displaying diagnostic information from Operations Manager on page 268
Exportability of a backup to a new location on page 268

When to back up data

You must back up your data regularly.

Following are the other situations for your data backup:

- Before upgrading (or during the upgrade, as one of the install wizard steps)
- Before any maintenance on the system host on the DataFabric Manager server or Operating System upgrade

Where to back up data

By default, the DataFabric Manager server creates the archive backups in two directories.

DataFabric Manager creates archives in the following directories:

- `/opt/NTAPdfm/data` on a UNIX machine
- `C:\Program Files\NetApp\DataFabric Manager\DFM\data` on a Windows machine

You can also specify a different target directory. The backup file has an added file name extension of .db, .gz, .zip, or .ndb, depending on the version of the DataFabric Manager server that you are running.

Note: Current version of DataFabric Manager uses .ndb format.

The Snapshot-based backups are volume Snapshots. Therefore, unlike in the archive backups, you do not have to specify a target directory in the Snapshot based backups.

Recommendations for disaster recovery

If you are using the archive-based backups, set the database backup location to a remote location. You can access the backup even if the DataFabric Manager server is not accessible.

Similar to archive-based backups, integration support of DataFabric Manager server with SnapVault or SnapMirror is available for Snapshot-based backups.

Backup storage and sizing

When you perform an archived backup, DataFabric Manager server calculates the amount of disk space required to complete the backup successfully. You can view the backup information in the **Database Backup Schedule Confirmation** page.

In the case of Snapshot-based backups, DataFabric Manager server does not calculate the amount of disk space required. Therefore, it is a good practice to provide enough disk space to hold the backups.

Limitation of Snapshot-based backups

To configure the DataFabric Manager database for Snapshot-based backups on Windows and Linux, you must install the appropriate versions of SnapDrive software.

SnapDrive restrictions on Windows

To configure the DataFabric Manager database for Snapshot-based backups on Windows, you must install SnapDrive 4.1 for Windows or later.

SnapDrive restrictions on Linux

To configure the DataFabric Manager database for Snapshot-based backups on Linux, you must install SnapDrive 2.2.1 for UNIX or later. For information about supported versions, see the SnapDrive for UNIX Compatibility Matrix page on the NOW site.

Related information

The NOW site -- http://now.netapp.com/

Access requirements for backup operations

You must log in to DataFabric Manager server with the CoreControl capability in the Global scope to perform various backup operations.

Following are the backup operations you can perform:

- Create
- Delete
- Start

- Abort
- Set schedule
- Enable schedule
- Export
- Diagnose

To list the backups on a directory, and to get status and schedules of backups, you log in to Operations Manager with the GlobalRead role.

Changing the directory path for archive backups

You can update the directory path for archive backups from Operations Manager.

Steps

1. Select **Setup ➤ Options**
2. Click **Database Backup under Edit Options**.
3. In the **Archive Backup Destination Directory** field, change the directory path if you want to back up to a different location.
4. Click **Update**.

Starting database backup from Operations Manager

You can manually start a database backup from Operations Manager.

Steps

1. Select **Setup ➤ Database Backup**.
2. Select **Backup Type**.

   You can choose between the archive- and Snapshot-based backups.

3. Click **Back Up Now**.

   The **Database Backup Confirmation** page is displayed if the Backup Type is Archive.

4. Click **Run Backup**.

After You Finish

Note: To stop a backup that is in progress, click **Abort Backup**.

Scheduling database backups from Operations Manager

You can schedule a database backup to occur at a specific time on a recurring basis.

Considerations

While scheduling database backup in the archive format, hourly backups and multiple backups in a day are not feasible. Because backups in the archive format take time.

Steps

1. Select **Setup ➤ Database Backup**.
2. Select Backup Type.

   You can choose between the archive-based and Snapshot-based backups.
3. Select **Enable Schedule** to activate the schedule.
4. Select the frequency to run the backup and enter the time to run it.

   Entries are based on hourly, less frequent than hourly, daily, and weekly schedules.
5. Click **Update Schedule**.
6. Verify that the settings are correct, then click **Update Data**.

Specifying backup retention count

You can specify the number of backups DataFabric Manager server needs to retain.

Steps

1. Select **Setup ➤ Options**.
2. Click on **Database Backup**.
3. In the Database Backup Retention Count field, enter the count.
4. Click **Update**.

Disabling database backup schedules

You can temporarily disable a DataFabric Manager database backup schedule.

Steps

1. Select **Setup ➤ Database Backup**.
2. Deselect Enable Schedule to disable the schedule.

3. Click **Update Schedule**.

Listing database backups

You can view information about DataFabric Manager database backups.

Steps

1. Select **Setup ➤ Database Backup**.
2. Click **List Database Backups**.

Deleting database backups from Operations Manager

You can delete a DataFabric Manager database backup using Operations Manager.

Steps

1. Select **Setup ➤ Database Backup**.
2. Click **List Database Backups**.
3. Click **List Database Backups**.
4. Select **Delete Selected**.

Displaying diagnostic information from Operations Manager

The DataFabric Manager server might fail to detect the DataFabric Manager setup on a LUN. You can investigate such backup-related issues using diagnostic information.

Steps

1. Click **Setup ➤ Database Backup**.
2. Click **Update Schedule**.

   Update schedule after you schedule a database backup.

3. Click **Diagnose**.

Exportability of a backup to a new location

To export a Snapshot-based backup to a different location, use `dfm backup export <backup_name>` command. You can overwrite an existing backup at a new location by using `dfm backup export -f <backup_name>` command.

To export the backup file to a new path, use `dfm backup export <backup_name> [target_filepath]` command. If target_filepath is not specified, the archive-based backup is created by default in the directory specified in the Archive Backup Destination Directory field using Operations Manager.

What the restore process is

The DataFabric Manager database backups can be restored only through CLI. You can restore all data by using the `dfm backup restore` command.

If, for some reason, the restore job fails, DataFabric Manager attempts to restore the database to its earlier state, and all temporary files that were created are deleted. If this attempt also fails, the CLI prompts you with a set of instructions to restore the original database.

Note: Do not run any dfm command during the DataFabric Manager restore or upgrade operation. If some commands are run, they can interfere with the restore or upgrade operation by locking database tables and causing the operation to fail.

Next topics

Restoring the database from the archive-based backup on page 269
Restoring the database from the Snapshot copy-based backup on page 269
Restoration of the database on different systems on page 270

Restoring the database from the archive-based backup

You can restore the DataFabric Manager database on the same system. You could specify the absolute path for the backup file using the `dfm backup restore` command.

Steps

1. Copy the backup file into the `databaseBackupDir` directory.
2. Type the following command at the command line: `dfm backup restore <backup_name>`

   backup_name is the name of the file to which you saved your DataFabric Manager database.

   A “Completed restore” message is displayed when the restore process finishes successfully.

Restoring the database from the Snapshot copy-based backup

You can restore the DataFabric Manager database on the same system.

Steps

1. Type the following command at the command line to display the names of backup copies of the database: `dfm backup list`
2. Type the following command at the command line: `dfm backup restore <backup_name>`

   backup_name is the name of the backup copy in the database.

   A “Completed restore” message is displayed when the restore process finishes successfully.

Restoration of the database on different systems

To restore the DataFabric Manager database and other configuration from the archive-based backup on to another server, create a backup file (`dfm backup create`). Copy that backup file onto the new system, and then restore the backup on that system (`dfm backup restore`).

You can restore the database from a Snapshot-based backup on to another server. One way is to export the Snapshot-based backup in the archive format (`dfm backup export`), copy that backup file onto the new system, then restore the backup on that system (`dfm backup restore`).

Another way to restore the database from a Snapshot-based backup is to connect to the Snapshot using the SnapDrive commands, and run the `dfm datastore setup-n <target_dir_LUN>` command.

However, after you restore a database from one DataFabric Manager server to another, the local administrator account might be different on the new server. This restore operation would result in the local administrator account losing access to the restored DataFabric Manager database. If this happens, you need to perform the following tasks:

- Log in to the new system as a user with GlobalFullControl.
- Add the local account administrator of the new system back into DataFabric Manager with GlobalFullControl capabilities.

Note: If there are no GlobalFullControl users that can access the new system, contact NetApp Global Services for assistance. This can usually be avoided by ensuring a domain user (who has permission to log in to both systems) exists in DataFabric Manager with GlobalFullControl role before migrating the database.

Disaster recovery configurations

You can configure DataFabric Manager for disaster recovery by using Protection Manager and SnapDrive.

Note: Disaster Recovery does not support IPv6 addressing.

Disaster recovery support enables you to recover the DataFabric Manager services quickly on another site. Disaster recovery support prevents any data loss due to disasters that might result in a total site failure.

A disaster recovery plan typically involves deploying remote failover architecture. This remote failover architecture allows a secondary data center to take over critical operations when there is a disaster in the primary data center.

Next topics

Disaster recovery using Protection Manager on page 271
Disaster recovery using SnapDrive on page 276

Disaster recovery using Protection Manager

If you have a Protection Manager license, then you can use Protection Manager to configure DataFabric Manager for disaster recovery.

Snapshot-based backups are made at the primary site according to the backup schedule. By using Protection Manager and SnapMirror technology, the Snapshot-based backups are registered with Protection Manager. These Snapshot-based backups are then mirrored to the secondary site according to the Protection Manager Mirror policy.

If a catastrophic failure of the primary site occurs, DataFabric Manager services should be started on the secondary site using mirrored data by running the dfm datastore mirror connect command.

Next topics

Limitation of disaster recovery support on page 271
Prerequisites for disaster recovery support on page 271
Setting up DataFabric Manager on page 272
Recovering DataFabric Manager services on page 273
Recovering DataFabric Manager services using the dfm datastore mirror connect command on page 274
Failing back DataFabric Manager services on page 275

Limitation of disaster recovery support

You must use SnapDrive to configure DataFabric Manager on Linux for disaster recovery.

For more information, you can view the technical report on the NetApp website at *http://media.netapp.com/documents/tr- 3655.pdf*

Prerequisites for disaster recovery support

A set of prerequisites must be met for disaster recovery support for DataFabric Manager data.

following are the prerequisites to be met for disaster recovery support for DataFabric Manager data:

- You must be a Windows domain administrator.
- You must have a Protection Manager license.

- You must have SnapDrive for Windows 6.0 or greater. DataFabric Manager is dependent on SnapDrive for Windows to provide the disaster recovery support.
- You must be using the same version of Data ONTAP on both the source and destination storage systems. To ensure that you have the required Data ONTAP version for SnapDrive, see the SnapDrive/Data ONTAP Compatibility Matrix page at the NOW site.
- You must have a SnapMirror license for both the source and destination storage systems.
- You must configure the Snapshot-based backup for DataFabric Manager. To grant root access to the Windows domain account that is used by the SnapDrive service, you must configure the source and destination storage systems. You can configure the storage systems, by setting the `wafl.map_nt_admin_priv_to_root` option to "On" in the CLI.
- You are advised to have a dedicated flexible volume for the DataFabric Manager data, because Volume SnapMirror is used for mirroring the data.
- DataFabric Manager data must be stored in LUN.
- The source and destination storage systems must be managed by Protection Manager.
- The Windows domain account that is used by the SnapDrive service must be a member of the local built-in group or local administrators group on both the source and destination storage systems.
- The Windows domain account used to administer SnapDrive must have full access to the Windows domain to which both the source and destination storage systems belong.

Related information

The NOW site -- http://now.netapp.com/

Setting up DataFabric Manager

You must perform a set a tasks to set up DataFabric Manager for disaster recovery.

Steps

1. Install or upgrade DataFabric Manager on the primary site by completing the following steps:
   a) Install DataFabric Manager.
   b) Install SnapDrive for Windows and configure it with Protection Manager.
   c) Create an FCP-based or iSCSI-based LUN on the storage system using SnapDrive.
   d) Run the dfm datastore setup command to migrate the data to a directory in the FCP-based or iSCSI-based LUN.
2. Configure a schedule for Snapshot-based backup by following the steps described in
3. Run the `dfm datastore mirror setup` command to create the application dataset.
4. Configure DataFabric Manager disaster recovery using Protection Manager features, by completing the following steps:
   a) Create a volume on the destination storage system having the same size and space configuration as the primary volume.

If you have either the Protection Manager Disaster Recovery license or the Provisioning Manager license, secondary volume provisioning can take advantage of the policies provided by that license. If you do not have either of these licenses, then provision the secondary volume manually.

b) Assign the provisioned secondary volume to the application dataset. For more information on how to use Protection Manager to assign resources to a dataset, see the *NetApp Management Console Help*.
c) Assign a schedule to the application dataset. For more information on how to use Protection Manager to assign schedules to a dataset, see the *NetApp Management Console Help*.
d) Ensure that there are no conformance issues.

5. Run the `dfm backup diag` command and note down the Mirror location information from the command output.

   You would need this information while using the `dfm datastore mirror connect` command during the process of recovering DataFabric Manager.

6. Install DataFabric Manager on the secondary site.
7. Run the `dfm service disable` command on the secondary site to disable all DataFabric Manager.

   DataFabric Manager services must be enabled only during the disaster recovery, by using the `dfm datastore mirror connect` command.

Recovering DataFabric Manager services

You can recover DataFabric Manager services on the secondary site if a disaster occurs at the primary site.

Steps

1. Connect to the LUN using the Microsoft Management Console (MMC) Connect Disk wizard on the secondary storage system by completing the following procedure:

   a) Expand the `Storage` option in the left panel of the MMC.
   b) Double-click SnapDrive List, if you are managing multiple instances of SnapDrive. Otherwise, double-click SnapDrive.
   c) Double-click the name of the SnapDrive host you want to manage.
   d) Right-click Disks.
   e) Select the `Connect Disk` option and follow the instructions on the Connect Disk wizard.

      For more information about connecting virtual disks, see the *SnapDrive for Windows Installation and Administration Guide*.

2. Run the `dfm service enable` command to enable the services.

3. Run the `dfm datastore setup -n` command to configure DataFabric Manager to use the mirrored data.
4. Run the `dfm service start` command to start DataFabric Manager services.
5. Using the Protection Manager UI, change the dataset created for DataFabric Manager data from the current mode to suspended mode.
6. Run the `dfm options set` command to reset the `localHostName global` option on the secondary site, if the primary site is clustered using MSCS.
7. Run the `dfm service disable` command to disable the services on the primary site.

   If the primary site is clustered using MSCS, offline the services before disabling them.

Related information

SnapDrive for Windows Installation and Administration Guide - http://now.netapp.com/NOW/knowledge/docs/client_filer_index.shtml

Recovering DataFabric Manager services using the dfm datastore mirror connect command

You can use the `dfm datastore mirror connect` to recover the DataFabric Manager services on the secondary site if a disaster occurs at the primary site.

Steps

1. Run the `dfm datastore mirror connect` command on the DataFabric Manager server at the secondary site to start DataFabric Manager services using mirrored data.

   The `dfm datastore mirror connect` command performs the following operations:

   - Breaks the mirror relationship between the source and destination DataFabric Manager.
   - Connects to the mirrored volume or LUN using SnapDrive for Windows.
   - Enables the services using the `dfm service enable` command.
   - Configures DataFabric Manager to use the data from the mirrored location.
   - Starts the DataFabric Manager services.
   - Puts the dataset created for the DataFabric Manager data in suspended mode.

2. Run the `dfm options set` command to reset the `localHostName global` option on the secondary site, if the primary site is clustered using MSCS.
3. Run the `dfm service disable` command to disable the services on the primary site.

   If the primary site is clustered using MSCS, offline the services before disabling them.

Failing back DataFabric Manager services

You must complete a list of tasks to fail back DataFabric Manager services to the primary site.

Steps

1. Ensure that the DataFabric Manager data at the source storage system is in synchronization with data at the destination storage system by completing the following steps:
   a) Run the `dfdrm mirror list` command to find relationships between the source and destination storage systems.
   b) Run the `dfdrm mirror resync -r` command to resynchronize the mirror relationships.

      This command reverses the mirror direction and starts updates.

   c) Run the `snapmirror resync` command to resynchronize the data at the storage system level, if the SnapMirror relationship is removed during the process of recovering DataFabric Manager services.
   d) Run `dfdrm mirror initialize` command to create a new relationship from the secondary storage system to the new primary storage system , if the primary storage system is destroyed during disaster.

2. Run the `dfm service disable` command to stop and disable the services at the secondary site.
3. Start DataFabric Manager services using the mirrored data on the primary site by using one of the following methods:
   - Run the `dfm datastore mirror connect` command at the CLI
   - Alternatively you perform the following procedure:

   a) Connect to the LUN using MMC Connect Disk wizard on the primary storage system, by completing the procedure described in .
   b) Run the `dfm service enable` command to enable the services.
   c) Run the `dfm datastore setup -n` command to configure DataFabric Manager to use the mirrored data on LUN.
   d) Run the `dfm service start` command to start DataFabric Manager services.

      Note:: The `dfm datastore mirror connect` command does not support shared storage. Therefore, the command should not be used if the primary system is set up for cluster using MSCS.

4. Run the `dfdrm mirror resync -r` command to resynchronize the mirror relationships so that they are no longer reversed.
5. Run the `snapmirror resync` command to resynchronize the data at the storage system level, if the SnapMirror relationship is removed during the fail back process.

6. Run the `dfm host discover` command to discover the reversed relationships on the primary site, if they are not discovered already.
7. Run the `dfdrm mirror list` command to ensure that these relationships are discovered.
8. Run the `dfm datastore mirror destroy` command to destroy the application dataset created for DataFabric Manager data.
9. Run the `dfm datastore mirror setup` command to create a new application dataset for DataFabric Manager data.
10. Using the Protection Manager UI, import the SnapMirror relationship already established for DataFabric Manager data to the new application dataset.

    For more information about how to use Protection Manager to import SnapMirror relationships, see the *NetApp Management Console Help*.

Disaster recovery using SnapDrive

If you do not have a Protection Manager license, then you can use SnapDrive to configure DataFabric Manager for disaster recovery.

For more information, you can view the technical report at *Disaster Recovery Support for DataFabric Manager Data Using SnapDrive*.

Troubleshooting in Operations Manager

Learn about the common issues with DataFabric Manager, how to troubleshoot those problems, and how to get technical assistance from your service provider.

You can contact NetApp technical support, if you cannot troubleshoot or resolve those problems.

Next topics

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AutoSupport in DataFabric Manager

The AutoSupport feature of DataFabric Manager sends messages to technical support.

When you install or upgrade to DataFabric Manager 3.3 or later, the scheduler service automatically enables AutoSupport after the first 24 hours of operation, provided that you have not disabled the feature. DataFabric Manager then starts to monitor the system's operations and logs a message that AutoSupport was enabled.

AutoSupport sends messages to NetApp Technical Support over secure HTTPS (by default), HTTP, or SMTP.

Note: AutoSupport in DataFabric Manager does not support IPv6 addressing.

Next topics

Reasons for using AutoSupport on page 278
Types of AutoSupport messages in DataFabric Manager on page 278
Protection of private data by using AutoSupport on page 278

Configuring AutoSupport on page 278

Reasons for using AutoSupport

With the help of AutoSupport feature in DataFabric Manager, you can detect potential problem and get quick help.

The AutoSupport feature sends messages to Technical Support for the following reasons:

- Scripts have been programmed to automatically look for particular data in AutoSupport weekly reports that might indicate a potential problem.
- NetApp helps you solve problems that AutoSupport detects. A range of support might be provided, including automated parts replacement, e-mail contact, and contact by a Technical Support engineer, depending on the type of problem. For example, if a message is received that a disk failure occurred on your system, a replacement disk is automatically sent to you.

Types of AutoSupport messages in DataFabric Manager

AutoSupport tracks events and sends messages.

AutoSupport generates the following types of messages:

Event message	A message that AutoSupport sends to recipients when an event tracked by AutoSupport occurs. The message contains information to help you diagnose and troubleshoot the problem.
Weekly report	A weekly report is a general status message that AutoSupport sends automatically each week to recipients you have identified.

Note: If you are using a DataFabric Manager demonstration license, DataFabric Manager does not send AutoSupport messages.

Protection of private data by using AutoSupport

You can prevent private data, such as IP address and user names, from the AutoSupport message.

Complete AutoSupport messages are required for normal technical support. Minimal AutoSupport messages omit sections and values that might be considered sensitive information, but greatly affects the level of support you can receive.

If you do not want to include private data such as IP addresses, host names, and user names, set the `Autosupport Content` global option to `minimal`.

Configuring AutoSupport

You can configure AutoSupport using Operations Manager.

Steps

1. Click **Setup ➤ Options ➤ AutoSupport**.
2. From the **AutoSupport Settings** page, identify the administrator to be designated as the sender of the notification.
3. Specify the type of AutoSupport content that messages should contain.

   Note: If this setting is changed from "complete" to "minimal," any complete AutoSupport message not sent is cleared from the outgoing message spool and notification of this is displayed on the console.

4. Enter the comma-delimited list of recipients for the AutoSupport email notification. Up to five e-mail address are allowed, or the list can be left empty.
5. Select Yes to enable AutoSupport notification to NetApp.
6. Specify the type of delivery - HTTP, HTTPS or SMTP - for AutoSupport notification to NetApp.

   Note: By default, AutoSupport uses port numbers 80 for HTTP, 443 for HTTPS, and 25 for SMTP.

7. Enter the number of times the NetApp system tries to resend the AutoSupport notification before giving up, if previous attempts have failed.
8. Enter the time to wait before trying to resend a failed AutoSupport notification.
9. Select Include to include the Performance Advisor AutoSupport data along with the DataFabric Manager AutoSupport data.
10. Select Include to include the Provisioning Manager AutoSupport data along with the DataFabric Manager AutoSupport data.
11. Click **Update**.

DataFabric Manager logs

DataFabric Manager creates logs, which you can use to troubleshoot issues such as storage system discovery not working, CLI commands failing for unexpected reasons, and events not generating as expected.

Next topics

Access to logs on page 280
Accessing the logs through the DataFabric Manager command-line interface on page 280
Access to the SAN log on page 280
Apache and Sybase log rotation in DataFabric Manager on page 280

Access to logs

You can access DataFabric Manager logs using Operations Manager GUI or by using the command-line interface.

You can access the DataFabric Manager logs through the **Diagnostics** page. To access this page, use the following URL:

http://mgmt_station:8080/dfm/diag

In the preceding URL, mgmt_station is the name or IP address of the workstation on which DataFabric Manager is installed.

You must scroll down to the Logs section to find the available DataFabric Manager logs.

You access DataFabric Manager logs through the CLI , going to different directories depending on whether you are using a Windows or a UNIX workstation:

- On a Windows workstation, enter `installation_directory\dfm\log`.
- On a UNIX workstation, enter `installation_directory/log`.

Accessing the logs through the DataFabric Manager command-line interface

You can access DataFabric Manager logs using the command-line interface.

On a Windows workstation, you can find the DataFabric Manager logs in the following directory: `installation_directory\dfm\log`.

On a UNIX workstation, you can find the DataFabric Manager logs in the following directory: `installation_directory/log`.

Access to the SAN log

You can access the logs containing LUN-related information by using Operations Manager or command-line interface (CLI).

DataFabric Manager logs information related to LUN management in the `dfmsan.log` file. You can access this file using the CLI or through Operations Manager.

Apache and Sybase log rotation in DataFabric Manager

DataFabric Manager automatically rotates Apache and Sybase logs.

DataFabric Manager automatically rotates Apache and Sybase logs. Apache log files are rotated when they are 3,000 KB or larger. Sybase logs are rotated when they are 10,000 KB or larger.

Common DataFabric Manager problems

The most common problems that you might encounter when using DataFabric Manager and the suggested corrective actions for resolving them are documented here.

Next topics

Communication issues between DataFabric Manager and routers on page 281
E-mail alerts not working in DataFabric Manager on page 281

Communication issues between DataFabric Manager and routers

Communication between DataFabric Manager and routers fails due to mismatch of SNMP community string, SNMP disabled on the router, and so on.

DataFabric Manager relies on routers to discover networks other than the network to which the DataFabric Manager server is attached. If DataFabric Manager fails to communicate with a router, it cannot discover other networks attached to that router. These are some typical reasons DataFabric Manager fails to communicate with routers:

- The SNMP community strings do not match.
- SNMP is disabled on the router.
- The router is beyond the maximum number of hops set in the Network Discovery Limit option.

E-mail alerts not working in DataFabric Manager

If e-mail alerts do not work, you could verify the e-mail address in the `log` file.

If an alarm does not send e-mail to the expected e-mail address, use the log files generated by DataFabric Manager to help troubleshoot the problem.

- Look in `alert.log` to see if DataFabric Manager attempted to send e-mail to that address.
- Look in `dfmeventd.log` to see if errors were reported.

Related concepts

DataFabric Manager logs on page 279

How discovery issues are resolved

You can use Diagnose Connectivity tool to troubleshoot discovery problems.

DataFabric Manager provides a Diagnose Connectivity tool that automates frequently used steps of the troubleshooting process for connectivity issues. Use this tool when you want to troubleshoot discovery problems.

This tool queries the DataFabric Manager database about a selected storage system, runs connectivity tests, and displays information and test outcomes. The sequence of steps depends on whether the selected storage system is managed or unmanaged. A managed storage system is one that is in the DataFabric Manager database. An unmanaged storage system is one that is not in the DataFabric Manager database.

Next topics

Use of the Diagnose Connectivity tool for a managed storage system on page 282
Use of the Diagnose Connectivity tool for unmanaged storage system on page 282
Where to find the Diagnose Connectivity tool in Operations Manager on page 283
Reasons why DataFabric Manager might not discover your network on page 283

Use of the Diagnose Connectivity tool for a managed storage system

You can collect information about your managed storage system by using the Diagnose Connectivity tool.

The Diagnose Connectivity tool queries the database and displays a summary of information about the storage system:

- The name, DataFabric Manager object ID, model, system ID, and OS version
- Whether the storage system is up, according to DataFabric Manager
- Results of the SNMP, ping, SSH, RLM, XML, RSH, and HTTP port tests.

Use of the Diagnose Connectivity tool for unmanaged storage system

The Diagnose Connectivity tool runs the following tests:

- Determines if the storage system IP address falls within the range of networks discovered by DataFabric Manager
- Sends an SNMP GET request to determine if DataFabric Manager can use SNMP to communicate with the storage system
- If it is a supported storage system , shows sysName, sysObjectID, and productID
- Uses the ping utility to contact the IP address of the storage system and test for connectivity
- If it is a supported storage system, tests the following:
  - The RSH connection that uses the user name and password stored in DataFabric Manager for the storage system
  - The HTTP port

Note: For unmanaged storage systems, you must run the Diagnose Connectivity tool from the command line.

Where to find the Diagnose Connectivity tool in Operations Manager

You can use the **Diagnose Connectivity** tool for both managed and unmanaged storage system.

You can find the **Diagnose Connectivity** tool in the **Appliance Tools** list in the left pane on the **Appliance Details** page. The **Diagnose Connectivity** tool is available only for managed storage systems. To diagnose connectivity on unmanaged storage systems, use one of the following methods:

- From the CLI, run the command `dfm host diag`.
- From Operations Manager, try to add the storage system. If the operation fails, an error message is displayed with a link labeled **Click here to troubleshoot**. Click this link to run the **Diagnose Connectivity** tool.

Reasons why DataFabric Manager might not discover your network

DataFabric Manager might not discover your network due to failure in communicating with the router. DataFabric Manager might not discover your network if SNMP community string in DataFabric Manager does match the community string required by the router, switch, and storage system.

Three possible reasons why DataFabric Manager might not discover your network are as follows:

- SNMP community string set in DataFabric Manager does not match the community string required by the router, switch, and storage system.
- DataFabric Manager fails to communicate with a router, and it cannot discover other networks attached to that router.
- You changed the IP address of the router for the network.

Troubleshooting network discovery issues

You can troubleshoot network discovery issues using Operations Manager.

Steps

1. Ensure that the `Network Discovery Enabled` option on the **Options** page is set to **Yes**. Also ensure that the router is within the maximum number of hops set in the `Network Discovery Limit` option.
2. From the command line, run the **Diagnose Connectivity** tool against the IP address of the router of the network to determine if DataFabric Manager can communicate with the router through SNMP.

If you changed the IP address for the router, you must change the primary IP address stored in DataFabric Manager on the **Edit Settings** page. You can also modify the primary IP address by entering the following CLI command:

`dfm host set` *`host-id`* `hostPrimaryAddress=`*`ip-address`*

3. Determine whether an SNMP community string other than the default (public) is required for the network device to which the undiscovered network is attached.

   To set an SNMP community string in DataFabric Manager, click the **Options** link (in the Banner area), find **Discovery Options**, and then click the **edit** link beside **Network Credentials**. On the **Network Credentials** page, click the **edit** link at the right of the **SNMP Community** whose string you want to set.

4. If Steps 1 through 3 are not successful, add the network manually by using the Networks To Discover option on the **Options** page under **Discovery Options**.

Troubleshooting appliance discovery issues with Operations Manager

If DataFabric Manager does not discover a storage system, you can troubleshoot using Operations Manager

Steps

1. Ensure that the `Host Discovery Enabled` option on the **Options** page is set to **Enabled**.
2. Click the **edit** link of the `Networks to Discover` option to check whether the network to which this appliance is attached has been discovered.

   If the network to which this storage system is attached has not been discovered, follow troubleshooting guidelines.

3. Determine whether an SNMP community string other than the default (public) is required for the network device to which the undiscovered network is attached.

   To set an SNMP community string in DataFabric Manager , click the **Options** link (in the Banner area), find **discovery Options**, and then click the **edit** link beside **Network Credentials**. On the **Network Credentials** page, click the **edit** link at the right of the SNMP Community whose string you want to set.

4. If Steps 1 through 3 are not successful, add the network manually by using the `Networks to Discover` option on the **Options** page under **Discovery** Options.

How configuration push errors are resolved

You can troubleshoot configuration push errors by analyzing logs that DataFabric Manager creates.

DataFabric Manager logs the reason for the failure in the job's report, if one or more push jobs fail. You can access the job report by clicking the job ID in the Job ID column of the Status of Configuration Jobs option.

The following failure conditions are documented by DataFabric Manager:

- An attempt to push a configuration for a particular group was disallowed because the group already had a pending configuration push job. To fix the error, you must cancel the pending job and then re-push the new job.
- The storage system was offline. When a storage system is offline, DataFabric Manager continues to try to contact the storage system until you manually cancel the push. DataFabric Manager could not authenticate to the system. You can correct this problem by setting the correct login and password.
- The storage system downloaded the configuration, but did not update its configuration because it found the configuration invalid.

How File Storage Resource Manager (FSRM) issues are resolved

You can resolve FSRM issues by reviewing host agent credentials and network issues.

- If you cannot collect FSRM data, then review settings of host agent administration and host agent password, and then check the login and password settings configured on the FSRM host agent and on DataFabric Manager.
- If a path walk fails, do the following:
  - Verify that the FSRM host agent is running.
  - Check for network problems between the FSRM host agent and the storage device. Network problems between the FSRM host agent and the storage device can cause the path walk to fail or return incomplete results.
- If a path walk takes a long time to complete: A path walk can take many hours to complete. You can monitor the status of the path walk that is in progress from the **SRM Path Details** page (**Control Center ➤ Home ➤ Group Status ➤ File SRM ➤ SRM path name**.

Issues related to SAN events

You can use Operations Manager to troubleshoot SAN events by resolving issues related to FC switch port, HBA port, and LUNs.

Next topics

Offline FC Switch Port or Offline HBA Port on page 286
Faulty FC Switch Port or HBA Port Error on page 286
Offline LUNs on page 287
Snapshot copy of LUN not possible on page 287
High traffic in HBA Port on page 287

Offline FC Switch Port or Offline HBA Port

FC Switch Port or HBA Port goes offline if taken over by administrator.

Cause:

A port goes offline, typically in one of two situations:

- An administrator might have changed the port state either because the port is no longer required to be connected to a storage system, or because maintenance needs to be performed on the port.
- The connectivity to the port failed because of a bad cable or loose connection.

Corrective action:

1. If the port state was not changed by an administrator, see the administration guide for your switch to diagnose the problem.
2. Ensure that the cable is connected securely to the port.
3. Replace the cables.

Faulty FC Switch Port or HBA Port Error

Faulty FC Switch Port or HBA Port Error occurs due to port hardware malfunctioning.

Cause:

The port hardware might be malfunctioning.

Corrective action:

1. For the FC switch, if a SAN device is connected to a port that is reported faulty, connect the device to another port.
2. Replace the port.

Offline LUNs

A LUN could be offline due if taken over by administrator or conflict between the serial numbers of two LUNs.

Causes:

A LUN goes offline typically in one of two situations:

- An administrator, to perform maintenance or to apply changes to the LUN, such as to modify its size might have changed the status
- The LUN has a serial number that conflicts with that of another LUN.

Corrective action:

1. 1 If an administrator did not change the LUN status, bring the LUN online from the storage system console.
2. Check for a conflicting serial number and resolve the issue.

Snapshot copy of LUN not possible

If you cannot take Snapshot copy of LUN, expand the size of the volume.

Cause:

Snapshot copy for the volume that contains the LUN cannot be taken because the amount of free space on this volume is less than the used and reserved space.

Corrective action:

Expand the size of the volume.

High traffic in HBA Port

High traffic in HBA Port occurs if the DataFabric Manager threshold HBA Port Too Busy exceeds the permitted value.

Cause:

DataFabric Manager threshold HBA Port Too Busy has been exceeded.

Corrective action:

Determine the cause of high traffic. If traffic stays above the threshold for a long period, consider upgrading the infrastructure.

Import and export of configuration files

You could export your configuration files for archival to DataFabric Manager or to your local computer. If you want to restore the configuration files, you could import the archived configuration files.

DataFabric Manager enables you to save all your configuration files as a text file. This helps you to revert to a working set of configuration files, if you need to undo future configuration changes. After creating the file, you should archive it in a different location for safekeeping. You can use the Export Configuration Files option on the **Configurations** page to save your configuration files to DataFabric Manager, or to your local computer.

If you need to restore the configuration files, you can import the archived file that you previously exported. You can also edit the configuration file with a text editor, to make any required changes, and then import it.

How inconsistent configuration states are fixed

To fix the inconsistent configuration state, re-push the configuration files to the required storage systems.

DataFabric Manager routinely monitors the storage systems in a configuration resource group to determine if their settings are inconsistent with the group's configuration files. To fix the inconsistent configuration state, re-push the configuration files to any storage systems that require updating.

Configuration modification events can also help you maintain configuration consistency by alerting you to configuration changes.

Related concepts

Management of storage system configuration files on page 217

Data ONTAP issues impacting protection on vFiler units

You might encounter errors while trying to create SnapMirror and SnapVault relationships by using vFiler units in DataFabric Manager 7.2 and later.

Data ONTAP versions earlier than 7.2 do not support SnapMirror and SnapVault commands on vFiler units. To create SnapMirror and SnapVault relationships, you must use the hosting storage system . DataFabric Manager uses the hosting storage system to create SnapMirror and SnapVault relationships.

For Data ONTAP 7.2 and later, SnapMirror and SnapVault relationships can be created using vFiler units. However, DataFabric Manager continues using the hosting storage system to create, monitor, and manage these relationships. As a result, you might encounter the following issues:

- Issue: If the `snapvault.access` and `snapmirror.access` options on the source storage system allow access only to the destination vFiler unit, the relationship creation, scheduled backups, on-demand backups, SnapMirror updates, and SnapMirror resync from DataFabric Manager fails. DataFabric Manager displays the following error message: “Request denied by the source storage system. Check access permissions on the source.”

  Workaround: To allow access to the destination hosting storage system, set the `snapmirror.access` `snapvault.access` options on the source system.
- Issue: If the ndmpd.preferred_interfaces option is not set on the source hosting storage system, the backups from DataFabric Manager might not use the correct network interface.

  Workaround: Set the `ndmpd.preferred_interfaces` option on the source hosting storage system.
- Issue: The backups and SnapMirror updates from DataFabric Manager fail with the error message Source unknown. This issue occurs when both of the following conditions are met:

  - A relationship between two vFiler units is imported into DataFabric Manager by autodiscovery or added manually.
  - The destination hosting storage system is not able to contact the IP address of the source vFiler unit.

  Workaround: Ensure that the host name or IP address of the source system that is used to create relationships can be reached from the destination hosting storage system .

List of events and severity types

These tables list all the events generated by Protection Manager, Provisioning Manager, and Operations Manager and the associated event severity types. Events are listed in alphabetical order by object type.

Note: Performance Advisor uses only the Normal and Error events.

Active/Active Configuration Controller

Event name	Severity
Can Take Over	Normal
Cannot Takeover	Error
Dead	Critical
Takeover	Warning

Active/Active Configuration Interconnect

Event name	Severity
Down	Error
Not Present	Warning
Partial Failure	Error
Up	Normal

Active/Active Configuration Partner

Event name	Severity
Dead	Warning
May Be Down	Warning
OK	Normal

Active/Active Configuration Settings

Event name	Severity
Disabled	Normal
Enabled	Normal

Event name	Severity
Not Configured	Normal
Takeover Disabled	Normal
This Controller Dead	Warning

Agent

Event name	Severity
Down	Error
Login Failed	Warning
Login OK	Normal
Up	Normal

Aggregate

Event name	Severity
Almost Full	Warning
Almost Overcommitted	Warning
Deleted	Information
Discovered	Information
Failed	Error
Full	Error
Nearly Over Deduplicated	Warning
Not Over Deduplicated	Normal
Not Overcommitted	Normal
Offline	Error
Online	Normal
Overcommitted	Error
Over Deduplicated	Error
Restricted	Normal
Snapshot Reserve Almost Full	Warning

Event name	Severity
Snapshot Reserve Full	Warning
Snapshot Reserve OK	Normal
Space Normal	Normal

Alarm

Event name	Severity
Created	Information
Deleted	Information
Modified	Information

CFO Interconnect

Event name	Severity
Down	Error
Not Present	Warning
Partial Failure	Error
Up	Normal

CFO Partner

Event name	Severity
Dead	Warning
May Be Down	Warning
OK	Normal

CFO Settings

Event name	Severity
Disabled	Normal
Enabled	Normal
Not Configured	Normal
Takeover Disabled	Normal

Event name	Severity
This Node Dead	Warning

CFO This Storage System

Event name	Severity
Can Take Over	Normal
Cannot Take Over	Error
Dead	Critical
Takeover	Warning

Configuration Changed

Event name	Severity
Config Group	Information

CPU

Event name	Severity
Load Normal	Normal
Too Busy	Warning

Data Protection

Event name	Severity
Job Started	Information
Policy Created	Information
Policy Modified	Information
Schedule Created	Information
Schedule Modified	Information

Database

Event name	Severity
Backup Failed	Error

Event name	Severity
Backup Succeeded	Information
Restore Failed	Error
Restore Succeeded	Information

Dataset

Event name	Severity
Backup Aborted	Warning
Backup Completed	Normal
Backup Failed	Error
Created	Information
Deleted	Information
DR State Ready	Information
DR State Failover Over	Warning
DR State Failed Over	Information
DR State Failover Error	Error
DR Status Normal	Information
DR Status Warning	Warning
DR Status Error	Error
Initializing	Information
Job Failure	Warning
Member Clone Snapshot Discovered	Information
Member Clone Snapshot Status OK	Information
Member Dedupe Operation Failed	Error
Member Dedupe Operation Succeeded	Normal
Member Destroyed	Information
Member Destroy Operation Failed	Information
Member Resized	Information
Member Resize Operation Failed	Information

Event name	Severity
Modified	Information
Protected	Normal
Protection Failed	Error
Protection Lag Error	Error
Protection Lag Warning	Warning
Protection Suspended	Warning
Protection Uninitialized	Normal
Provisioning Failed	Error
Provisioning OK	Normal
Space Status: Normal	Normal
Space Status: Warning	Warning
Space Status: Error	Error
Write Guarantee Check - Member Resize Required	Warning
Write Guarantee Check - Member Size OK	Normal

Dataset Conformance

Event name	Severity
Conformant	Normal
Conforming	Information
Initializing	Information
Nonconformant	Warning

Disks

Event name	Severity
No Spares	Warning
None Failed	Normal
None Reconstructing	Normal
Some Failed	Error

Event name	Severity
Some Reconstructing	Warning
Spares Available	Normal

Enclosures

Event name	Severity
Active	Information
Disappeared	Warning
Failed	Error
Found	Normal
Inactive	Warning
OK	Normal

Fans

Event name	Severity
Many Failed	Error
Normal	Normal
One Failed	Error

FC (Fibre Channel) Switch Port

Event name	Severity
Faulty	Error
Offline	Warning
Online	Normal

Filer Configuration

Event name	Severity
Changed	Warning
OK	Normal
Push Error	Warning

Event name	Severity
Push OK	Normal

Global Status

Event name	Severity
Critical	Critical
Non Critical	Error
Non Recoverable	Emergency
OK	Normal
Other	Warning
Unknown	Warning

HBA Port

Event name	Severity
Offline	Warning
Online	Normal
Port Error	Error
Traffic High	Warning
Traffic OK	Normal

Host

Event name	Severity
Cluster Configuration Error	Error
Cluster Configuration OK	Normal
Cold Start	Information
Deleted	Information
Discovered	Information
Down	Critical
Identity Conflict	Warning
Identity OK	Normal

Event name	Severity
Login Failed	Warning
Login OK	Normal
Modified	Information
Name Changed	Information
SNMP Not Responding	Warning
SNMP OK	Normal
System ID Changed	Information
Up	Normal

Host Agent

Event name	Severity
Down	Error
Up	Normal
Host Agent: Login Failed	Warning

Inodes

Event name	Severity
Almost Full	Warning
Full	Error
Utilization Normal	Normal

Interface Status

Event name	Severity
Down	Error
Testing	Normal
Unknown	Normal
Up	Normal

LUN

Event name	Severity
Offline	Warning
Online	Normal
Snapshot Not Possible	Warning
Snapshot Possible	Normal

Management Station

Event name	Severity
Enough Free Space	Normal
File System File Size Limit Reached	Error
License Expired	Error
License Nearly Expired	Warning
License Not Expired	Normal
Load OK	Normal
Load Too High	Warning
Node Limit Nearly Reached	Warning
Node Limit OK	Normal
Node Limit Reached	Error
Not Enough Free Space	Error
Provisioning Manager Node Limit Nearly Reached	Warning
Provisioning Manager Node Limit Ok	Normal
Provisioning Manager Node Limit Reached	Error
Protection Manager Node Limit Nearly Reached	Warning
Protection Manager Node Limit Ok	Normal
Protection Manager Node Limit Reached	Error

Migration

Event name	Severity
Dataset Not Migrating	Normal
Dataset Migrating	Normal
Dataset Migrated With Errors	Warning
Dataset Migrated	Normal
Dataset Migrate Failed	Error
vFiler Unit Not Migrating	Normal
vFiler Unit Migrating	Normal
vFiler Unit Migrated With Errors	Warning
vFiler Unit Migrated	Normal
vFiler Unit Migrate Failed	Error

NDMP

Event name	Severity
Credentials Authentication Failed	Warning
Credentials Authentication Succeeded	Normal
Communication Initialization Failed	Warning
Communication Initialization Succeeded	Normal
Down	Warning
Up	Normal

Network

Event name	Severity
OK	Normal
Too Large	Warning

Network Services

Event name	Severity
CIFS Service - Up	Normal

Event name	Severity
CIFS Service - Down	Warning
NFS Service - Up	Normal
NFS Service - Down	Warning
iSCSI Service - Up	Normal
iSCSI Service - Down	Warning
FCP Service - Up	Normal
FCP Service - Down	Warning

No Schedule Conflict

Event name	Severity
Between Snapshot and SnapMirror Schedules	Normal
Between Snapshot and SnapVault Schedules	Normal

NVRAM Battery

Event name	Severity
Discharged	Error
Fully Charged	Normal
Low	Warning
Missing	Error
Normal	Normal
Old	Warning
Overcharged	Warning
Replace	Error
Unknown Status	Warning

OSSV (Open Systems SnapVault)

Event name	Severity
Host Discovered	Information

Performance Advisor

Event name	Severity
Enough Free Space	Normal
Not Enough Free Space	Error

Power Supplies

Event name	Severity
Many Failed	Error
Normal	Normal
One Failed	Error

Primary

Event name	Severity
Host Discovered	Information

Protection Policy

Event name	Severity
Created	Information
Deleted	Information
Modified	Information

Protection Schedule

Event name	Severity
Created	Information
Deleted	Information
Modified	Information

Provisioning Policy

Event name	Severity
Created	Information

Event name	Severity
Deleted	Information
Modified	Information

Qtree

Event name	Severity
Almost Full	Warning
Files Almost Full	Warning
Files Full	Error
Files Utilization Normal	Normal
Full	Error
Growth Rate Abnormal	Warning
Growth Rate OK	Information
Space Normal	Normal

Remote Platform Management (RPM)

Event name	Severity
Online	Normal
Unavailable	Critical

Resource Group

Event name	Severity
Created	Information
Deleted	Information
Modified	Information

Resource Pool

Event name	Severity
Created	Information
Deleted	Information

Event name	Severity
Modified	Information
Space Full	Error
Space Nearly Full	Warning
Space OK	Normal

SAN Host LUN Mapping

Event name	Severity
Changed	Warning

Script

Event name	Severity
Critical Event	Critical
Emergency Event	Emergency
Error Event	Error
Information Event	Information
Normal Event	Normal
Warning Event	Warning

SnapMirror

Event name	Severity
Abort Completed	Normal
Abort Failed	Error
Break Completed	Normal
Break Failed	Error
Date OK	Normal
Delete Aborted	Warning
Delete Completed	Information
Delete Failed	Error
Initialize Aborted	Warning

Event name	Severity
Initialize Completed	Normal
Initialize Failed	Error
Nearly Out of Date	Warning
Not Scheduled	Normal
Not Working	Error
Off	Normal
Out of Date	Error
Possible Problem	Warning
Quiesce Aborted	Warning
Quiesce Completed	Normal
Quiesce Failed	Error
Resume Completed	Normal
Resume Failed	Error
Resync Aborted	Warning
Resync Completed	Normal
Resync Failed	Error
Unknown State	Warning
Update Aborted	Warning
Update Completed	Normal
Update Failed	Error
Working	Normal

Snapshot(s)

Event name	Severity
Age Normal	Normal
Age Too Old	Warning
Count Normal	Normal
Count OK	Normal

Event name	Severity
Count Too Many	Error
Created	Normal
Failed	Error
Full	Warning
Schedule Conflicts with the SnapMirror Schedule	Warning
Schedule Conflicts with the SnapVault Schedule	Warning
Schedule Modified	Information
Scheduled Snapshots Disabled	Warning
Scheduled Snapshots Enabled	Normal

SnapVault

Event name	Severity
Backup Aborted	Warning
Backup Completed	Information
Backup Failed	Error
Host Discovered	Information
Relationship Create Aborted	Warning
Relationship Create Completed	Information
Relationship Create Failed	Error
Relationship Delete Aborted	Warning
Relationship Delete Completed	Information
Relationship Delete Failed	Error
Relationship Discovered	Information
Relationship Modified	Information
Replica Date OK	Normal
Replica Nearly Out of Date	Warning
Replica Out of Date	Error
Restore Aborted	Warning

Event name	Severity
Restore Completed	Normal
Restore Failed	Error

SNMP Trap Listener

Event name	Severity
Alert Trap Received	Information
Critical Trap Received	Information
Emergency Trap Received	Information
Error Trap Received	Information
Information Trap Received	Information
Notification Trap Received	Information
Warning Trap Received	Information
Start Failed	Warning
Start OK	Information

Sync

Event name	Severity
SnapMirror In Sync	Information
SnapMirror Out of Sync	Warning

Temperature

Event name	Severity
Hot	Critical
Normal	Normal

Unprotected Item

Event name	Severity
Discovered	Information

User

Event name	Severity
Disk Space Quota Almost Full	Warning
Disk Space Quota Full	Error
Disk Space Quota OK	Normal
Disk Space Soft Limit Exceeded	Warning
Disk Space Soft Limit Not Exceeded	Normal
E-mail Address OK	Normal
E-mail Address Rejected	Warning
Files Quota Almost Full	Warning
Files Quota Full	Error
Files Quota Utilization Normal	Normal
Files Soft Limit Exceeded	Warning
Files Soft Limit Not Exceeded	Normal

vFiler Unit

Event name	Severity
Deleted	Information
Discovered	Information
Hosting Storage System Login Failed	Warning
IP Address Added	Information
IP Address Removed	Information
Renamed	Information
Storage Unit Added	Information
Storage Unit Removed	Information

vFiler Unit Template

Event name	Severity
Created	Information

Event name	Severity
Deleted	Information
Modified	Information

Volume

Event name	Severity
Almost Full	Warning
Automatically Deleted	Information
Autosized	Information
Clone Deleted	Information
Clone Discovered	Information
Destroyed	Information
First Snapshot OK	Normal
Full	Error
Growth Rate Abnormal	Warning
Growth Rate OK	Normal
Maxdirsize Limit Nearly Reached	Information
Maxdirsize Limit Reached	Information
Nearly No Space for First Snapshot	Warning
Nearly Over Deduplicated	Warning
New Snapshot	Normal
Next Snapshot Not Possible	Warning
Next Snapshot Possible	Normal
No Space for First Snapshot	Warning
Not Over Deduplicated	Normal
Offline	Warning
Offline or Destroyed	Warning
Online	Normal
Over Deduplicated	Error

Event name	**Severity**
Quota Overcommitted	Error
Quota Almost Overcommitted	Warning
Restricted	Restricted
Snapshot Automatically Deleted	Information
Snapshot Deleted	Normal
Space Normal	Normal
Space Reserve Depleted	Error
Space Reservation Nearly Depleted	Error
Space Reservation OK	Normal

Report fields and performance counters

Next topics

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Report Fields and Performance Counters for Filer Catalogs

DataFabric Manager creates reports for Filer Catalogs.

The table below lists and describes the various fields in Filer Catalogs and provides the corresponding performance counters.

Field	Name/description	Performance counter
Filer.TotalOpsperSec	Storage System Total Ops/Sec	system:total_ops
Filer.CIFSOps	Storage System CIFS Ops/Sec	system:cifs_ops
Filer.NFSOps	Storage System NFS Ops/Sec	system:nfs_ops
Filer.HTTPOps	Storage System HTTP Ops/Sec	system:http_ops
Filer.iSCSIOps	Storage System iSCSI Ops/Sec	system:iscsi_ops
Filer.FCPOps	Storage System FCP Ops/Sec	system:fcp_ops
Filer.NFSv3ReadOps	Storage System NFSv3 Read Ops/Sec	nfsv3:nfsv3_read_ops
Filer.NFSv3WriteOps	Storage System NFSv3 Write Ops/Sec	nfsv3:nfsv3_write_ops
Filer.NFSv4ReadOps	Storage System NFSv4 Read Ops/Sec	nfsv4:nfsv4_read_ops
Filer.NFSv4WriteOps	Storage System NFSv4 Write Ops/Sec	nfsv4:nfsv4_write_ops

Field	Name/description	Performance counter
Filer.NFSv3Avglatency	Storage System NFSv3 Avg Latency (millisec)	nfsv3:nfsv3_avg_op _latency
Filer.NFS4Avglatency	Storage System NFSv4 Avg Latency (millisec)	nfsv4:nfsv4_avg_op _latency
Filer.CPUBusy	Storage System CPU Busy (%)	system:cpu_busy
Filer.iSCSIReadOps	Storage System iSCSI Read Ops/Sec	iscsi:iscsi_read_ops
Filer.iSCSIWriteOps	Storage System iSCSI Write Operations	iscsi:iscsi_write_ops
Filer.CIFSLatency	Storage System CIFS Latency (millisec)	cifs:cifs_latency
Filer.NFSReadLatency	Storage System NFS Read Latency (millisec)	nfsv3:nfsv3_read _latency
Filer.NFSWriteLatency	Storage System NFS Write Latency (millisec)	nfsv3:nfsv3_write _latency
Filer.iSCSIRead Latency	Storage System iSCSI Read Latency (millisec)	iscsi:iscsi_read_latency
Filer.iSCSIWrite Latency	Storage System iSCSI Write Latency (millisec)	iscsi:iscsi_write _latency
Filer.FCPReadLatency	Storage System FCP Read Latency (millisec)	fcp:fcp_read_latency
Filer.FCPWriteLatency	Storage System FCP Write Latency (millisec)	fcp:fcp_write_latency
Filer.NASThroughput	Storage System NAS Throughput (KB/Sec)	system:nas_throughput
Filer.SANThroughput	Storage System SAN Throughput (KB/Sec)	system:san_throughput
Filer.DiskThroughput	Storage System Disk Throughput (KB/Sec)	system:disk_ throughput
Filer.NetThroughput	Storage System Network Throughput (MB/Sec)	system:load_total _mbps
Filer.LoadInbound Mbps	Storage System Total Data Received (MB/Sec)	system:load_inbound_ mbps
Filer.LoadOutbound Mbps	Storage System Total Data Sent (MB/Sec)	system:load_outbound_ mbps

Field	Name/description	Performance counter
Filer.NetDataSent	Storage System Network Data Sent (KB/Sec)	system:net_data_sent
Filer.NetDataRecv	Storage System Network Data Receive (KB/Sec)	system:net_data_recv
Filer.LoadReadBytes Ratio	Storage System Ratio of disk data read and load outbound	system:load_read_bytes _ratio
Filer.LoadWriteBytes Ratio	Storage System Ratio of disk data write and load inbound	system:load_write_byte s_ratio
Filer.DiskDataRead	Storage System Disk Data Read (KB/Sec)	system:disk_data_read
Filer.DiskDataWritten	Storage System Disk Data Written (KB/Sec)	system:disk_data_ written
Filer.FCPWriteData	Storage System FCP Write Data (B/Sec)	fcp:fcp_write_data
Filer.FCPReadData	Storage System FCP Read Data (B/Sec)	fcp:fcp_read_data
Filer.iSCSIWriteData	Storage System iSCSI Write Data (B/Sec)	iscsi:iscsi_write_data
Filer.iSCSIReadData	Storage System iSCSI Read Data (B/Sec)	iscsi:iscsi_read_data
Filer.ProcessorBusy	Storage System Processor Busy (%)	system:avg_processor_ busy
Filer.NFSLatency	Storage System NFS Latency (millisec)	nfsv3:nfsv3_avg_op _latency
Filer.PerfViolation Count	Storage System Perf Threshold Violation Count	Not Applicable
Filer.PerfViolation Period	Storage System Perf Threshold Violation Period (Sec)	Not Applicable

Report Fields and Performance Counters for vFiler Catalogs

DataFabric Manager creates reports for vFiler Catalogs.

The following table lists and describes the fields of the vFiler Catalog.

Field	Name/description	Performance counter
vFiler.TotalOps	vFiler Total Ops/Sec	vfiler:vfiler_total_ops
vFiler.ReadOps	vFiler Read Ops/Sec	vfiler:vfiler_read_ops
vFiler.WriteOps	vFiler Write Ops/Sec	vfiler:vfiler_write_ops
vFiler.MiscOps	vFiler Miscellaneous Ops/Sec	vfiler:vfiler_misc_ops
vFiler.NetThroughput	vFiler Network Throughput (KB/Sec)	vfiler:vfiler_nw_ throughput
vFiler.ReadBytes	vFiler Number of Bytes Read (KB/Sec)	vfiler:vfiler_read_bytes
vFiler.WriteBytes	vFiler Number of Bytes Write (KB/Sec)	vfiler:vfiler_write_ bytes
vFiler.NetDataRecv	vFiler Network Data Received (KB/Sec)	vfiler:vfiler_net_data_ recv
vFiler.NetDataSent	vFiler Network Data Sent (KB/Sec)	vfiler:vfiler_net_data_ sent
vFiler.DataTransferred	vFiler Total Data Transferred (KB/Sec)	vfiler:vfiler_data_ transferred
vFiler.PerfViolation Count	vFiler Perf Threshold Violation Count	Not Applicable
vFiler.PerfViolation Period	vFiler Perf Threshold Violation Period (Sec)	Not Applicable

Report Fields and Performance Counters for Volume Catalogs

DataFabric Manager creates reports for Volume Catalogs.

The following table lists and describes the fields of the Volume Catalog.

Field	Name/description	Performance counter
Volume.TotalOps	Volume Total Ops/Sec	volume:total_ops
Volume.CIFSOps	Volume CIFS Ops/Sec	volume:cifs_ops
Volume.NFSOps	Volume NFS Ops/Sec	volume:nfs_ops
Volume.SANOps	Volume SAN Ops/Sec	volume:total_san_ops
Volume.SANReadOps	Volume SAN Read Ops/Sec	volume:san_read_ops
Volume.SANWriteOps	Volume SAN Write Ops/Sec	volume:san_write_ops

Field	Name/description	Performance counter
Volume.SANOtherOps	Volume SAN Other Ops/Sec	volume:san_other_ops
Volume.ReadOps	Volume Read Ops/Sec	volume:read_ops
Volume.WriteOps	Volume Write Ops/Sec	volume:write_ops
Volume.OtherOps	Volume Other Ops/Sec	volume:other_ops
Volume.NFSReadOps	Volume NFS Read Ops/Sec	volume:nfs_read_ops
Volume.NFSWriteOps	Volume NFS Write Ops/Sec	volume:nfs_write_ops
Volume.NFSOtherOps	Volume NFS Other Ops/Sec	volume:nfs_other_ops
Volume.CIFSReadOps	Volume CIFS Read Ops/Sec	volume:cifs_read_ops
Volume.CIFSWriteOps	Volume CIFS Write Ops/Sec	volume:cifs_write_ops
Volume.CIFSOtherOps	Volume CIFS Other Ops/Sec	volume:cifs_other_ops
Volume.FlexCache ReadOps	Volume FlexCache Read Ops/Sec	volume:flexcache_read _ops
Volume.FlexCache WriteOps	Volume FlexCache Write Ops/Sec	volume:flexcache_ write_ops
Volume.FlexCache OtherOps	Volume FlexCache Other Ops/Sec	volume:flexcache_ other_ops
Volume.Latency	Volume Latency (millisec)	volume:avg_latency
Volume.CIFSLatency	Volume CIFS Latency (millisec)	volume:cifs_latency
Volume.NFSLatency	Volume NFS Latency (millisec)	volume:nfs_latency
Volume.SANLatency	Volume SAN Latency (millisec)	volume:san_latency
Volume.ReadLatency	Volume Read Latency (millisec)	volume:read_latency
Volume.WriteLatency	Volume Write Latency (millisec)	volume:write_latency
Volume.OtherLatency	Volume Other Latency (millisec)	volume:other_latency
Volume.CIFSRead Latency	Volume CIFS Read Latency (millisec)	volume:cifs_read_ latency
Volume.CIFSWrite Latency	Volume CIFS Write Latency (millisec)	volume:cifs_write_ latency
Volume.CIFSOther Latency	Volume CIFS Other Latency	volume:cifs_other_ latency
Volume.SANRead Latency	Volume SAN Read Latency (millisec)	volume:san_read_ latency
Volume.SANWrite Latency	Volume SAN Write Latency (millisec)	volume:san_write_ latency
Volume.SANOther Latency	Volume SAN Other Latency (millisec)	volume:san_other_ latency

Field	Name/description	Performance counter
Volume.NFSRead Latency	Volume NFS Read Latency (millisec)	volume:nfs_read_ latency
Volume.NFSWrite Latency	Volume NFS Write Latency	volume:nfs_write_ latency
Volume.NFSOther Latency	Volume NFS Other Latency (millisec)	volume:nfs_other_ latency
Volume.Data Throughput	Volume Throughput (KB/Sec)	volume:throughput
Volume.PerfViolation Count	Volume Perf Threshold Violation Count	Not Applicable
Volume.PerfViolation Period	Volume Perf Threshold Violation Period (Sec)	Not Applicable

Report Fields and Performance Counters for Qtree Catalogs

DataFabric Manager creates reports for Qtree Catalogs.

The following table lists and describes the fields of the Qtree Catalog.

Field	Name/description	Performance counter
Qtree.CIFSOps	Qtree CIFS Ops/Sec	qtree:cifs_ops
Qtree.NFSOps	Qtree NFS Ops/Sec	qtree:nfs_ops
Qtree.InternalOps	Qtree Internal Ops/Sec	qtree:internal_ops
Qtree.PerfViolation Count	Qtree Perf Threshold Violation Count	Not Applicable
Qtree.PerfViolation Period	Qtree Perf Threshold Violation Period (Sec)	Not Applicable

Report Fields and Performance Counters for LUN Catalogs

DataFabric Manager creates reports for LUN Catalogs.

The following table lists and describes the fields of the LUN Catalog.

Field	Name/description	Performance counter
LUN.TotalOps	LUN Total Ops/Sec	lun:total_ops

Field	Name/description	Performance counter
LUN.ReadOps	LUN Read Ops/Sec	lun:read_ops
LUN.WriteOps	LUN Write Ops/Sec	lun:write_ops
LUN.OtherOps	LUN Other Ops/Sec	lun:other_ops
LUN.Latency	LUN Latency (millisec)	lun:avg_latency
LUN.Throughput	LUN Throughput (KB/Sec)	lun:throughput
LUN.ReadData	LUN Read Data (KB/Sec)	lun:read_data
LUN.WriteData	LUN Write Data (KB/Sec)	lun:write_data
LUN.PerfViolation Count	LUN Perf Threshold Violation Count	Not Applicable
LUN.PerfViolation Period	LUN Perf Threshold Violation Period (Sec)	Not Applicable

Report Fields and Performance Counters for Aggregate Catalogs

DataFabric Manager creates reports for Aggregate Catalogs.

The following table lists and describes the fields of the Aggregate Catalog.

Field	Name/description	Performance counter
Aggregate.TotalOps	Aggregate Total Ops/Sec	aggregate:total_ transfers
Aggregate.UserReads	Aggregate User Reads (per_sec)	aggregate:user_reads
Aggregate.UserWrites	Aggregate User Writes (per_sec)	aggregate:user_writes
Aggregate.CPReads	Aggregate Reads done during CP (per_sec)	aggregate:cp_reads
Aggregate.PerfViolation Count	Aggregate Perf Threshold Violation Count	Not Applicable
Aggregate.PerfViolation Period	Aggregate Perf Threshold Violation Period (Sec)	Not Applicable

Report Fields and Performance Counters for Disk Catalogs

DataFabric Manager creates reports for Disk Catalogs.

The following table lists and describes the fields of the Disk Catalog.

Field	Name/description	Performance counter
Disk.ReadOps	Disk User Read Ops/Sec	disk:user_reads
Disk.WriteOps	Disk User Write Ops/Sec	disk:user_writes
Disk.CPReads	Disk Reads initiated for CP processing (per_sec)	disk:cp_reads
Disk.ReadLatency	Disk Read Latency (millisec)	disk:user_read_latency
Disk.WriteLatency	Disk Write Latency (millisec)	disk:user_write_latency
Disk.CPReadLatency	Disk CP Read Latency (millisec)	disk:cp_read_latency
Disk.Throughput	Disk Throughput (blocks/Sec)	disk:throughput
Disk.Utilization	Disk Utilization (%)	disk:disk_busy
Disk.PerfThreshold Violations	Disk Perf Threshold Violations Count	Not Applicable
Disk.PerfViolation Period	Disk Perf Threshold Violation Period (Sec)	Not Applicable

Protocols and port numbers

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DataFabric Manager access to storage systems on page 321
DataFabric Manager access to host agents on page 322
DataFabric Manager access to Open Systems SnapVault agents on page 322

DataFabric Manager server communication

DataFabric Manager uses various networking protocols and port numbers to communicate with storage systems, host agents (for SRM and SAN management), and Open Systems SnapVault agents.

You might need to enable both HTTP and HTTPS transports if multiple administrators are accessing the workstation from different locations. The presence of firewalls, non-trusted environments, or other circumstances might require a combination of HTTP and HTTPS transport.

Note: Reconfiguring these options from Operations Manager results in a message instructing you to restart the HTTP service from the CLI. Use the following command to restart the HTTP service: `dfm service start http`.

DataFabric Manager access to storage systems

There are a set of protocols and port numbers used by DataFabric Manager, to access your storage systems.

Protocol	UDP port	TCP port
HTTP		80
HTTPS		443
RSH		514
SSH		22
Telnet		23
SNMP	161	

DataFabric Manager access to host agents

There are a set of protocols and port numbers used by DataFabric Manager to access your host agents.

Protocol	UDP port	TCP port
HTTP		4092
HTTPS		4093

DataFabric Manager access to Open Systems SnapVault agents

There are a set of protocols and port numbers used by DataFabric Manager to access your Open Systems SnapVault agents.

Protocol	UDP port	TCP port
HTTP		10000
SNMP	161	

SAN management

You can use DataFabric Manager to monitor and manage components—such as logical unit numbers (LUNs), Fibre Channel (FC) switches, and Windows and UNIX SAN hosts—of your NetApp storage area networks (SANs).

The NetApp SANs are storage networks that have been installed in compliance with the "SAN setup guidelines" by NetApp. For information about setting up a NetApp SAN, see the *Data ONTAP Block Access Management Guide for iSCSI and FC*.

Note: NetApp has announced the end of availability for the SAN license for DataFabric Manager . Existing customers can continue to license the SAN option with DataFabric Manager. DataFabric Manager customers should check with their sales representative regarding other SAN management solutions.

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SAN management using DataFabric Manager on page 324
Reports for monitoring SANs on page 327
DataFabric Manager options on page 335
DataFabric Manager options for SAN management on page 335
How SAN components are grouped on page 338

Related information

Data ONTAP Block Access Management Guide for iSCSI and FC - http://now.netapp.com/NOW/knowledge/docs/san/#ontap_san

Discovery of SAN hosts by DataFabric Manager

DataFabric Manager discovers SAN hosts with the NetApp Host Agent installed on each SAN host.

DataFabric Manager can automatically discover SAN hosts; however, it does not use SNMP to poll for new SAN hosts. Instead, the special-purpose NetApp Host Agent discovers, monitors, and manages SANs on SAN hosts. You must install the NetApp Host Agent software on each SAN host that you want to monitor and manage with DataFabric Manager.

DataFabric Manager communicates with the NetApp Host Agent software using HTTP or HTTPS. If both DataFabric Manager and the Host Agent software are configured to use HTTP, port 4092 is used for communication; however, if HTTPS is configured on both, port 4093 is used.

You can specify the protocol to use for communication in DataFabric Manager and when you install the NetApp Host Agent software on your SAN host. By default, both the Host Agent and DataFabric Manager are configured to use HTTP.

Note: If you choose to use HTTPS for communication between DataFabric Manager and a SAN host, ensure that both DataFabric Manager and the NetApp Host Agent software on the SAN host are configured to use HTTPS. If the Host Agent is configured to use HTTP and DataFabric Manager is configured to use HTTPS, communication between the SAN host and DataFabric Manager does not occur. Conversely, if the NetApp Host Agent software is configured to use HTTPS and DataFabric Manager is configured to use HTTP, communication between the two occurs, but HTTP is used for communication.

For more information about the NetApp Host Agent software, see the *NetApp Host Agent Installation and Administration Guide*.

Related information

NetApp Host Agent Installation and Administration Guide - http://now.netapp.com/NOW/knowledge/docs/nha/nha_index.shtml

SAN management using DataFabric Manager

By using DataFabric Manager, you can perform tasks such as, view reports about LUNs, targets, FC switches, SAN hosts, and HBA ports. You can also group LUNs, storage systems in a SAN, FC switches, or SAN hosts, and so on.

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List of tasks performed for SAN management on page 326
List of user interface locations to perform SAN management tasks on page 326

Prerequisites for SAN management with DataFabric Manager

Different prerequisites apply for SAN management with DataFabric Manager.

For DataFabric Manager

You must have the SAN Management license key installed on your DataFabric Manager server.

All SAN monitoring and management features including LUN and FC switch monitoring are available only if you have the SAN Management license key installed, for DataFabric Manager 2.3 or later.

If you do not have this license, contact your sales representative to find out how you can purchase one.

For NetApp storage systems (targets)

DataFabric Manager does not report any data for your SAN if you do not have it set up according to the guidelines specified by NetApp.

SAN deployments are supported on specific hardware platforms running Data ONTAP 6.3 or later. For information about the supported hardware platforms, see the SAN Configuration Guide *http://now.netapp.com/*.

For FC switches

- To enable discovery of FC switches, the following settings must be enabled:
  - discoverEnabled (available from the CLI only)
  - Host Discovery (**Setup ➤ Options ➤ Edit Options: Discovery**)
  - SAN Device Discovery (**Setup ➤ Options ➤ Edit Options: Discovery**)
- DataFabric Manager can discover and monitor only FC switches, specifically Brocade Silkworm switches, configured in a SAN set up as specified in the SAN Setup Overview for FCP guide.

  Note: For a list of supported Brocade switches, see the SAN Configuration Guide at *http://now.netapp.com/*.
- All FC switches to be managed by DataFabric Manager must be connected to a TCP/IP network either known to or discoverable by DataFabric Manager. The FC switches must be connected to the network through an Ethernet port and must have a valid IP address.
- Certain FC switch monitoring reports in DataFabric Manager require that the storage systems connected to an FC switch run Data ONTAP 6.4 or later. For example, a report displaying storage systems that are connected to an FC switch displays only storage systems that are running Data ONTAP 6.4 or later.

For SAN hosts (initiators)

- All SAN hosts to be managed by DataFabric Manager must be connected to a TCP/IP network either known to or discoverable by DataFabric Manager. The SAN hosts must be connected to the network through an Ethernet port and must each have a valid IP address.
- Each SAN host must have the NetApp Host Agent software installed on it. The NetApp Host Agent software is required for discovering, monitoring, and managing SAN hosts. For more information about the Host Agent software, see the *NetApp Host Agent Installation and Administration Guide*.
- The Windows SAN hosts must have proper version of SnapDrive software installed on it, for LUN management by using DataFabric Manager. To find out which SnapDrive version you must have installed, see the DataFabric Manager software download pages at *http://now.netapp.com/*.

Note: LUN management on UNIX SAN hosts by using DataFabric Manager is not currently available.

Related information

NetApp Host Agent Installation and Administration Guide - http://now.netapp.com/NOW/knowledge/docs/nha/nha_index.shtml

List of tasks performed for SAN management

You can perform different tasks for SAN management by using DataFabric Manager.

- View reports that provide information about all LUNs, targets, FC switches, SAN hosts, and HBA ports in a SAN
- View details about a specific LUN, a target on a storage system, an FC switch, a SAN host, and an HBA port
- Perform management functions such as configuring an FC switch, and creating, modifying, or expanding a LUN
- Group LUNs, storage systems in a SAN, FC switches, or SAN hosts for efficient monitoring and management
- Change the monitoring intervals for LUNs, FC switches, and SAN hosts
- View SAN events and logs containing information related to LUN management and respond to SAN events
- Configure DataFabric Manager to generate alarms to notify recipients of the SAN events

List of user interface locations to perform SAN management tasks

You can perform the SAN management tasks in the Operations Manager Control Center UI.

UI locations to perform SAN management tasks:

SANs tab (Control Center ➤ Home ➤ Member Details)	To view reports about all or a group of SAN components (LUNs, FCP targets on a storage system, FC switches, and SAN hosts). You also use this tab to • Access the details about a specific SAN component • Perform LUN and FC switch management functions • Create groups of LUNs, FC switches, and SAN hosts • Configure settings for SAN hosts such as the administration port, on which DataFabric Manager should poll the SAN host. You can also configure the type of protocol (HTTP or HTTPS) DataFabric Manager should use to communicate with SAN hosts
Options link (Setup ➤ Options)	To enable and disable the discovery of SAN components and change the monitoring intervals for FC switches, LUNs, and SAN hosts in the DataFabric Manager database

Events tab (Control Center ➤ Home ➤ Group Status ➤ Events)	To view and respond to SAN events
Alarms link (Control Center ➤ Home ➤ Group Status ➤ Alarms)	To configure alarms for SAN events

Reports for monitoring SANs

You can view various reports about the SAN components that DataFabric Manager manages, from the SANs tab.

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DataFabric Manager managed SAN data in spreadsheet format on page 329
Where to find information for specific SAN components on page 329
Where to view LUN details of SAN components on page 329
Tasks performed on the LUN Details page for a SAN host on page 329
Information about FCP Target on a SAN host on page 330
Information about FCP switch of a SAN host on page 331
Access to the FC Switch Details page on page 331
Information about FC Switch on a SAN host on page 331
Tasks performed on the FC Switch Details page for a SAN host on page 331
Information about Host Agent on a SAN host on page 332
Accessing the HBA Port Details page for a SAN host on page 332
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Location of SAN reports

Reports about the SAN components that DataFabric Manager manages are available on the SANs tab. You can view reports by selecting reports in the Report drop-down list. If you want to view a report about a specific group, you specify the group by clicking the group name in the left pane of the DataFabric Manager window.

You can view the following reports from the SANs page:

- LUNs, Comments
- Fibre Channel Switches, All
- Fibre Channel Switches, Deleted
- Fibre Channel Switches, Comments
- Fibre Channel Switches, Compact
- Fibre Channel Switches, Down
- Fibre Channel Switch Environmentals
- Fibre Channel Switch Locations
- Fibre Channel Switch Firmware
- Fibre Channel Switches, Up
- Fibre Channel Switches, Uptime
- Fibre Channel Switch Ports
- Fibre Channel Links, Physical
- Fibre Channel Links, Logical
- FCP Targets
- HBA Ports, All
- HBA Ports, FCP
- HBA Ports, iSCSI
- SAN Hosts, Comments
- SAN Hosts, All
- SAN Hosts, FCP
- SAN Hosts, iSCSI
- SAN Hosts, Deleted
- SAN Hosts Traffic, FCP
- SAN Host Cluster Groups
- SAN Host LUNs, All
- SAN Host LUNs, iSCSI SAN Host LUNs, FCP
- LUNs, All
- LUNs, Comments
- LUNs, Deleted
- LUNs, Unmapped
- LUN Statistics
- LUN Initiator Groups
- Initiator Groups

DataFabric Manager managed SAN data in spreadsheet format

The report for DataFabric Manager managed SAN components into spreadsheets.

You can put data from reports for SAN component that DataFabric Manager manages into spreadsheet format. When you view a report, you can bring up the data in spreadsheet format by clicking the spreadsheet icon (<*ICON* >) on the right side of the Report drop-down list.

You can use the data in the spreadsheet to create your own charts and graphs or to analyze the data statistically.

Where to find information for specific SAN components

You can view information of SAN components from the **Details** page of a SAN component.

The **Details** page of a SAN component provides information specific to that component. For example, the **FC Switch Details** page provides the following details:

- Firmware version
- Uptime
- Status of each port on the switch

The **LUN Details** page provides the following details:

- The status and size of a LUN
- Events associated with the LUN
- All groups to which the LUN belongs

In addition, you can obtain graphs of information about the SAN components, access the management tools for these components, and view events associated with these components

Where to view LUN details of SAN components

You can view LUN details of SAN components using DataFabric Manager

You can access the **LUN Details page** for a LUN by clicking the path of the LUN in any of the reports.

Tasks performed on the LUN Details page for a SAN host

You can diagnose connectivity, expand a LUN, destroy LUN, edit settings, and so on.

The **Tools** list on the **LUN Details** page enables you to select the following tasks:

- Diagnose Connectivity
- Expand this LUN—Launches a wizard that helps you expand the LUN
- Destroy this LUN—Launches a wizard that helps you destroy the LUN
- Edit Settings

- Refresh Monitoring Samples—Obtains current monitoring samples from the storage system on which this LUN exists
- FilerView—Launches FilerView, the Web-based UI of the storage system on which the LUN exists
- Manage LUNs with FilerView—Launches FilerView and displays a page where you can manage the LUN
- Run a Command—Runs a Data ONTAP command on the storage system on which this LUN exists

Note: You must have appropriate authentication set up, to run commands on the storage system.

Information about FCP Target on a SAN host

You can view FCP target details of a SAN hosts from the **FCP Target Details** page.

The **FCP Target Details** page contains the following information:

- Name of the FC switch and the port to which the target connects
- Status of the target
- Name of the storage system on which target is installed
- Port state of the target—Port state can be one of the following:
  - Startup
  - Uninitialized
  - Initializing Firmware
  - Link Not Connected
  - Waiting For Link Up
  - Online
  - Link Disconnected
  - Resetting
  - Offline
  - Offline By User System
  - Unknown
- Specifics about the target such as hardware version, firmware version, and speed of the target
- FC topology of the target—Topology can be one of the following:
  - Fabric
  - Point-To-Point
  - Loop
  - Unknown
- WWNN and WWPN of the target
- Other FCP targets on the storage system on which the target is installed

- Time of the last sample collected and the configured polling interval for the FCP target

Information about FCP switch of a SAN host

You can view FCP switch details of a SAN host and status of the switch. You also view events associated with the switch, and the number of devices connected with the switch.

Access to the FC Switch Details page

You can access **FC Switch Details** page from SAN monitoring reports.

You can access the **FC Switch Details** page for a switch by clicking the name of the switch in any of the reports for SAN monitoring.

Information about FC Switch on a SAN host

You can view FCP Switch details of a SAN host from the **FCP Switch Details** page.

The **Details** page for an FC switch consists of the following information:

- Status of the switch
- Firmware version installed on the switch
- The length of time that the switch has been up since the last reboot
- Contact information for the switch such as the administrator name and location of the switch
- Events associated with the FC switch
- FC switch port status is a graphical layout of the switch ports with color of the switch port that indicates the status of the port:
  - Green—indicates that the port is online and working normally
  - Yellow—indicates that the port is connected to a GBIC, but is not synchronized (No Sync)
  - Red—indicates that the port is offline or not working normally
  - Black—indicates that there is no GBIC connected
- Number of devices connected to the switch and a link to a report that lists those devices
- The DataFabric Manager groups to which the FC switch belongs
- Time when the last data sample was collected and the configured polling interval for the switch
- Graph of FC traffic per second on the switch—You can view the traffic over a period of one day, one week, one month, one quarter (three months), or one year.

Tasks performed on the FC Switch Details page for a SAN host

You can edit FC Switch settings, refresh monitoring samples, run FabricSwitch, and run Telnet using the **FC Switch Details** page.

The **Tools** list on the **FC Switch Details** page enables you to select the following tasks to perform for the switch whose **Details** page you are on:

- **Edit Settings**—Displays the **Edit FC Switch Settings** page where you configure the login and password information in DataFabric Manager for the switch. DataFabric Manager requires the login and password information to connect to a switch using the Telnet program.
- **Refresh Monitoring Samples**—Obtains current monitoring samples from the FC switch.
- **Invoke FabricWatch**—Connects you to FabricWatch, the Web-based UI, of the Silkworm switch. You might want to connect to FabricWatch to manage and configure the switch.
- **Run Telnet**—Connect to the CLI of the switch using the Telnet program.
  DataFabric Manager requires the login and password information to connect to a switch using the Telnet program.

Information about Host Agent on a SAN host

You can view SAN host status, version details of the operating system and Host Agent, number of HBAs, and so on in the **Host Agent Details** page.

The **Details** page for a SAN host contains the following information:

- Status of the SAN host and the time since the host has been up
- The operating system and Host Agent version running on the SAN host
- The SAN protocols available on the host
- The MSCS configuration information about the SAN host, if any, such as the cluster name, cluster partner, and cluster groups to which the SAN host belongs
- The events that occurred on this SAN host
- The number of HBAs and HBA ports on the SAN host
- The devices related to the SAN host such as the FC switches connected to it and the storage systems accessible from it
- The number of LUNs mapped to the SAN host and a link to the list of those LUNs
- The number of initiator groups that contain the SAN host and a link to the list of those initiator groups
- Time of the last sample collected and the configured polling interval for the SAN host
- Graphs of information such as, the HBA port traffic per second or the HBA port frames per second over a period of one day, one week, one month, one quarter (three months), or one year

Accessing the HBA Port Details page for a SAN host

You can access **HBA Port Details** page for a SAN host from the SAN host reports.

Steps

1. Click **Member Details ➤ SANs ➤ Report drop-down ➤ HBA Ports, All**.

2. Click on the name of the HBA port.

   The **HBA Port Details** page is displayed.

Details on the HBA Port Details page

You can view status of HBA port, view HBA protocol, view events that occurred in the HBA port, and so on.

The **Details** page for an HBA port contains the following information:

- Status and state of the HBA port
- Name of the SAN host on which the HBA is installed
- The protocol available on the HBA
- Specifics about the HBA such as the name, serial number, model, hardware version, driver version, and firmware version
- WWNN of the HBA and WWPN of the HBA port
- FC switch port to which the HBA port connects
- The events that occurred on this HBA port
- The number of HBA ports on the HBA and a link to the list of those ports
- The number of HBA ports on the SAN host on which the HBA port exists and a link to the list of those ports
- The number of storage systems accessible to the HBA port and a link to the list of those storage systems
- The number of LUNs mapped to the HBA port and a link to the list of those LUNs
- The number of initiator groups that contain the HBA port and a link to the list of those initiator groups
- Time of the last sample collected and the configured polling interval for the HBA port
- Graphs of information such as the HBA port traffic per second or the HBA port frames per second over a period of one day, one week, one month, one quarter (three months), or one year

List of SAN management tasks

You can perform various SAN management tasks by using DataFabric Manager.

- For LUNs: Create, expand, and destroy LUNs; map a LUN to or unmap a LUN from initiator groups
- For initiator groups: Create or delete initiator groups
- For FC switches: Configure and view the current configuration of a switch

LUN management

You can manage a LUN in two ways by using DataFabric Manager.

- Use the LUN management options available in DataFabric Manager
  - The **Host Agent Details** page provides a `Create a LUN` option in the **Tools** list to create LUNs. When you select the `Create a LUN` option, a wizard is launched that steps you through the process of creating a LUN.
  - The **LUN Details** page provides the following LUN management options in the **Tools** list: Expand this LUN and Destroy this LUN.
    These LUN management options launch wizards specific to their function. The wizards step you through the process of expanding or destroying a LUN.

  By using a wizard available in the Tools list on the **Host Agent Details** page and **LUN Details** page, you can create, expand, and destroy a LUN. Before you run the wizard, ensure the availability of the following details:

  - That the SAN host management options are appropriately set on the **Options** page or the **Edit Host Agent Settings** page. For more information about the SAN Host management options,
  - That to manage a shared LUN on an MSCS, you perform the operation on the active node of the cluster. Otherwise, the operation fails.

- Connect to FilerView, the Web-based management interface, of your storage system
  The **LUN Details** page provides a Manage LUNs with FilerView option in the Tools list, as shown in the previous example.
  This option enables you to access FilerView, the Web-based UI of your storage system. You can perform the following LUN management functions from FilerView:
  - Add or delete a LUN
  - Modify configuration settings such as the size or status of a LUN
  - Map a LUN to or unmap a LUN from initiator groups
  - Create or delete initiator groups

  The **Tools** list on the **LUN Details** page displays two options for FilerView. The `Invoke FilerView` option connects you to the main window of the UI of your storage system and the Manage LUNs with FilerView option connects you directly to the **Manage LUNs** window.
  LUNs inherit access control settings from the storage system, volume, and qtree they are contained in. Therefore, to perform LUN operations on storage systems, you must have appropriate privileges set up on those storage systems.

Initiator group management

You can manage initiator groups by connecting to FilerView, the Web-based management interface, of your storage system. The **LUN Details** page provides a Manage LUNs with FilerView option in the Tools list. This option enables you to connect to FilerView.

FC switch management

The **FC Switch Details** page provides the `Invoke FabricWatch` option in the Tools list. You can use this option to connect to FabricWatch, the Web-based management tool for the Brocade SilkWorm switches.

DataFabric Manager options

DataFabric Manager uses the values of options in its database to determine whether to automatically discover new objects or not. DataFabric Manager determines, how frequently to monitor objects, and what threshold value to use to generate an event.

Note: A DataFabric Manager object is an entity that is monitored or managed by DataFabric Manager. Examples of DataFabric Manager objects are storage systems, LUNs, FC switches, and user quotas.

When DataFabric Manager is installed, these options are assigned default values; however, you can change these values. The options can be changed globally—to apply to all objects in the DataFabric Manager database, or locally—to apply to a specific object or a group of objects in the DataFabric Manager database. Some options can be set globally, but not locally.

When both global and local options are specified for an object, the local options override the global options.

DataFabric Manager options for SAN management

There are two DataFabric Manager options for SAN management, namely, Global-only option and Global and local options.

Global-only options:

- SAN Device Discovery
  This option specifies whether to enable or disable the automatic discovery of SAN components (LUNs, FC switches, SAN hosts).
  By default, this option is enabled.
- LUN monitoring interval, Fibre Channel monitoring interval, and SAN Host monitoring interval
  The monitoring intervals determine how frequently DataFabric Manager collects information about an object.
  Following are the default monitoring intervals:
  - For LUNs, 30 minutes
  - For Fibre Channel, 5 minutes

- For SAN Host, 5 minutes

Global and local options:

- Host Agent Login

  This option specifies the user name that is used to authenticate to the NetApp Host Agent software, for SAN monitoring and management.

  By default, SAN monitoring is enabled; therefore, the user name guest is used.

  If you want to enable SAN management in addition to monitoring, you must select the user name admin.
- Host Agent Monitoring Password

  This option specifies the password that is used for the user name guest to authenticate to the Host Agent software for SAN monitoring.

  By default, public is used as the password; however, you can change it. If you change the password in DataFabric Manager, ensure that you change the password to the same value in the Host Agent software running on the SAN hosts. Otherwise, DataFabric Manager is not able to communicate with the SAN host.
- Host Agent Management Password

  This option specifies the password that is used for the user name admin to authenticate to the NetApp Host Agent software for SAN monitoring and management.

  There is no default value for the management password. Therefore, you must specify a value for this option before you can use the LUN management features through DataFabric Manager. The password you specify for this option must match the password specified in the Host Agent software running on the SAN hosts. Otherwise, DataFabric Manager is not able to communicate with the SAN host.
- Host Agent Administration Transport

  This option specifies the protocol, HTTP or HTTPS, used to connect to the NetApp Host Agent software.

  By default, this option is set to HTTP.
- Host Agent Administration Port

  This option specifies the port that is used to connect to the Host AgentNetApp Host Agent software.

  By default, 4092 is used for HTTP and 4093 for HTTPS.
- HBA Port Too Busy Threshold

  This threshold specifies the value, as a percentage, at which an HBA port has so much incoming and outgoing traffic that its optimal performance is hindered.

  If this threshold is crossed, DataFabric Manager generates an HBA Port Traffic High event. By default, this threshold is set to 90 for all HBA ports.

Next topics

Where to configure monitoring intervals for SAN components on page 337

Deleting and undeleting SAN components on page 337

Reasons for deleting and undeleting SAN components on page 337
Process of deleting SAN components on page 338
Process of undeleting SAN components on page 338

Where to configure monitoring intervals for SAN components

You can configure the global options on the **Options** page.

To configure options locally (for a specific object), you must be on the **Edit Settings** page of that specific object (**Details page ➤ Tools list ➤ Edit Settings**).

Deleting and undeleting SAN components

You can stop monitoring a SAN component (a LUN, an FC switch, a storage system, or a SAN host) with DataFabric Manager by deleting it from the Global group.

When you delete a SAN component, DataFabric Manager stops collecting and reporting data about it. Data collection and reporting is not resumed until the component is added back (using the Undelete button) to the database.

You cannot stop monitoring a specific FCP target or an HBA port unless you stop monitoring the storage system or the SAN host on which the target or the port exists.

Note: When you delete a SAN component from any group except Global, the component is deleted only from that group; DataFabric Manager does not stop collecting and reporting data about it. You must delete the SAN component from the Global group for DataFabric Manager to stop monitoring it altogether.

Reasons for deleting and undeleting SAN components

You might want to delete a SAN component, if you want to stop monitoring the SAN component either temporarily or permanently. You might want to undelete a SAN component if you want to resume the monitoring of the component that you previously deleted.

Temporarily stop monitoring SAN component

You might delete a SAN component if you want to perform maintenance on the component and do not want DataFabric Manager to generate events and alarms (if configured) during the maintenance process.

Permanently stop monitoring the SAN component

You might delete a component if it exists on a non-mission critical network and does not need to be monitored, but it has been discovered by DataFabric Manager. A non-mission critical network could be a laboratory network.

Process of deleting SAN components

You can delete a SAN component from any of the reports related to that component.

First, you select the components you want to delete in the left-most column of a report. Then, you click **Delete** at the bottom of each report to delete the selected components.

Process of undeleting SAN components

All deleted objects are listed in their respective Deleted reports. You can delete a SAN component from these reports.

All deleted FC switches are listed in the FC Switches, Deleted report. All deleted LUNs are listed in the LUNs, Deleted report. All deleted SAN hosts are listed in the SAN hosts, Deleted report.

You can undelete an object by selecting it from its Deleted report and clicking **Undelete** at the bottom of the report.

How SAN components are grouped

You can group SAN components—LUNs, storage systems, SAN hosts, or FC switches—for easier management and to apply access control.

Storage systems, SAN hosts, and FC switches are considered storage systems for the purpose of creating groups. Therefore, when you create a group of storage systems, SAN hosts, or FC switches, the type of the created group is "Appliance resource group." In addition, you can add storage systems, SAN hosts, and FC switches to an Appliance resource group.

However, a group containing LUNs cannot contain any other objects—storage systems, SAN hosts, or FC switches. Therefore, when you create a group of LUNs, the created group is "LUN resource group."

Note: You cannot group HBA ports or FCP targets.

Next topics

Restriction of SAN management access on page 338
Access control on groups of SAN components on page 339

Restriction of SAN management access

To allow an administrator to manage your SAN hosts and devices, select the **GlobalSAN** role on the **Administrators** page (**Setup menu ➤ Administrative Users**). The GlobalSAN role allows an administrator to create, expand, and destroy LUNs. This role can be global or per-group.

Access control on groups of SAN components

Just as with other DataFabric Manager groups, you can apply access control on groups of SAN components to restrict the scope of tasks an administrator can perform.

You apply access control to a group (group-based access control) by assigning a role to an administrator account for that group. The role defines the administrator's authority to view and perform operations on the components in that group.

Note: By default, DataFabric Manager is configured to provide global Read access across all groups, including Global, to user Everyone.

Glossary

backup relationship A persistent association between a primary directory and a secondary volume for disk-based data backup and restore using the Data ONTAP SnapVault feature.

baseline transfer An initial backup (also known as a level-0 backup) of a primary directory to a secondary volume in which the entire contents of the primary directory are transferred.

broken-off mirror A mirror that no longer replicates data from a source volume or qtree to a destination volume or qtree.

Note: The destination is readable and writable; therefore, the destination can be used or can be resynchronized to the source.

connection A connection is the physical path used to replicate data from a source storage system or vFiler unit to a destination storage system or vFiler unit. You can define up to two paths for a particular SnapMirror relationship. You can also set the connection mode for SnapMirror relationships that use multiple paths. See “Managing connections” for more details.

counter A statistical measurement of activity on a storage system or storage subsystem that is provided by Data ONTAP.

DataFabric Manager DataFabric Manager provides infrastructure services such as discovery, monitoring, role-based access control, auditing, logging for products in the NetApp storage and data suites. DataFabric Manager software runs on a separate server. It does not run on the storage systems.

DataFabric Manager has a CLI for scripting commands that might otherwise be performed using a Web-based user interface, known as Operations Manager.

dataset A collection of storage sets along with configuration information associated with data. The storage sets associated with a dataset include, a primary storage set used to export data to clients, and the set of replicas and archives that exist on other storage sets. Datasets represent exportable user data.

destination volume or qtree A read-only volume or qtree to which you are replicating data from a volume or qtree. The destination volume or qtree is usually on a storage system or vFiler unit unit that is separate from the storage system on which the original volume or qtree resides.

Users access the destination volumes and qtrees only in the following cases:

- A disaster takes down the source volumes or qtrees

- The administrator uses SnapMirror commands to make the replicated data at the destination accessible and writable

failover	Failover is the process of making the standby DataFabric Manager server, at the secondary site, operational.
failback	Failback is the process of restoring the dataset to its original operational state.
historical data	Data that is archived by the performance monitoring server on the DataFabric Manager server. All the data that is included in the Performance Advisor default views is also archived as historical data. The historical data is accessible to any Performance Advisor that can connect to the workstation. Historical data is collected on an ongoing basis, independent of whether a client has the associated performance view open or not. Historical data can be used for diagnosing past performance problems or for short-term trend analysis.
host	A workstation or server running the NetApp Host Agent software is called a host.
SAN host	If the host has SAN hardware, it can also be referred to as a SAN host.
SRM host	If you are collecting file-system data from a host, it can be referred to as an SRM host.
hosting storage system	The physical storage system on which one or more vFiler units are configured. Some counters that Performance Advisor tracks apply to both storage systems and vFiler units. Other counters (for example, CPU usage) apply only to storage systems and the associated host of a vFiler unit. The hosting storage system is also referred to as the "vFiler host."
incremental transfer	A subsequent backup after a baseline transfer has occurred of a primary directory in which only the new and changed data since the last backup (baseline or incremental) is transferred. The transfer time of incremental transfers can be significantly less than the baseline transfer.
logical objects	Object types that represent storage containers such as volume, qtree, LUNs, vFiler units, and datasets are known as Logical Objects.
logical hierarchy	The hierarchy that only the Logical Objects and instances when selected.
managed object	A managed object represents any object that has an identity and a name in the DataFabric Manager object table. A managed object is an object that is contained within a DataFabric Manager group. Volumes, aggregates, qtrees, and LUNs are the examples of managed objects.
NetApp Management Console	NetApp Management Console is the client platform for the Java-based NetApp Management Software applications. NetApp Management Console runs on a Windows or a Linux workstation, separate from the system on which the DataFabric Manager server is installed.

Network Data Management Protocol (NDMP) An open protocol for managing data stored on networked servers.

object Typically there is an object associated with each hardware or software subsystem within Data ONTAP. Examples of hardware objects are processor, disk, NVRAM, and networking card objects. FCP, iSCSI, CIFS, and NFS are the examples of software protocol objects. WAFL, RAID and target are the examples of internal objects specific to Data ONTAP. Virtual objects like the system object capture key statistics across all the other objects in one single place. Examples of system objects are avg_processor_busy, nfs_ops, cifs_ops, and net_data_recv.

Open Systems platform A server running AIX, Solaris, HP-UX, Linux, Windows NT, Windows 2000, or Windows 2003, whose data can be backed up to a SnapVault secondary storage system.

Operations Manager Operations Manager is the Web-based user interface of DataFabric Manager, from which you can monitor and manage multiple storage systems, clusters, and other appliances. Operations Manager is used for day-to-day monitoring, alerting, and reporting on storage infrastructure.

Performance Advisor The Performance Advisor component installed on the NetApp Management Console platform enables you to monitor the performance of storage system and vFiler unit as described in this chapter.

The user interface of Performance Advisor contains only performance monitoring information. This Performance Advisor interface is distinct from Operations Manager, which contains other DataFabric Manager information.

physical objects Object types that represent the physical resources in a storage system such as disk, aggregates, memory, network interfaces, resource pools, and RAID groups are known as Physical Objects.

physical hierarchy The hierarchy that only the Physical Objects and instances when selected.

policies A collection of configuration settings that you can apply to multiple SnapMirror relationships. You can decide on the following using a policy:

- How a SnapMirror relationship replicates data from a source storage system or vFiler unit to a destination storage system or vFiler unit
- What a SnapMirror relationship does if the storage system or vFiler unit fails

primary directory A directory on a primary storage system that is to be backed up.

primary storage system A system whose data is to be backed up.

primary system qtree	A qtree on a primary storage system whose data is backed up to a secondary qtree on a secondary storage system.
quiesced mirror	A mirror that is in a stable state—that is, no data transfers are occurring, and any future data transfers to the destination volume or qtree are blocked. You can quiesce only volumes and qtrees that are online and that are SnapMirror destinations. You cannot quiesce a restricted or offline volume or a qtree in a restricted or offline volume.
resource pool	A managed object in DataFabric Manager, containing storage provisioning resources like storage systems, aggregates and spare disks.
secondary storage system	A storage system or NearStore to which data is backed up.
secondary system qtree	A qtree on a secondary storage system to which data from a primary qtree on a primary storage system is backed up.
secondary volume	A volume on a secondary storage system to which data is backed up from one or more primary directories. The primary directories being backed up to a secondary volume might exist on one or many primary storage systems.
Snapshot-based backup	A backup of DataFabric Manager data stored as a volume Snapshot copy having an .sndb extension.
SnapMirror relationship	The replication relationship between a source and destination storage systems orvFiler units by using the Data ONTAP SnapMirror feature.
SnapVault	SnapVault is a disk-based storage backup feature of Data ONTAP that enables data stored on multiple storage systems to be backed up to a central, secondary storage system quickly and efficiently as read-only Snapshot copies. For detailed information about SnapVault and Snapshot copies, see the *Data ONTAP Data Protection Online Backup and Recovery Guide*.
SnapVault baseline transfer	An initial complete backup of a primary storage qtree or an Open Systems platform directory to a corresponding qtree on the secondary storage system.
SnapVault relationship	The backup relationship between a qtree on a primary system or a directory on an Open Systems primary platform and its corresponding secondary system qtree.
SnapVault incremental transfer	A follow-up backup to the secondary storage system that contains only the changes to the primary storage data between the current and last transfer actions.
source volume or qtree	A writable volume or qtree whose data is to be replicated. The source volumes and qtrees are the objects normally visible, accessible, and writable by the storage system clients.
storage set	Containers that are used for delegation, replication and in some cases, sub storage provisioning. The only container of merit in a storage set is a volume

	(flexible or traditional). A storage set contains a group of volumes whereas a volume should be in at most one storage set.
storage system	An appliance that is attached to a computer network and is used for data storage. FAS appliances and NearStore systems are the examples of storage systems.
unmanaged object	Objects apart from the managed objects belong to the class of unmanaged objects. An unmanaged object does not have a unique identity in the DataFabric Manager table.
vFiler unit	One or more virtual storage systems that can be configured on a single physical storage system licensed for the MultiStore feature. DataFabric Manager 3.4 and later enables monitoring and management of vFiler units.

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