Learn about the new capabilities available in ONTAP 9.9.1. The release candidate version was made available on May 24, 2021. The general availability was made available on July 21, 2021.

The following features were announced with ONTAP 9.9.1:

Data protection

| **Update** | **Description** |
| --- | --- |
| [Storage efficiency support on SnapLock volumes and aggregates](https://docs.netapp.com/us-en/ontap/snaplock/index.html) | Storage efficiency capabilities for SnapLock volumes and aggregates have been extended to include data compaction, cross-volume deduplication, adaptive compression, and TSSE (Temperature Sensitive Storage Efficiency), allowing for greater space savings for WORM data. |
| [Support for configuring different Snapshot policies on SVM DR source and destination](https://docs.netapp.com/us-en/ontap/data-protection/snapmirror-svm-replication-concept.html) | SVM DR configurations can use the mirror-vault policy to configure different Snapshot policies on the source and destination, and the policies on the destination are not overwritten by the policies on the source. |
| [System Manager support for SnapMirror Cloud](https://docs.netapp.com/us-en/ontap/data-protection/snapmirror-licensing-concept.html) | SnapMirror Cloud is now supported in System Manager. |
| [Auditing-enabled SVMs](https://docs.netapp.com/us-en/ontap/nas-audit/enable-disable-auditing-svms-task.html) | The maximum number of auditing-enabled SVMs supported in a cluster has been increased from 50 to 400. |
| [SnapMirror Synchronous](https://docs.netapp.com/us-en/ontap/data-protection/snapmirror-synchronous-disaster-recovery-basics-concept.html) | The maximum number of supported SnapMirror Synchronous endpoints per HA pair has increased from 80 to 160. |
| [FlexGroup SnapMirror topology](https://docs.netapp.com/us-en/ontap/flexgroup/create-snapmirror-relationship-task.html) | FlexGroup volumes support two or more fanout relationships; for example A→B, A→C. Like FlexVol volumes, FlexGroup fanout supports a maximum of 8 fanout legs, and cascading up to two-levels; for example, A→B→C. |

File access protocols

| **Update** | **Description** |
| --- | --- |
| [LDAP referral chasing enhancements](https://docs.netapp.com/us-en/ontap/nfs-config/using-ldap-concept.html) | LDAP referral chasing is supported with LDAP signing and sealing, encrypted TLS connections, and communications over LDAPS port 636. |
| [LDAPS support on any port](https://docs.netapp.com/us-en/ontap/nfs-admin/ldaps-concept.html) | LDAPS can be configured on any port; port 636 remains the default. |
| [NFSv4.x versions enabled by default](https://docs.netapp.com/us-en/ontap/nfs-admin/supported-versions-clients-reference.html) | NFSv4.0, NFSv4.1, and NFSv4.2 are enabled by default. |
| [Labeled NFSv4.2 support](https://docs.netapp.com/us-en/ontap/nfs-admin/enable-nfsv42-security-labels-task.html) | Mandatory Access Control (MAC) labeled NFS is supported when NFSv4.2 is enabled. With this functionality, ONTAP NFS servers are MAC-aware, storing and retrieving sec\_label attributes sent by clients. |

MetroCluster

| **Update** | **Description** |
| --- | --- |
| [IP support for shared link at layer 3](https://docs.netapp.com/us-en/ontap-metrocluster/install-ip/concept_considerations_layer_3.html) | MetroCluster IP configurations can be implemented with IP-routed (layer 3) back-end connections. |
| [Support for 8-node clusters](https://docs.netapp.com/us-en/ontap-metrocluster/install-ip/task_install_and_cable_the_mcc_components.html) | Permanent 8-node clusters are supported in IP and Fabric-attached configurations. Additionally, AFF ASA platforms support 8-node MCC IP configurations. |

Networking

| **Update** | **Description** |
| --- | --- |
| [Cluster resiliency](https://docs.netapp.com/us-en/ontap/high-availability/index.html) | * Port monitoring and avoidance for two-node switchless clusters (previously available only in switched configurations) * Automatic node failover when a node cannot serve data across its cluster network * New tools to display which cluster paths are experiencing packet loss |
| [Virtual IP (VIP) LIF extension](https://docs.netapp.com/us-en/ontap/networking/configure_virtual_ip_@vip@_lifs.html) | * Autonomous system number (ASN) for border gateway protocol (BGP) supports a 4-byte non-negative integer. * Multi-exit discriminator (MED) enables advanced route selections with support for path prioritization. MED is an optional attribute in the BGP update message. * VIP BGP provides default route automation using BGP peer grouping to simplify configuration. |

S3 object storage

| **Update** | **Description** |
| --- | --- |
| [S3 metadata and tag support](https://docs.netapp.com/us-en/ontap/s3-config/enable-client-access-from-s3-app-task.html) | The ONTAP S3 server provides enhanced automation capabilities to S3 clients and applications with support for user-defined object metadata and object tagging. |

SAN

| **Update** | **Description** |
| --- | --- |
| [Foreign LUN import (FLI)](https://docs.netapp.com/us-en/ontap/san-migration/task_checking_supported_configurations_for_fli_using_san_lun_migrate_app.html) | The SAN LUN Migrate App on the NetApp Support Site can be used to qualify a foreign array that is not listed in the FLI interoperability matrix. |
| [NVMe-oF remote path access](https://docs.netapp.com/us-en/ontap/san-config/host-support-multipathing-concept.html) | If direct path access is lost in failover, remote I/O allows the system to failover to a remote path and continue data access. |
| [Support for 12-node clusters on ASAs](https://docs.netapp.com/us-en/ontap/task_asa_software_configuration.html#asa-limitations-and-restrictions) | 12-node clusters are supported for AFF ASA configurations. ASA clusters can include a mix of various ASA system types. |
| [NVMe-oF protocol on ASAs](https://docs.netapp.com/us-en/ontap/task_asa_software_configuration.html#asa-limitations-and-restrictions) | The NVMe-oF protocol support is also available with an AFF ASA system. |
|  | * [You can create an igroup that consists of existing igroups](https://docs.netapp.com/us-en/ontap/task_san_create_nested_igroup.html). * You can add a description to an igroup or host initiators that serves as an alias for the igroup or host initiator. * [You can map igroups to two or more LUNs simultaneously.](https://docs.netapp.com/us-en/ontap/task_san_map_igroups_to_multiple_luns.html) |
| [Single LUN performance improvement](https://docs.netapp.com/us-en/ontap/san-admin/storage-virtualization-vmware-copy-offload-concept.html) | Single LUN performance for AFF has been significantly improved, making it ideal for simplifying deployments in virtual environments. For example, A800 can provide up to 400% more Random Read IOPs. |

Security

| **Update** | **Description** |
| --- | --- |
| [Support for multifactor authentication with Cisco DUO when logging in to System Manager](https://docs.netapp.com/us-en/ontap/system-admin/configure-saml-authentication-task.html) | Beginning with ONTAP 9.9.1P3, you can configure Cisco DUO as a SAML identity provider (IdP), enabling users to authenticate using Cisco DUO when they log in to System Manager. |

Storage efficiency

| **Update** | **Description** |
| --- | --- |
| [Set number of files to maximum for volume](https://docs.netapp.com/us-en/ontap-cli-991/volume-modify.html) | Automate file maximums with the volume parameter -files-set-maximum, eliminating the need to monitor file limits. |

Storage resource management enhancements

| **Update** | **Description** |
| --- | --- |
| [File System Analytics (FSA) management enhancements in System Manager](https://docs.netapp.com/us-en/ontap/concept_nas_file_system_analytics_overview.html) | FSA provides additional System Manager capabilities for search and filtering, and for taking action on FSA recommendations. |
| [Support for negative lookup cache](https://docs.netapp.com/us-en/ontap/flexcache/accelerate-data-access-concept.html) | Caches a "file not found" error on the FlexCache volume to reduce network traffic caused by calls to the origin. |
| [FlexCache disaster recovery](https://docs.netapp.com/us-en/ontap/flexcache/supported-unsupported-features-concept.html) | Provides non-disruptive migration of clients from one cache to another. |
| [SnapMirror cascade and fanout support for FlexGroup volumes](https://docs.netapp.com/us-en/ontap/flexgroup/supported-unsupported-config-concept.html) | Provides support for SnapMirror cascade and SnapMirror fanout relationships for FlexGroup volumes. |
| [SVM disaster recovery support for FlexGroup volumes](https://docs.netapp.com/us-en/ontap/flexgroup/supported-unsupported-config-concept.html) | SVM disaster recovery support for FlexGroup volumes provides redundancy by using SnapMirror to replicate and synchronize an SVM's configuration and data. |
| [Logical space reporting and enforcement support for FlexGroup volumes](https://docs.netapp.com/us-en/ontap/flexgroup/supported-unsupported-config-concept.html) | You can display and limit the amount of logical space consumed by FlexGroup volume users. |
| [SMB access support in qtrees](https://docs.netapp.com/us-en/ontap/smb-config/configure-client-access-shared-storage-concept.html) | SMB access is supported to qtrees in FlexVol and FlexGroup volumes with SMB enabled. |

System Manager

| **Update** | **Description** |
| --- | --- |
| [System Manager displays risks reported by Active IQ](https://docs.netapp.com/us-en/ontap/task_admin_monitor_risks.html) | Use System Manager to link to NetApp Active IQ, which reports opportunities to reduce risk and improve the performance and efficiency of your storage environment. |
| [Manually assign local tiers](https://docs.netapp.com/us-en/ontap/task_san_provision_linux.html) | System Manager users can assign a local tier manually when they are creating and adding volumes and LUNs. |
| [Fast directory delete](https://docs.netapp.com/us-en/ontap/task_nas_manage_directories_files.html) | Directories can be deleted in System Manager with low-latency fast directory delete functionality. |
| [Generate Ansible Playbooks](https://docs.netapp.com/us-en/ontap/task_admin_use_ansible_playbooks_add_edit_volumes_luns.html) | System Manager users can generate Ansible Playbooks from the UI for a few select workflows and can use them in an automation tool to repeatedly add or edit volumes or LUNs. |
| [Hardware Visualization](https://docs.netapp.com/us-en/ontap/task_admin_troubleshoot_hardware_problems.html) | First introduced in ONTAP 9.8, the Hardware Visualization feature now supports all AFF platforms. |
| [Active IQ integration](https://docs.netapp.com/us-en/ontap/task_admin_troubleshoot_hardware_problems.html) | System Manager users can view support cases associated with the cluster and download. They can also copy cluster details they need to submit new support cases on the NetApp Support site. System Manager users can receive alerts from Active IQ to inform them when new firmware updates are available. Then, they can download the firmware image and upload it using System Manager. |
| [Cloud Manager integration](https://docs.netapp.com/us-en/ontap/task_cloud_backup_data_using_cbs.html) | System Manager users can set up protection to back up data to public cloud endpoints using the Cloud Backup Service. |
| [Data protection provisioning workflow enhancements](https://docs.netapp.com/us-en/ontap/task_dp_configure_mirror.html) | System Manager users can manually name a SnapMirror destination and igroup name when setting up data protection. |
| [Enhanced network port management](https://docs.netapp.com/us-en/ontap/concept_admin_viewing_managing_network.html) | The network interfaces page has enhanced capabilities to display and manage interfaces on their home ports. |
| System management enhancements | * [Support for nested igroups](https://docs.netapp.com/us-en/ontap/task_san_create_nested_igroup.html) * [Map multiple LUNs to an igroup in a single task and can use a WWPN alias for filtering during the process.](https://docs.netapp.com/us-en/ontap/task_san_map_igroups_to_multiple_luns.html) * [During the NVMe-oF LIF creation, you no longer need to select identical ports on both the controllers.](https://docs.netapp.com/us-en/ontap/task_admin_troubleshoot_hardware_problems.html) * [Disable FC ports with a toggle button for each port.](https://docs.netapp.com/us-en/ontap/task_admin_troubleshoot_hardware_problems.html) |
| [Enhanced display in System Manager of information about Snapshot copies](https://docs.netapp.com/us-en/ontap/task_dp_configure_snapshot.html) | * System Manager users can view the size of Snapshot copies and the SnapMirror label. * Snapshot copy reserves are set to zero if Snapshot copies are disabled. |
| Enhanced display in System Manager about capacity and location information for storage tiers | * [A new **Tiers** column identifies the local tiers (aggregates) in which each volume resides.](https://docs.netapp.com/us-en/ontap/concept_admin_viewing_managing_network.html) * [System Manager shows the physical used capacity along with the logical used capacity at the cluster level as well as the local tier (aggregate) level.](https://docs.netapp.com/us-en/ontap/concept_capacity_measurements_in_sm.htmll) * [New capacity display fields allow monitor capacity, tracking volumes approaching capacity or that are underutilized.](https://docs.netapp.com/us-en/ontap/concept_admin_viewing_managing_network.html) |
| [Display in System Manager of EMS emergency alerts and other errors and warnings](https://docs.netapp.com/us-en/ontap/task_cp_dashboard_tour.html) | The number of EMS alerts received in 24 hours, as well as other errors and warnings, are shown in the Health card in System Manager. |