Prepare for an ONTAP upgrade

ONTAP 9

NetApp
March 13, 2026

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Determine how long an ONTAP upgrade will take

You should plan for at least 30 minutes to complete preparatory steps for an ONTAP upgrade, 60 minutes to upgrade each HA pair, and at least 30 minutes to complete post-upgrade steps.

> If you are using NetApp Encryption with an external key management server and the Key Management Interoperability Protocol (KMIP), you should expect the upgrade for each HA pair to be longer than one hour.

These upgrade duration guidelines are based on typical configurations and workloads. You can use these guidelines to estimate the time it will take to perform a nondisruptive upgrade in your environment. The actual duration of your upgrade process will depend on your individual environment and the number of nodes.

Prepare for an ONTAP upgrade with Upgrade Advisor or Upgrade Health Checker

You can use Upgrade Advisor in Active IQ Digital Advisor or Upgrade Health Checker to automatically generate an upgrade report specific to your environment and cluster configuration. Both tools provide intelligence that helps you plan your upgrade, identify blockers and warnings, and minimize uncertainty and risk.

Prepare to upgrade with Upgrade Advisor

Upgrade Advisor identifies issues in your environment that can be resolved by upgrading to a newer version of ONTAP and provides a report of issues you might need to be aware of in the ONTAP version you're upgrading to. Upgrade Advisor also provides a recommended upgrade path and generates an upgrade plan specific to your cluster's configuration.

Upgrade Advisor is especially suitable for users with a smaller environment who prefer a cloud-based, UI-centered experience.

Before you begin

- An active SupportEdge Services contract for Digital Advisor, is required to use Upgrade Advisor.
- AutoSupport must be enabled for Upgrade Advisor to automatically access the AutoSupport logs required to generate an upgrade plan. If you have not enabled AutoSupport, you can manually upload AutoSupport files.

Steps

1. Launch Active IQ Digital Advisor
2. In Digital Advisor view any risks associated with your cluster and manually take corrective actions.

   Risks included in the **SW Config Change**, **HW Config Change**, and **HW Replacement** categories need to be resolved prior to performing an ONTAP upgrade.

3. Review the recommended upgrade path and generate your upgrade plan.

What's next

- You should review the ONTAP release notes for the target ONTAP release recommended for your cluster by Upgrade Advisor; then you should follow the plan generated by Upgrade Advisor to upgrade your cluster.
- You should reboot the SP or BMC before the upgrade begins.

Prepare to upgrade with Upgrade Health Checker

Upgrade Health Checker is an onsite tool suitable for users with large or complex environments, limited access to the internet, or existing automation and orchestration frameworks. A SupportEdge contract is not required to use Upgrade Health Checker.

Before you begin

You must download and set up Upgrade Health Checker before you can use it to generate an upgrade plan.

Steps

1. Generate an upgrade plan with Upgrade Health Checker.

What's next

- You should review the ONTAP release notes for the target ONTAP release recommended for your cluster; then you should follow the plan generated by Upgrade Health Checker to upgrade your cluster.
- You should reboot the SP or BMC before the upgrade begins.

Manually prepare to upgrade

Manually prepare for an ONTAP software upgrade

If you choose to prepare for your upgrade manually, you need to complete multiple tasks to check for any known issues or blockers, and ensure that your cluster meets the necessary requirements for the upgrade. For example, if SSL FIPs mode is enabled on your cluster and the administrator accounts use SSH public keys for authentication, you need to verify that the host key algorithm is supported in your target ONTAP release.

Manual preparation is not necessary when you use Upgrade Advisor in Active IQ Digital Advisor or Upgrade Health Checker. Both tools provide intelligence that helps you plan your upgrade, identify blockers and warnings, and minimize uncertainty and risk. Learn more about preparing for an upgrade with Upgrade Advisor or Upgrade Health Checker.

Steps

1. Choose your target ONTAP release.
2. Review the *Upgrade cautions* and *Known problems and limitations* sections in the ONTAP 9 Release Notes for your target release.

   Upgrade cautions describe potential issues that you should be aware of before upgrading. *Known problems and limitations* describe potentially unexpected system behavior that you might experience after upgrading.

   You must sign in with your NetApp account or create an account to access the Release Notes.

3. Confirm ONTAP support for your hardware configuration.

   Your hardware platform, cluster management switches and MetroCluster IP switches must support the target release. If your cluster is configured for SAN, the SAN configuration must be fully supported.

4. Use Active IQ Config Advisor to verify that you have no common configuration errors.
5. Review the supported ONTAP upgrade paths to determine if you can perform a direct upgrade or if you need to complete the upgrade in stages.
6. Verify your LIF failover configuration.

   Before you perform an upgrade, you need to verify that the cluster's failover policies and failover groups are configured correctly.

7. Verify your SVM routing configuration.
8. Verify special considerations for your cluster.

   If certain configurations exist on your cluster, there are specific actions you need to take before you begin an ONTAP software upgrade.

9. Reboot the SP or BMC.

Choose a NetApp-recommended target ONTAP version for an upgrade

When you use Upgrade Advisor to generate an upgrade plan for your cluster, the plan includes a recommended target ONTAP release for upgrade. The recommendation given by Upgrade Advisor is based on your current configuration and your current ONTAP version.

If you do not use Upgrade Advisor to plan your upgrade, you should choose your target ONTAP release for the upgrade based on NetApp recommendations or your need to be at the minimum release to meet your for performance needs.

- Upgrade to the latest available release (recommended)

  NetApp recommends that you upgrade your ONTAP software to the latest patch version of the latest numbered ONTAP release. If this is not possible because the latest numbered release is not supported by the storage systems in your cluster, you should upgrade to the latest numbered release that is supported.

- Minimum recommended release

  If you want to restrict your upgrade to the minimum recommended release for your cluster, see Minimum recommended ONTAP releases to determine the ONTAP version you should upgrade to.

Confirm ONTAP target release support for your hardware configuration

Before you upgrade ONTAP, you should confirm that your hardware configuration can support the target ONTAP release.

All configurations

Use NetApp Hardware Universe to confirm that your hardware platform and cluster and management switches

are supported in the target ONTAP release.

The version of ONTAP that you can upgrade to might be limited based upon your hardware configuration. If your hardware doesn't support the version of ONTAP software that you want to upgrade to, you will need to first add new nodes to your cluster, migrate your data, remove the older nodes and then upgrade your ONTAP software. Follow the procedure to add new nodes to an ONTAP cluster.

Cluster and management switches include the cluster network switches (NX-OS), management network switches (IOS), and reference configuration file (RCF). If your cluster and management switches are supported but are not running the minimum software versions required for the target ONTAP release, upgrade your switches to supported software versions.

- NetApp Downloads: Broadcom Cluster Switches
- NetApp Downloads: Cisco Ethernet Switches
- NetApp Downloads: NetApp Cluster Switches

If you need to upgrade your switches, NetApp recommends that you complete the ONTAP software upgrade first, then perform the software upgrade for your switches.

MetroCluster configurations

Before you upgrade ONTAP, if you have a MetroCluster configuration, use the NetApp Interoperability Matrix Tool to confirm that your MetroCluster IP switches are supported in the target ONTAP release.

SAN configurations

Before you upgrade ONTAP, if your cluster is configured for SAN, use the NetApp Interoperability Matrix Tool to confirm that the SAN configuration is fully supported.

All SAN components—including the target ONTAP software version, host OS and patches, required Host Utilities software, multipathing software, and adapter drivers and firmware—should be supported.

Identify common configuration errors before upgrading ONTAP using Active IQ Config Advisor

Before you upgrade ONTAP, you can use the Active IQ Config Advisor tool to check for common configuration errors.

Active IQ Config Advisor is a configuration validation tool for NetApp systems. It can be deployed at both secure sites and nonsecure sites for data collection and system analysis.

Support for Active IQ Config Advisor is limited and is available only online.

Steps

1. Log in to the NetApp Support Site, and then click **TOOLS** > **Tools**.
2. Under **Active IQ Config Advisor**, click Download App.
3. Download, install, and run Active IQ Config Advisor.
4. After running Active IQ Config Advisor, review the tool's output, and follow the recommendations that are provided to address any issues discovered by the tool.

Supported ONTAP upgrade paths

The version of ONTAP that you can upgrade to depends on your hardware platform and the version of ONTAP currently running on your cluster's nodes.

To verify that your hardware platform is supported for the target upgrade release, see NetApp Hardware Universe. Use the NetApp Interoperability Matrix Tool to confirm support for your configuration.

To determine your current ONTAP version:

- In System Manager, click **Cluster > Overview**.
- From the command line interface (CLI), use the `cluster image show` command.
  You can also use the `system node image show` command at the advanced privilege level to display details.

Types of upgrade paths

Automated nondisruptive upgrades (ANDU) are recommended whenever possible. Depending on your current and target releases, your upgrade path will be **direct**, **direct multi-hop**, or **multi-stage**.

- **Direct**

  You can always upgrade directly to the next adjacent ONTAP release family using a single software image. For many releases, you can also install a software image that allows you to upgrade directly to releases that are up to four releases later than the running release.

  For example, you can use the direct upgrade path from 9.12.1 to 9.13.1, or from 9.13.1 to 9.17.1.

  All *direct* upgrade paths are supported for mixed version clusters.

- **Direct multi-hop**

  For some automated nondisruptive upgrades (ANDU) to non-adjacent releases, you need to install the software image for an intermediate release as well the target release. The automated upgrade process uses the intermediate image in the background to complete the update to the target release.

  For example, if the cluster is running 9.3 and you want to upgrade to 9.7, you would load the ONTAP install packages for both 9.5 and 9.7, then initiate ANDU to 9.7. ONTAP automatically upgrades the cluster first to 9.5 and then to 9.7. You should expect multiple takeover/giveback operations and related reboots during the process.

- **Multi-stage**

  If a direct or direct multi-hop path is not available for your non-adjacent target release, you must first upgrade to a supported intermediate release, and then upgrade to the target release.

  For example, if you are currently running 9.8 and you want to upgrade to 9.16.1, you must complete a multi-stage upgrade: first from 9.8 to 9.12.1, and then from 9.12.1 to 9.16.1. Upgrades from earlier releases might require three or more stages, with several intermediate upgrades.

  

  Before beginning multi-stage upgrades, be sure your target release is supported on your hardware platform.

Before you begin any major upgrade, it is a best practice to upgrade first to the latest patch release of the

ONTAP version running on your cluster. This will ensure that any issues in your current version of ONTAP are resolved before upgrading.

For example, if your system is running ONTAP 9.3P9 and you are planning to upgrade to 9.11.1, you should first upgrade to the latest 9.3 patch release, then follow the upgrade path from 9.3 to 9.11.1.

Learn about Minimum Recommended ONTAP releases on the NetApp Support Site.

Supported upgrade paths

The following upgrade paths are supported for automated and manual upgrades of your ONTAP software. These upgrade paths apply to on-premises ONTAP and ONTAP Select. There are different supported upgrade paths for Cloud Volumes ONTAP.

For mixed version ONTAP clusters: All *direct* and *direct multi-hop* upgrade paths include ONTAP versions that are compatible for mixed version clusters. ONTAP versions included in *multi-stage* upgrades are not compatible for mixed version clusters. For example, an upgrade from 9.8 to 9.12.1 is a *direct* upgrade. A cluster with nodes running 9.8 and 9.12.1 is a supported mixed version cluster. An upgrade from 9.8 to 9.13.1 is a *multi-stage* upgrade. A cluster with nodes running 9.8 and 9.13.1 is not a supported mixed version cluster.

From ONTAP 9.10.1 and later

If your current ONTAP release is…	And your target ONTAP release is…	Your automated or manual upgrade path is…
9.17.1	9.18.1	direct
9.16.1	9.18.1	direct
	9.17.1	direct
9.15.1	9.18.1	direct
	9.17.1	direct
	9.16.1	direct
9.14.1	9.18.1	direct
	9.17.1	direct
	9.16.1	direct
	9.15.1	direct
9.13.1	9.18.1	multi-stage • 9.13.1 → 9.17.1 • 9.17.1 → 9.18.1
	9.17.1	direct
	9.16.1	direct
	9.15.1	direct
	9.14.1	direct

If your current ONTAP release is…	And your target ONTAP release is…	Your automated or manual upgrade path is…
9.12.1	9.18.1	multi-stage • 9.12.1 → 9.16.1 • 9.16.1 → 9.18.1
	9.17.1	multi-stage • 9.12.1 → 9.16.1 • 9.16.1 → 9.17.1
	9.16.1	direct
	9.15.1	direct
	9.14.1	direct
	9.13.1	direct
9.11.1	9.18.1	multi-stage • 9.11.1 → 9.15.1 • 9.15.1 → 9.18.1
	9.17.1	multi-stage • 9.11.1 → 9.15.1 • 9.15.1 → 9.17.1
	9.16.1	multi-stage • 9.11.1 → 9.15.1 • 9.15.1 → 9.16.1
	9.15.1	direct
	9.14.1	direct
	9.13.1	direct
	9.12.1	direct

If your current ONTAP release is…	And your target ONTAP release is…	Your automated or manual upgrade path is…
9.10.1	9.18.1	multi-stage • 9.10.1 → 9.14.1 • 9.14.1 → 9.18.1
	9.17.1	multi-stage • 9.10.1 → 9.14.1 • 9.14.1 → 9.17.1
	9.16.1	multi-stage • 9.10.1 → 9.14.1 • 9.14.1 → 9.16.1
	9.15.1	multi-stage • 9.10.1 → 9.14.1 • 9.14.1 → 9.15.1
	9.14.1	direct
	9.13.1	direct
	9.12.1	direct
	9.11.1	direct

From ONTAP 9.9.1

If your current ONTAP release is…	And your target ONTAP release is…	Your automated or manual upgrade path is…
9.9.1	9.18.1	multi-stage • 9.9.1→9.13.1 • 9.13.1→9.17.1 • 9.17.1→9.18.1
	9.17.1	multi-stage • 9.9.1→9.13.1 • 9.13.1→9.17.1
	9.16.1	multi-stage • 9.9.1→9.13.1 • 9.13.1→9.16.1
	9.15.1	multi-stage • 9.9.1→9.13.1 • 9.13.1→9.15.1
	9.14.1	multi-stage • 9.9.1→9.13.1 • 9.13.1→9.14.1
	9.13.1	direct
	9.12.1	direct
	9.11.1	direct
	9.10.1	direct

From ONTAP 9.8

If you are upgrading any of the following platform models in a MetroCluster IP configuration from ONTAP 9.8 to 9.10.1 or later, you must first upgrade to ONTAP 9.9.1:

- FAS2750
- FAS500f
- AFF A220
- AFF A250

If your current ONTAP release is…	And your target ONTAP release is…	Your automated or manual upgrade path is…
9.8	9.18.1	multi-stage • 9.8 → 9.12.1 • 9.12.1 → 9.16.1 • 9.16.1 → 9.18.1
	9.17.1	multi-stage • 9.8 → 9.12.1 • 9.12.1 → 9.16.1 • 9.16.1 → 9.17.1
	9.16.1	multi-stage • 9.8 → 9.12.1 • 9.12.1 → 9.16.1
	9.15.1	multi-stage • 9.8 → 9.12.1 • 9.12.1 → 9.15.1
	9.14.1	multi-stage • 9.8 → 9.12.1 • 9.12.1 → 9.14.1
	9.13.1	multi-stage • 9.8 → 9.12.1 • 9.12.1 → 9.13.1
	9.12.1	direct
	9.11.1	direct
	9.10.1	direct
	9.9.1	direct

From ONTAP 9.7

The upgrade paths from ONTAP 9.7 might vary based upon whether you are performing an automated or a manual upgrade.

Automated paths

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.7		

	9.12.1	multi-stage • 9.7 → 9.8 • 9.8 → 9.12.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your automated upgrade path is…**
	9.11.1	direct multi-hop (requires images for 9.8 and 9.11.1)
	9.10.1	direct multi-hop (requires images for 9.8 and 9.10.1P1 or later P release)
	9.9.1	direct
	9.8	direct

Manual paths

If your current ONTAP release is…	And your target ONTAP release is…	Your manual upgrade path is…
9.7		

	9.12.1	multi-stage • 9.7 → 9.8 • 9.8 → 9.12.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your manual upgrade path is…**
	9.11.1	multi-stage • 9.7 → 9.8 • 9.8 → 9.11.1
	9.10.1	multi-stage • 9.7 → 9.8 • 9.8 → 9.10.1
	9.9.1	direct
	9.8	direct

From ONTAP 9.6

The upgrade paths from ONTAP 9.6 might vary based upon whether you are performing an automated or a manual upgrade.

Automated paths

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.6		

		• 9.6 → 9.8 • 9.8 → 9.12.1 • 9.12.1 → 9.13.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your automated upgrade path is…**
	9.12.1	multi-stage • 9.6 → 9.8 • 9.8 → 9.12.1
	9.11.1	multi-stage • 9.6 → 9.8 • 9.8 → 9.11.1
	9.10.1	direct multi-hop (requires images for 9.8 and 9.10.1P1 or later P release)
	9.9.1	multi-stage • 9.6 → 9.8 • 9.8 → 9.9.1
	9.8	direct
	9.7	direct

Manual paths

If your current ONTAP release is…	And your target ONTAP release is…	Your manual upgrade path is…
9.6		

		• 9.6 → 9.8 • 9.8 → 9.12.1 • 9.12.1 → 9.15.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your manual upgrade path is…**
	9.12.1	multi-stage • 9.6 → 9.8 • 9.8 → 9.12.1
	9.11.1	multi-stage • 9.6 → 9.8 • 9.8 → 9.11.1
	9.10.1	multi-stage • 9.6 → 9.8 • 9.8 → 9.10.1
	9.9.1	multi-stage • 9.6 → 9.8 • 9.8 → 9.9.1
	9.8	direct
	9.7	direct

From ONTAP 9.5

The upgrade paths from ONTAP 9.5 might vary based upon whether you are performing an automated or a manual upgrade.

Automated paths

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.5		

		• 9.5 → 9.9.1 (direct multi-hop, requires images for 9.7 and 9.9.1)
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your automated upgrade path is…**
	9.12.1	multi-stage • 9.5 → 9.9.1 (direct multi-hop, requires images for 9.7 and 9.9.1) • 9.9.1 → 9.12.1
	9.11.1	multi-stage • 9.5 → 9.9.1 (direct multi-hop, requires images for 9.7 and 9.9.1) • 9.9.1 → 9.11.1
	9.10.1	multi-stage • 9.5 → 9.9.1 (direct multi-hop, requires images for 9.7 and 9.9.1) • 9.9.1 → 9.10.1
	9.9.1	direct multi-hop (requires images for 9.7 and 9.9.1)
	9.8	multi-stage • 9.5 → 9.7 • 9.7 → 9.8
	9.7	direct
	9.6	direct

Manual upgrade paths

If your current ONTAP release is…	And your target ONTAP release is…	Your manual upgrade path is…
9.5		

		• 9.7 → 9.9.1 • 9.9.1 → 9.13.1 • 9.13.1 → 9.15.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your manual upgrade path is…**
	9.13.1	multi-stage • 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.13.1
	9.12.1	multi-stage • 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.12.1
	9.11.1	multi-stage • 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.11.1
	9.10.1	multi-stage • 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.10.1
	9.9.1	multi-stage • 9.5 → 9.7 • 9.7 → 9.9.1
	9.8	multi-stage • 9.5 → 9.7 • 9.7 → 9.8
	9.7	direct
	9.6	direct

From ONTAP 9.4-9.0

The upgrade paths from ONTAP 9.4, 9.3, 9.2, 9.1 and 9.0 might vary based upon whether you are performing an automated upgrade or a manual upgrade.

Automated upgrade paths

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.4		

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…

		• 9.4 → 9.5 • 9.5 → 9.8 (direct multi-hop, requires images for 9.7 and 9.8)
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your automated upgrade path is…**
	9.7	multi-stage • 9.4 → 9.5 • 9.5 → 9.7
	9.6	multi-stage • 9.4 → 9.5 • 9.5 → 9.6
	9.5	direct

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.3		

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…

		9.5 and 9.7) • 9.7 → 9.8
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your automated upgrade path is…**
	9.7	direct multi-hop (requires images for 9.5 and 9.7)
	9.6	multi-stage • 9.3 → 9.5 • 9.5 → 9.6
	9.5	direct
	9.4	not available

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.2		

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
		• 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7) • 9.7 → 9.10.1 (direct multi-hop, requires images for 9.8 and 9.10.1)
	9.9.1	multi-stage • 9.2 → 9.3 • 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7) • 9.7 → 9.9.1
	9.8	multi-stage • 9.2 → 9.3 • 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7) • 9.7 → 9.8
	9.7	multi-stage • 9.2 → 9.3 • 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7)
	9.6	multi-stage • 9.2 → 9.3 • 9.3 → 9.5 • 9.5 → 9.6
	9.5	multi-stage • 9.3 → 9.5 • 9.5 → 9.6
	9.4	not available
	9.3	direct

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.1		

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
		• 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7) • 9.7 → 9.10.1 (direct multi-hop, requires images for 9.5 and 9.10.1)
	9.9.1	multi-stage • 9.1 → 9.3 • 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7) • 9.7 → 9.9.1
	9.8	multi-stage • 9.1 → 9.3 • 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7) • 9.7 → 9.8
	9.7	multi-stage • 9.1 → 9.3 • 9.3 → 9.7 (direct multi-hop, requires images for 9.5 and 9.7)
	9.6	multi-stage • 9.1 → 9.3 • 9.3 → 9.6 (direct multi-hop, requires images for 9.5 and 9.6)
	9.5	multi-stage • 9.1 → 9.3 • 9.3 → 9.5
	9.4	not available
	9.3	direct
	9.2	not available

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…
9.0		

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…

If your current ONTAP release is…	And your target ONTAP release is…	Your automated upgrade path is…

		• 9.1 → 9.3 • 9.3 → 9.5 • 9.5 → 9.8
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your automated upgrade path is…**
	9.5	multi-stage • 9.0 → 9.1 • 9.1 → 9.3 • 9.3 → 9.5
	9.4	not available
	9.3	multi-stage • 9.0 → 9.1 • 9.1 → 9.3
	9.2	not available
	9.1	direct

Manual upgrade paths

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…
9.4		

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

		• 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.10.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your ANDU upgrade path is…**
	9.9.1	multi-stage • 9.4 → 9.5 • 9.5 → 9.7 • 9.7 → 9.9.1
	9.8	multi-stage • 9.4 → 9.5 • 9.5 → 9.7 • 9.7 → 9.8
	9.7	multi-stage • 9.4 → 9.5 • 9.5 → 9.7
	9.6	multi-stage • 9.4 → 9.5 • 9.5 → 9.6
	9.5	direct

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…
9.3		

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

		• 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.10.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your ANDU upgrade path is…**
	9.9.1	multi-stage • 9.3 → 9.5 • 9.5 → 9.7 • 9.7 → 9.9.1
	9.8	multi-stage • 9.3 → 9.5 • 9.5 → 9.7 • 9.7 → 9.8
	9.7	multi-stage • 9.3 → 9.5 • 9.5 → 9.7
	9.6	multi-stage • 9.3 → 9.5 • 9.5 → 9.6
	9.5	direct
	9.4	not available

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…
9.2		

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

		• 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.10.1
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your ANDU upgrade path is…**
	9.10.1	multi-stage • 9.2 → 9.3 • 9.3 → 9.5 • 9.5 → 9.7 • 9.7 → 9.9.1 • 9.9.1 → 9.10.1
	9.9.1	multi-stage • 9.2 → 9.3 • 9.3 → 9.5 • 9.5 → 9.7 • 9.7 → 9.9.1
	9.8	multi-stage • 9.2 → 9.3 • 9.3 → 9.5 • 9.5 → 9.7 • 9.7 → 9.8
	9.7	multi-stage • 9.2 → 9.3 • 9.3 → 9.5 • 9.5 → 9.7
	9.6	multi-stage • 9.2 → 9.3 • 9.3 → 9.5 • 9.5 → 9.6
	9.5	multi-stage • 9.2 → 9.3 • 9.3 → 9.5
	9.4	not available
	9.3	direct

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…
9.1		

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

		• 9.3 → 9.5
	9.4	not available
	9.3	direct
	9.2	not available

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…
9.0		

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

If your current ONTAP release is…	And your target ONTAP release is…	Your ANDU upgrade path is…

		• 9.3 → 9.5 • 9.5 → 9.7 • 9.7 → 9.8
If your current ONTAP release is…	**And your target ONTAP release is…**	**Your ANDU upgrade path is…**
	9.7	multi-stage • 9.0 → 9.1 • 9.1 → 9.3 • 9.3 → 9.5 • 9.5 → 9.7
	9.6	multi-stage • 9.0 → 9.1 • 9.1 → 9.3 • 9.3 → 9.5 • 9.5 → 9.6
	9.5	multi-stage • 9.0 → 9.1 • 9.1 → 9.3 • 9.3 → 9.5
	9.4	not available
	9.3	multi-stage • 9.0 → 9.1 • 9.1 → 9.3
	9.2	not available
	9.1	direct

Data ONTAP 8

Be sure to verify that your platform can run the target ONTAP release by using the NetApp Hardware Universe.

Note: The Data ONTAP 8.3 Upgrade Guide erroneously states that in a four-node cluster, you should plan to upgrade the node that holds epsilon last. This is no longer a requirement for upgrades beginning with Data ONTAP 8.2.3. For more information, see NetApp Bugs Online Bug ID 805277.

From Data ONTAP 8.3.x

You can upgrade directly to ONTAP 9.1, then upgrade to later releases.

From Data ONTAP releases earlier than 8.3.x, including 8.2.x

You must first upgrade to Data ONTAP 8.3.x, then upgrade to ONTAP 9.1, then upgrade to later releases.

Related information

- ONTAP command reference
- cluster image show
- system node image show

Verify the ONTAP cluster LIF failover configuration before an upgrade

Before you upgrade ONTAP, you must verify that the cluster's failover policies and failover groups are configured correctly.

During the upgrade process, LIFs are migrated based on the upgrade method. Depending upon the upgrade method, the LIF failover policy might or might not be used.

If you have 8 or more nodes in your cluster, the automated upgrade is performed using the batch method. The batch upgrade method involves dividing the cluster into multiple upgrade batches, upgrading the set of nodes in the first batch, upgrading their high-availability (HA) partners, and then repeating the process for the remaining batches. In ONTAP 9.7 and earlier, if the batch method is used, LIFs are migrated to the HA partner of the node being upgraded. In ONTAP 9.8 and later, if the batch method is used, LIFs are migrated to the other batch group.

If you have less than 8 nodes in your cluster, the automated upgrade is performed using the rolling method. The rolling upgrade method involves initiating a failover operation on each node in an HA pair, updating the node that has failed over, initiating giveback, and then repeating the process for each HA pair in the cluster. If the rolling method is used, LIFs are migrated to the failover target node as defined by the LIF failover policy.

Steps

1. Display the failover policy for each data LIF:

If your ONTAP version is…	Use this command
9.6 or later	`network interface show -service-policy *data* -failover`
9.5 or earlier	`network interface show -role data -failover`

This example shows the default failover configuration for a two-node cluster with two data LIFs:

```
cluster1::> network interface show -role data -failover
         Logical         Home                  Failover        Failover
Vserver  Interface       Node:Port             Policy          Group
-------- --------------- --------------------- --------------
---------------
vs0
         lif0            node0:e0b             nextavail       system-
defined
                         Failover Targets: node0:e0b, node0:e0c,
                                           node0:e0d, node0:e0e,
                                           node0:e0f, node1:e0b,
                                           node1:e0c, node1:e0d,
                                           node1:e0e, node1:e0f
vs1
         lif1            node1:e0b             nextavail       system-
defined
                         Failover Targets: node1:e0b, node1:e0c,
                                           node1:e0d, node1:e0e,
                                           node1:e0f, node0:e0b,
                                           node0:e0c, node0:e0d,
                                           node0:e0e, node0:e0f
```

The **Failover Targets** field shows a prioritized list of failover targets for each LIF. For example, if 'lif0' fails over from its home port (e0b on node0), it first attempts to fail over to port e0c on node0. If lif0 cannot fail over to e0c, it then attempts to fail over to port e0d on node0, and so on.

Learn more about `network interface show` in the ONTAP command reference.

2. If the failover policy is set to **disabled** for any LIFs, other than SAN LIFs, use the `network interface modify` command to enable failover.

   Learn more about `network interface modify` in the ONTAP command reference.

3. For each LIF, verify that the **Failover Targets** field includes data ports from a different node that will remain up while the LIF's home node is being upgraded.

   You can use the `network interface failover-groups modify` command to add a failover target to the failover group.

   Example

```
network interface failover-groups modify -vserver vs0 -failover-group
fg1 -targets sti8-vsim-ucs572q:e0d,sti8-vsim-ucs572r:e0d
```

Related information

- Network and LIF management

- network interface
- network interface failover-groups modify

Verify ONTAP cluster SVM routing configuration before an upgrade

To avoid disruption, before you upgrade your ONTAP software, you should ensure that the default SVM route is able to reach any network address that is not reachable by a more specific route. It is a best practice to configure one default route for an SVM. For more information, see SU134: Network access might be disrupted by incorrect routing configuration in ONTAP.

The routing table for an SVM determines the network path the SVM uses to communicate with a destination. It's important to understand how routing tables work so that you can prevent network problems before they occur.

Routing rules are as follows:

- ONTAP routes traffic over the most specific available route.
- ONTAP routes traffic over a default gateway route (having 0 bits of netmask) as a last resort, when more specific routes are not available.

In the case of routes with the same destination, netmask, and metric, there is no guarantee that the system will use the same route after a reboot or after an upgrade. This can especially be an issue if you have configured multiple default routes.

Special considerations

Check for specific ONTAP configurations before an upgrade

Certain cluster configurations require you to take specific actions before you begin an ONTAP software upgrade. For example, if you have a SAN configuration, you should verify that each host is configured with the correct number of direct and indirect paths before you begin the upgrade.

Review the following table to determine what additional steps you might need to take.

Before you upgrade ONTAP, ask yourself…	If your answer is yes, then do this…
Is my cluster currently in a mixed version state?	Check mixed version requirements
Do I have a MetroCluster configuration?	Review specific upgrade requirements for MetroCluster configurations
Do I have a SAN configuration?	Verify the SAN host configuration
Does my cluster have SnapMirror relationships defined?	Verify compatibility of ONTAP versions for SnapMirror relationships
Do I have DP-type SnapMirror relationships defined, and am I upgrading to ONTAP 9.12.1 or later?	Convert existing DP-type relationships to XDP

Before you upgrade ONTAP, ask yourself…	If your answer is yes, then do this…
Am I using SnapMirror S3, and am I upgrading to ONTAP 9.12.1 or later?	Verify licensing for SnapMirror S3 configurations
Do I have long-term retention snapshots enabled on the middle volume of a cascade?	Disable long-term retention snapshots in middle volumes of cascade topologies
Am I using NetApp Storage Encryption with external key management servers?	Delete any existing key management server connections
Do I have netgroups loaded into SVMs?	Verify that the netgroup file is present on each node
Did I create an SVM and am I upgrading from ONTAP 9.12.1 or earlier to a later version?	Assign an explicit value to the v4.2-xattrs option
Do I have LDAP clients using SSLv3?	Configure LDAP clients to use TLS
Am I using session-oriented protocols?	Review adverse effects of session-oriented protocols
Is SSL FIPS mode enabled on a cluster where administrator accounts authenticate with an SSH public key?	Verify SSH host key algorithm support
Does my Autonomous Ransomware Protection have an active warning?	Respond to Autonomous Ransomware Protection warnings of abnormal activity

Verify compatibility of ONTAP versions for mixed version clusters

In a mixed version ONTAP cluster, nodes run two different major ONTAP versions for a short time. For example, a cluster with nodes running ONTAP 9.8 and 9.12.1 or ONTAP 9.9.1 and 9.13.1 is a mixed version cluster. Clusters with nodes running different patch levels within the same version, like ONTAP 9.9.1P1 and 9.9.1P5, are not mixed version clusters.

Mixed version clusters are not supported for Cloud Volumes ONTAP.

NetApp supports mixed version ONTAP clusters for limited periods of time and in specific scenarios.

The following are the most common scenarios in which an ONTAP cluster will be in a mixed version state:

- ONTAP software upgrades in large clusters

  It can take several days or weeks to upgrade all the nodes in a large cluster. The cluster enters and remains in a mixed version state until all the nodes are upgraded.

- ONTAP software upgrades required when you plan to add new nodes to a cluster

  You might add new nodes to your cluster to expand its capacity, or you might add new nodes as part of the process of completely replacing your controllers. In either case, you need might need to enter a mixed version state to enable the migration of your data from existing controllers to the new nodes in your new system.

For optimal cluster operation, the length of time that the cluster is in a mixed version state should be as short as possible. The maximum length of time a cluster is eligible for support in a mixed version state depends on the lowest ONTAP version in the cluster.

If the lowest version of ONTAP running in the mixed version cluster is…	Then you can remain in a mixed version state for a maximum of…
ONTAP 9.8 or later	90 days
ONTAP 9.7 or earlier	7 days

While the cluster is in a mixed version state, you should not enter any commands that alter the cluster operation or configuration except those that are required for the upgrade or data migration process. For example, activities such as (but not limited to) LIF migration, planned storage failover operations, or large-scale object creation or deletion should not be performed until upgrade and data migration are complete.

Mixed version clusters supported for ONTAP software upgrades

You can enter a mixed version state with any ONTAP version supported for a direct upgrade from your lowest current release. For example, if you are running ONTAP 9.11.1, you can enter a mixed version state with nodes running ONTAP 9.15.1. You cannot enter a mixed version state with nodes running ONTAP 9.11.1 and ONTAP 9.16.1. ONTAP 9.16.1 is not supported for direct upgrade from ONTAP 9.11.1.

ONTAP patch (P) release versions have no impact on compatibility for mixed version clusters. For example, if you are running ONTAP 9.11.1P6, your current ONTAP release for mixed-version cluster compatibility is ONTAP 9.11.1. Or, if you are running ONTAP 9.12.1 and you want to upgrade to ONTAP 9.15.1P2, your target ONTAP release for mixed-version cluster compatibility is ONTAP 9.15.1.

To upgrade to an ONTAP version that is not supported for a direct upgrade from your current release, you must perform a multi-stage upgrade. In a multi-stage upgrade, you first enter a mixed version state with the highest release supported for a direct upgrade from your current release. You complete that upgrade; then you perform a separate upgrade to your target release. For example, if your lowest current release is ONTAP 9.10.1 and you want to upgrade to ONTAP 9.16.1, you first enter a mixed version state to upgrade all your nodes to ONTAP 9.14.1; then you perform a separate upgrade from ONTAP 9.14.1 to ONTAP 9.16.1. Learn more about multi-stage upgrades and supported upgrade paths.

A mixed version cluster can contain only two major ONTAP releases. For example, you can have a mixed version cluster with nodes running ONTAP 9.13.1 and 9.15.1; or with nodes running ONTAP 9.13.1 and 9.16.1. You cannot have a mixed version cluster with nodes running ONTAP 9.13.1, 9.15.1 and 9.16.1.

If your current ONTAP release is…	And your target ONTAP release is…	Mixed version state for upgrade is…
9.17.1	9.18.1	Supported
9.16.1	9.18.1	Supported
	9.17.1	Supported
9.15.1	9.18.1	Supported
	9.17.1	Supported
	9.16.1	Supported

If your current ONTAP release is…	And your target ONTAP release is…	Mixed version state for upgrade is…
9.14.1	9.18.1	Supported
	9.17.1	Supported
	9.16.1	Supported
	9.15.1	Supported
9.13.1	9.18.1	Not supported
	9.17.1	Supported
	9.16.1	Supported
	9.15.1	Supported
	9.14.1	Supported
9.12.1	9.17.1 or later	Not supported
	9.16.1	Supported
	9.15.1	Supported
	9.14.1	Supported
	9.13.1	Supported
9.11.1	9.16.1 or later	Not supported
	9.15.1	Supported
	9.14.1	Supported
	9.13.1	Supported
	9.12.1	Supported
9.10.1	9.15.1 or later	Not supported
	9.14.1	Supported
	9.13.1	Supported
	9.12.1	Supported
	9.11.1	Supported
9.9.1	9.14.1 or later	Not supported
	9.13.1	Supported
	9.12.1	Supported
	9.11.1	Supported
	9.10.1	Supported

If your current ONTAP release is…	And your target ONTAP release is…	Mixed version state for upgrade is…
9.8	9.13.1 or later	Not supported
	9.12.1	Supported
	9.11.1	Supported
	9.10.1	Supported
	9.9.1	Supported

Adding new nodes to an ONTAP cluster

If you plan to add new nodes to your cluster, and those nodes require a minimum version of ONTAP that's later than the version currently running in your cluster, you need to perform any supported software upgrades on the existing nodes in your cluster before adding the new nodes. Ideally, you would upgrade all existing nodes to the minimum version of ONTAP required by the nodes you plan to add to the cluster. However, if this is not possible because some of your existing nodes don't support the later version of ONTAP, you'll need to enter a mixed version state for a limited amount of time as part of your upgrade process.

Steps

1. Upgrade the nodes that do not support the minimum ONTAP version required by your new controllers to the highest ONTAP version they support.

   For example, if you have a FAS8080 running ONTAP 9.5 and you are adding a new C-Series platform running ONTAP 9.12.1, you should upgrade your FAS8080 to ONTAP 9.8 (which is the highest ONTAP version it supports).

2. Add the new nodes to your cluster.
3. Migrate the data from the nodes being removed from the cluster to the newly added nodes.
4. Remove the unsupported nodes from the cluster.
5. Upgrade the cluster to the same ONTAP version and patch level running on the new nodes or to the latest recommended patch release for the ONTAP version running on the new nodes.
6. Verify that all nodes are running the same ONTAP version.

   a. Show the ONTAP version running on the cluster:

   ```
   version
   ```

   b. Show the ONTAP version running on each node of the cluster:

   ```
   version *
   ```

   If there is a difference between the ONTAP version reported in the output for the `version *` (cluster) and `version` (individual nodes) commands, update all nodes to the same ONTAP and patch version by running a cluster image update.

For details on data migration see:

- Create an aggregate and move volumes to the new nodes
- Setting up new iSCSI connections for SAN volume moves
- Moving volumes with encryption

Check ONTAP upgrade requirements for MetroCluster configurations

Before you upgrade your ONTAP software on a MetroCluster configuration, your clusters must meet certain requirements.

- Both clusters must be running the same version of ONTAP.

  You can verify the ONTAP version by using the version command.

- If you're performing a major ONTAP upgrade, the MetroCluster configuration must be in normal mode.
- If you're performing a patch ONTAP upgrade, the MetroCluster configuration can be in either normal or switchover mode.
- For all configurations except two-node clusters, you can nondisruptively upgrade both clusters at the same time.

  For nondisruptive upgrade in two-node clusters, the clusters must be upgraded one node at a time.

- The aggregates in both clusters must not be in resyncing RAID status.

  During MetroCluster healing, the mirrored aggregates are resynchronized. You can verify if the MetroCluster configuration is in this state by using the `storage aggregate plex show -in -progress true` command. If any aggregates are being synchronized, you should not perform an upgrade until the resynchronization is complete.

  Learn more about `storage aggregate plex show` in the ONTAP command reference.

- Negotiated switchover operations will fail while the upgrade is in progress.

  To avoid issues with upgrade or revert operations, do not attempt an unplanned switchover during an upgrade or revert operation unless all nodes on both clusters are running the same version of ONTAP.

Configuration requirements for MetroCluster normal operation

- The source SVM LIFs must be up and located on their home nodes.

  Data LIFs for the destination SVMs are not required to be up or to be on their home nodes.

- All aggregates at the local site must be online.
- All root and data volumes owned by the local cluster's SVMs must be online.

Configuration requirements for MetroCluster switchover

- All LIFs must be up and located on their home nodes.
- All aggregates must be online, except for the root aggregates at the DR site.

  Root aggregates at the DR site are offline during certain phases of switchover.

- All volumes must be online.

Related information

Verifying networking and storage status for MetroCluster configurations

Verify SAN host configuration before an ONTAP upgrade

Upgrading ONTAP in a SAN environment changes which paths are direct. Before you upgrade a SAN cluster, you should verify that each host is configured with the correct number of direct and indirect paths, and that each host is connected to the correct LIFs.

Steps

1. On each host, verify that a sufficient number of direct and indirect paths are configured, and that each path is active.

   Each host must have a path to each node in the cluster.

2. Verify that each host is connected to a LIF on each node.

   You should record the list of initiators for comparison after the upgrade. If you are running ONTAP 9.11.1 or later, use System Manager to view the connection status as it gives a much clearer display than CLI.

   System Manager

   1. In System Manager, click **Hosts > SAN Initiator Groups**.

      The page displays a list of initiator groups (igroups). If the list is large, you can view additional pages of the list by clicking the page numbers at the lower right corner of the page.

      The columns display various information about the igroups. Beginning with 9.11.1, the connection status of the igroup is also displayed. Hover over status alerts to view details.

   CLI

   - List iSCSI initiators:

     ```
     iscsi initiator show -fields igroup,initiator-name,tpgroup
     ```

   - List FC initiators:

     ```
     fcp initiator show -fields igroup,wwpn,lif
     ```

SnapMirror

Compatible ONTAP versions for SnapMirror relationships

The source and destination volumes must be running compatible ONTAP versions before creating a SnapMirror data protection relationship. Before you upgrade ONTAP, you

should verify that your current ONTAP version is compatible with your target ONTAP version for SnapMirror relationships.

Unified replication relationships

For SnapMirror relationships of type “XDP”, using on premises or Cloud Volumes ONTAP releases:

Beginning with ONTAP 9.9.0:

- ONTAP 9.x.0 releases are cloud-only releases and support Cloud Volumes ONTAP systems. The asterisk (*) after the release version indicates a cloud-only release.

  ⓘ ONTAP 9.16.0 is an exception to the cloud-only rule because it provides support for ASA r2 systems. The plus sign (+) after the release version indicates both an ASA r2 and cloud supported release. ASA r2 systems support SnapMirror relationships only to other ASA r2 systems.

- ONTAP 9.x.1 releases are general releases and support both on-premises and Cloud Volumes ONTAP systems.

  ⓘ When advanced capacity balancing is enabled on volumes in clusters running ONTAP 9.16.1 or later, SnapMirror transfers are not supported to clusters running ONTAP versions earlier than ONTAP 9.16.1.

  ⓘ Interoperability is bidirectional.

Interoperability for ONTAP version 9.4 and later

ONTAP version…	**Interoperates with these previous ONTAP versions…**																				
	9.18.1	9.17.1	9.16.1	9.16.0+	9.15.1	9.15.0*	9.14.1	9.14.0*	9.13.1	9.13.0*	9.12.1	9.12.0*	9.11.1	9.11.0*	9.10.1	9.10.0*	9.9.1	9.9.0*	9.8	9.7	9.6	9.5
9.18.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**Yes**	**Yes**	No	No	No	No	No	No	No	No	No	No	No	No
9.17.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No	No	No	No	No
9.16.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No	No
9.16.0+	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	No	No	No	No	No	No
9.15.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No

9.15.0*	No	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	No	No	No	No
9.14.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No
9.14.0*	No	**Yes**	**Yes**	No	**Yes**	No	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	No	No	No	No
9.13.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No
9.13.0*	No	**Yes**	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	No	No
9.12.1	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No
9.12.0*	No	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	**Yes**	No	No
9.11.1	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No
9.11.0*	No	No	No	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	**Yes**	**Yes**	No	**Yes**	No	**Yes**	**Yes**	**Yes**	No
9.10.1	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
9.10.0*	No	No	No	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**
9.9.1	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
9.9.0*	No	No	No	No	No	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
9.8	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
9.7	No	No	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
9.6	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
9.5	No	No	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

SnapMirror synchronous relationships

SnapMirror synchronous is not supported for ONTAP cloud instances.

ONTAP version…	Interoperates with these previous ONTAP versions…													
	9.18.1	9.17.1	9.16.1	9.15.1	9.14.1	9.13.1	9.12.1	9.11.1	9.10.1	9.9.1	9.8	9.7	9.6	9.5
9.18.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No
9.17.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No	No
9.16.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No	No
9.15.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No	No
9.14.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No
9.13.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No
9.12.1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No
9.11.1	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	No
9.10.1	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No
9.9.1	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No
9.8	No	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No
9.7	No	No	No	No	No	**Yes**	**Yes**	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
9.6	No	No	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**
9.5	No	No	No	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**

SnapMirror SVM disaster recovery relationships

- This matrix applies to the SVM data mobility migration feature beginning with ONTAP 9.10.1.
- You can use SVM DR to migrate an SVM that does not meet the restrictions indicated for SVM migration (SVM data mobility).
- In both cases, a maximum of 2 major **newer** ONTAP versions can separate the source and destination clusters, with the requirement that the destination be same version or newer than source ONTAP version.

For SVM disaster recovery data and SVM protection:

SVM disaster recovery is supported only between clusters running the same version of ONTAP. **Version-independence is not supported for SVM replication**.

For SVM disaster recovery for SVM migration:

- Replication is supported in a single direction from an earlier version of ONTAP on the source to the same or later version of ONTAP on the destination.
- The ONTAP version on the target cluster must be no more than two major on-premises versions newer or two major cloud versions newer (beginning with ONTAP 9.9.0), as shown in the table below.
  - Replication is not supported for long-term data protection use cases.

The asterisk (*) after the release version indicates a cloud-only release.

To determine support, locate the source version in the left table column, and then locate the destination version on the top row (DR/Migration for like versions and Migration only for newer versions).

> If you are using ONTAP 9.10.1 or later, you can use the SVM data mobility feature instead of SVM DR to migrate SVMs from one cluster to another.

Source	Destination																				
	9.5	9.6	9.7	9.8	9.9.0*	9.9.1	9.10.0*	9.10.1	9.11.0*	9.11.1	9.12.0*	9.12.1	9.13.0*	9.13.1	9.14.0*	9.14.1	9.15.0*	9.15.1	9.16.0	9.16.1	9.17.1	9.18.1
9.5	DR/Migration	Migration	Migration																			
9.6		DR/Migration	Migration	Migration																		
9.7			DR/Migration	Migration	Migration																	
9.8				DR/Migration	Migration	Migration		Migration														
9.9.0*					DR/Migration	Migration	Migration	Migration	Migration	Migration												
9.9.1						DR/Migration	Migration	Migration	Migration	Migration												
9.10.0*							DR/Migration	Migration	Migration	Migration	Migration	Migration										
9.10.1								DR/Migration	Migration	Migration	Migration	Migration										
9.11.0*									DR/Migration	Migration	Migration	Migration	Migration	Migration								

9.11.1										DR/Migration	Migration	Migration	Migration	Migration							
9.12.0*											DR/Migration	Migration	Migration	Migration	Migration	Migration					
9.12.1												DR/Migration	Migration	Migration	Migration	Migration					
9.13.0*													DR/Migration	Migration	Migration	Migration	Migration	Migration			
9.13.1														DR/Migration	Migration	Migration	Migration	Migration			
9.14.0*															DR/Migration	Migration	Migration	Migration	Migration	Migration	
9.14.1																DR/Migration	Migration	Migration	Migration	Migration	
9.15.0*																	DR/Migration	Migration	Migration	Migration	Migration
9.15.1																		DR/Migration	Migration	Migration	Migration
9.16.0																			DR/Migration	Migration	Migration
9.16.1																				DR/Migration	Migration	Migration

9.17.1																				DR/Migration	Migration
9.18.1																					DR/Migration

SnapMirror disaster recovery relationships

For SnapMirror relationships of type “DP” and policy type “async-mirror”:

DP-type mirrors cannot be initialized beginning with ONTAP 9.11.1 and are completely deprecated in ONTAP 9.12.1. For more information, see Deprecation of data protection SnapMirror relationships.

In the following table, the column on the left indicates the ONTAP version on the source volume, and the top row indicates the ONTAP versions you can have on your destination volume.

Source	Destination								
	9.11.1	9.10.1	9.9.1	9.8	9.7	9.6	9.5	9.4	9.3
9.11.1	Yes	No	No	No	No	No	No	No	No
9.10.1	Yes	Yes	No	No	No	No	No	No	No
9.9.1	Yes	Yes	Yes	No	No	No	No	No	No
9.8	No	Yes	Yes	Yes	No	No	No	No	No
9.7	No	No	Yes	Yes	Yes	No	No	No	No
9.6	No	No	No	Yes	Yes	Yes	No	No	No
9.5	No	No	No	No	Yes	Yes	Yes	No	No
9.4	No	No	No	No	No	Yes	Yes	Yes	No
9.3	No	No	No	No	No	No	Yes	Yes	Yes

Interoperability is not bidirectional.

Convert an existing ONTAP SnapMirror DP-type relationship to XDP

If you are upgrading to ONTAP 9.12.1 or later, you must convert DP-type relationships to XDP before upgrading. ONTAP 9.12.1 and later does not support DP-type relationships. You can easily convert an existing DP-type relationship to XDP to take advantage of version-flexible SnapMirror.

Before upgrading to ONTAP 9.12.1, you must convert existing DP-type relationships to XDP before you can upgrade to ONTAP 9.12.1 and later releases.

About this task

- SnapMirror does not automatically convert existing DP-type relationships to XDP. To convert the relationship, you need to break and delete the existing relationship, create a new XDP relationship, and resync the relationship.
- When planning your conversion, you should be aware that background preparation and the data warehousing phase of an XDP SnapMirror relationship can take a long time. It is not uncommon to see the SnapMirror relationship reporting the status "preparing" for an extended time period.

After you convert a SnapMirror relationship type from DP to XDP, space-related settings, such as autosize and space guarantee are no longer replicated to the destination.

Steps

1. From the destination cluster, ensure that the SnapMirror relationship is type DP, that the mirror state is SnapMirrored, the relationship status is Idle, and the relationship is healthy:

```
snapmirror show -destination-path <SVM:volume>
```

The following example shows the output from the `snapmirror show` command:

```
cluster_dst::>snapmirror show -destination-path svm_backup:volA_dst

Source Path: svm1:volA
Destination Path: svm_backup:volA_dst
Relationship Type: DP
SnapMirror Schedule: -
Tries Limit: -
Throttle (KB/sec): unlimited
Mirror State: Snapmirrored
Relationship Status: Idle
Transfer Snapshot: -
Snapshot Progress: -
Total Progress: -
Snapshot Checkpoint: -
Newest Snapshot: snapmirror.10af643c-32d1-11e3-954b-
123478563412_2147484682.2014-06-27_100026
Newest Snapshot Timestamp: 06/27 10:00:55
Exported Snapshot: snapmirror.10af643c-32d1-11e3-954b-
123478563412_2147484682.2014-06-27_100026
Exported Snapshot Timestamp: 06/27 10:00:55
Healthy: true
```

You might find it helpful to retain a copy of the `snapmirror show` command output to keep track existing of the relationship settings. Learn more about `snapmirror show` in the ONTAP command reference.

2. From the source and the destination volumes, ensure that both volumes have a common snapshot:

```
volume snapshot show -vserver <SVM> -volume <volume>
```

The following example shows the `volume snapshot show` output for the source and the destination volumes:

```
cluster_src:> volume snapshot show -vserver vsm1 -volume volA
---Blocks---
Vserver Volume Snapshot State Size Total% Used%
-------- ------- ------------------------------ -------- --------
------ -----
svm1 volA
weekly.2014-06-09_0736 valid 76KB 0% 28%
weekly.2014-06-16_1305 valid 80KB 0% 29%
daily.2014-06-26_0842 valid 76KB 0% 28%
hourly.2014-06-26_1205 valid 72KB 0% 27%
hourly.2014-06-26_1305 valid 72KB 0% 27%
hourly.2014-06-26_1405 valid 76KB 0% 28%
hourly.2014-06-26_1505 valid 72KB 0% 27%
hourly.2014-06-26_1605 valid 72KB 0% 27%
daily.2014-06-27_0921 valid 60KB 0% 24%
hourly.2014-06-27_0921 valid 76KB 0% 28%
snapmirror.10af643c-32d1-11e3-954b-123478563412_2147484682.2014-06-
27_100026
valid 44KB 0% 19%
11 entries were displayed.


cluster_dest:> volume snapshot show -vserver svm_backup -volume volA_dst
---Blocks---
Vserver Volume Snapshot State Size Total% Used%
-------- ------- ------------------------------ -------- --------
------ -----
svm_backup volA_dst
weekly.2014-06-09_0736 valid 76KB 0% 30%
weekly.2014-06-16_1305 valid 80KB 0% 31%
daily.2014-06-26_0842 valid 76KB 0% 30%
hourly.2014-06-26_1205 valid 72KB 0% 29%
hourly.2014-06-26_1305 valid 72KB 0% 29%
hourly.2014-06-26_1405 valid 76KB 0% 30%
hourly.2014-06-26_1505 valid 72KB 0% 29%
hourly.2014-06-26_1605 valid 72KB 0% 29%
daily.2014-06-27_0921 valid 60KB 0% 25%
hourly.2014-06-27_0921 valid 76KB 0% 30%
snapmirror.10af643c-32d1-11e3-954b-123478563412_2147484682.2014-06-
27_100026
```

3. To ensure scheduled updates will not run during the conversion, quiesce the existing DP-type relationship:

```
snapmirror quiesce -source-path <SVM:volume> -destination-path
<SVM:volume>
```

You must run this command from the destination SVM or the destination cluster.

The following example quiesces the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror quiesce -destination-path svm_backup:volA_dst
```

Learn more about `snapmirror quiesce` in the ONTAP command reference.

4. Break the existing DP-type relationship:

```
snapmirror break -destination-path <SVM:volume>
```

You must run this command from the destination SVM or the destination cluster.

The following example breaks the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror break -destination-path svm_backup:volA_dst
```

Learn more about `snapmirror break` in the ONTAP command reference.

5. If automatic deletion of snapshots is enabled on the destination volume, disable it:

```
volume snapshot autodelete modify -vserver _SVM_ -volume _volume_
-enabled false
```

The following example disables snapshot autodelete on the destination volume `volA_dst`:

```
cluster_dst::> volume snapshot autodelete modify -vserver svm_backup
-volume volA_dst -enabled false
```

6. Delete the existing DP-type relationship:

```
snapmirror delete -destination-path <SVM:volume>
```

Learn more about `snapmirror-delete` in the ONTAP command reference.

You must run this command from the destination SVM or the destination cluster.

The following example deletes the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror delete -destination-path svm_backup:volA_dst
```

7. Release the origin SVM disaster recovery relationship on the source:

```
snapmirror release -destination-path <SVM:volume> -relationship-info
-only true
```

The following example releases the SVM disaster recovery relationship:

```
cluster_src::> snapmirror release -destination-path svm_backup:volA_dst
-relationship-info-only true
```

Learn more about `snapmirror release` in the ONTAP command reference.

8. You can use the output you retained from the `snapmirror show` command to create the new XDP-type relationship:

```
snapmirror create -source-path <SVM:volume> -destination-path
<SVM:volume>  -type XDP -schedule <schedule> -policy <policy>
```

The new relationship must use the same source and destination volume. Learn more about the commands described in this procedure in the ONTAP command reference.

You must run this command from the destination SVM or the destination cluster.

The following example creates a SnapMirror disaster recovery relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup` using the default `MirrorAllSnapshots` policy:

```
cluster_dst::> snapmirror create -source-path svm1:volA -destination
-path svm_backup:volA_dst
-type XDP -schedule my_daily -policy MirrorAllSnapshots
```

9. Resync the source and destination volumes:

```
snapmirror resync -source-path <SVM:volume> -destination-path
<SVM:volume>
```

To improve resync time, you can use the `-quick-resync` option, but you should be aware that storage efficiency savings can be lost.

> You must run this command from the destination SVM or the destination cluster. Although resync does not require a baseline transfer, it can be time-consuming. You might want to run the resync in off-peak hours.

The following example resyncs the relationship between the source volume `volA` on `svm1` and the destination volume `volA_dst` on `svm_backup`:

```
cluster_dst::> snapmirror resync -source-path svm1:volA -destination
-path svm_backup:volA_dst
```

Learn more about `snapmirror resync` in the ONTAP command reference.

10. If you disabled automatic deletion of snapshots, reenable it:

```
volume snapshot autodelete modify -vserver <SVM> -volume <volume>
-enabled true
```

After you finish

1. Use the `snapmirror show` command to verify that the SnapMirror relationship was created.

   Learn more about `snapmirror show` in the ONTAP command reference.

2. Once the SnapMirror XDP destination volume begins updating snapshots as defined by the SnapMirror policy, use the output of `snapmirror list-destinations` command from the source cluster to display the new SnapMirror XDP relationship.

Additional information about DP-type relationships

Beginning with ONTAP 9.3, XDP mode is the default, and any invocations of DP mode on the command line or in new or existing scripts are automatically converted to XDP mode.

Existing relationships are not affected. If a relationship is already of type DP, it will continue to be of type DP. Beginning with ONTAP 9.5, MirrorAndVault is the default policy when no data protection mode is specified or when XDP mode is specified as the relationship type. The table below shows the expected behavior.

If you specify…	The type is…	The default policy (if you do not specify a policy) is…
DP	XDP	MirrorAllSnapshots (SnapMirror DR)

Nothing	XDP	MirrorAndVault (unified replication)
XDP	XDP	MirrorAndVault (unified replication)

As the table shows, the default policies assigned to XDP in different circumstances ensure that the conversion maintains the functional equivalence of the previous types. Of course, you can use different policies as needed, including policies for unified replication:

If you specify…	And the policy is…	The result is…
DP	MirrorAllSnapshots	SnapMirror DR
	XDPDefault	SnapVault
	MirrorAndVault	Unified replication
XDP	MirrorAllSnapshots	SnapMirror DR
	XDPDefault	SnapVault
	MirrorAndVault	Unified replication

The only exceptions to conversion are as follows:

- SVM data protection relationships continue to default to DP mode in ONTAP 9.3 and earlier.

  Beginning with ONTAP 9.4, SVM data protection relationships default to XDP mode.

- Root volume load-sharing data protection relationships continue to default to DP mode.
- SnapLock data protection relationships continue to default to DP mode in ONTAP 9.4 and earlier.

  Beginning with ONTAP 9.5, SnapLock data protection relationships default to XDP mode.

- Explicit invocations of DP continue to default to DP mode if you set the following cluster-wide option:

  ```
  options replication.create_data_protection_rels.enable on
  ```

  This option is ignored if you do not explicitly invoke DP.

Related information

- snapmirror create
- snapmirror delete
- snapmirror quiesce
- snapmirror release
- snapmirror resync

Disable long-term retention snapshots before ONTAP upgrade

In a relationship of cascaded volumes, long-term retention snapshots are supported only on the final SnapMirror destination volume of the cascade in all versions of ONTAP 9. Enabling long-term retention snapshots on any middle volume in the cascade results in missed backups and snapshots.

Learn more about long-term retention snapshots.

If you have an unsupported configuration in which long-term retention snapshots have been enabled on any middle volume of a cascade, contact technical support and reference the link:https://kb.netapp.com/on-prem/ontap/DP/SnapMirror/SnapMirror-KBs/Cascading_a_volume_with_Long-Term_Retention_(long-term retention)_snapshots_enabled_is_not_supported[NetApp Knowledge Base: Cascading a volume with Long-Term Retention (LTR) snapshots enabled is not supported^] for assistance.

The following ONTAP versions do not allow you to enable long-term retention snapshots on any volume in a cascade except the final SnapMirror destination volume.

- 9.15.1 and later
- 9.14.1P2 and P4 through P14
- 9.13.1P9 through P17
- 9.12.1 P12 through P19
- 9.11.1P15 through P20
- 9.10.1P18 through P20
- 9.9.1P20

Before upgrading from an ONTAP version that allows you to enable long-term retention snapshots on middle volumes of a cascade to an ONTAP version that blocks it, you need to disable long-term retention snapshots to avoid missed backups and snapshots.

You need to take action in the following scenarios:

- Long-Term Retention snapshots are configured on the "B" volume in an **A › B › C** SnapMirror cascade or on another middle SnapMirror destination volume in your larger cascade.
- long-term retention snapshots are defined by a schedule applied to a SnapMirror policy rule. This rule does not replicate snapshots from the source volume but creates them directly on the destination volume.

> For more information on schedules and SnapMirror policies, see the NetApp Knowledge Base: How does the "schedule" parameter in an ONTAP 9 SnapMirror policy rule work?.

Steps

1. Remove the long-term retention rule from the SnapMirror policy on the middle volume of the cascade:

```
Secondary::> snapmirror policy remove-rule -vserver <> -policy <>
-snapmirror-label <>
```

Learn more about `snapmirror policy remove-rule` in the ONTAP command reference.

2. Add the rule again for the SnapMirror label without the long-term retention schedule:

```
Secondary::> snapmirror policy add-rule -vserver <> -policy <>
-snapmirror-label <> -keep <>
```

> Removing long-term retention snapshots from the SnapMirror policy rules means SnapMirror will pull the snapshots with the given label from the source volume. You might also need to add or modify a schedule on the source volume's snapshot policy to create properly labeled snapshots.

Learn more about `snapmirror policy add-rule` in the ONTAP command reference.

3. If necessary, modify (or create) a schedule on the source volume snapshot policy to allow snapshots to be created with a SnapMirror label:

```
Primary::> volume snapshot policy modify-schedule -vserver <> -policy <>
-schedule <> -snapmirror-label <>
```

```
Primary::> volume snapshot policy add-schedule -vserver <> -policy <>
-schedule <> -snapmirror-label <> -count <>
```

> long-term retention snapshots can still be enabled on the final SnapMirror destination volume within a SnapMirror cascade configuration.

Verify ONTAP licensing for SnapMirror S3 configurations

Before you upgrade ONTAP, if you are using SnapMirror S3, and you are upgrading to ONTAP 9.12.1 or later, you should verify that you have the proper SnapMirror licenses.

After upgrading ONTAP, licensing changes that occurred between ONTAP 9.11.1 and earlier and ONTAP 9.12.1 and later might cause SnapMirror S3 relationships to fail.

ONTAP 9.11.1 and earlier

- When replicating to a NetApp-hosted destination bucket (ONTAP S3 or StorageGRID), SnapMirror S3 checks for the SnapMirror synchronous license, included in the Data Protection Bundle prior to the introduction of the ONTAP One software suite.
- When replicating to a non-NetApp destination bucket, SnapMirror S3 checks for the SnapMirror cloud license, included in the Hybrid Cloud Bundle which was available prior to the introduction of the ONTAP One software suite.

ONTAP 9.12.1 and later

- When replicating to a NetApp-hosted destination bucket (ONTAP S3 or StorageGRID), SnapMirror S3 checks for the SnapMirror S3 license, included in the Data Protection bundle which was available prior to the introduction of the ONTAP One software suite.

- When replicating to a non-NetApp destination bucket, SnapMirror S3 checks for the SnapMirror S3 External license, included in the Hybrid Cloud Bundle which was available prior to the introduction of ONTAP One software suite and the ONTAP One Compatibility bundle.

Existing SnapMirror S3 relationships

Existing SnapMirror S3 relationships should continue to work after an upgrade from ONTAP 9.11.1 or earlier to ONTAP 9.12.1 or later, even if the cluster does not have the new licensing.

Creation of new SnapMirror S3 relationships will fail if the cluster does not have the proper license installed.

Delete existing external key management server connections before upgrading ONTAP

Before you upgrade ONTAP, if you are running ONTAP 9.2 or earlier with NetApp Storage Encryption (NSE) and upgrading to ONTAP 9.3 or later, you must use the command line interface (CLI) to delete any existing external key management (KMIP) server connections.

Steps

1. Verify that the NSE drives are unlocked, open, and set to the default manufacture secure ID 0x0:

   ```
   storage encryption disk show -disk *
   ```

   Learn more about `storage encryption disk show` in the ONTAP command reference.

2. Enter the advanced privilege mode:

   ```
   set -privilege advanced
   ```

   Learn more about `set` in the ONTAP command reference.

3. Use the default manufacture secure ID 0x0 to assign the FIPS key to the self-encrypting disks (SEDs):

   ```
   storage encryption disk modify -fips-key-id 0x0 -disk *
   ```

   Learn more about `storage encryption disk modify` in the ONTAP command reference.

4. Verify that assigning the FIPS key to all disks is complete:

   ```
   storage encryption disk show-status
   ```

   Learn more about `storage encryption disk show-status` in the ONTAP command reference.

5. Verify that the **mode** for all disks is set to data

```
storage encryption disk show
```

Learn more about `storage encryption disk show` in the ONTAP command reference.

6. View the configured KMIP servers:

```
security key-manager keystore show
```

Learn more about `security key-manager keystore show` in the ONTAP command reference.

7. Delete the configured KMIP servers:

```
security key-manager delete -address <kmip_ip_address>
```

Learn more about `security key-manager delete` in the ONTAP command reference.

8. Delete the external key manager configuration:

```
security key-manager external disable
```

Learn more about `security key-manager external disable` in the ONTAP command reference.

ⓘ This step does not remove the NSE certificates.

What's next

After the upgrade is complete, you must reconfigure the KMIP server connections.

Verify netgroup file is present on all nodes before an ONTAP upgrade

Before you upgrade ONTAP, if you have loaded netgroups into storage virtual machines (SVMs), you must verify that the netgroup file is present on each node. A missing netgroup file on a node can cause an upgrade to fail.

Steps

1. Set the privilege level to advanced:

```
set -privilege advanced
```

2. Display the netgroup status for each SVM:

```
vserver services netgroup status
```

3. Verify that for each SVM, each node shows the same netgroup file hash value:

```
vserver services name-service netgroup status
```

If this is the case, you can skip the next step and proceed with the upgrade or revert. Otherwise, proceed to the next step.

4. On any one node of the cluster, manually load the netgroup file:

```
vserver services netgroup load -vserver vserver_name -source uri
```

This command downloads the netgroup file on all nodes. If a netgroup file already exists on a node, it is overwritten.

Related information

Working with Netgroups

Assign an explicit value to the v4.2-xattrs option before an ONTAP upgrade

If you have an NFSv4.2 client, before you upgrade from certain releases and patches of ONTAP 9.12.1 and later you need to give an explicit value for the NFSv4.2 extended attributes option to prevent NFS response errors after upgrade.

If the `v4.2-xattrs` option is never explicitly assigned a value before the ONTAP upgrade to affected versions, NFSv4.2 clients are not informed that the server's extended attributes option has changed. This causes NFS response errors to specific `xattrs` calls due to a client and server mismatch.

Before you begin

You need to assign an explicit value for the NFSv4.2 extended attributes option if the following is true:

- You are using NFSv4.2 with an SVM created using ONTAP 9.11.1 or earlier
- You are upgrading ONTAP from any of these affected releases and patches:
  - 9.12.1RC1 to 9.12.1P11
  - 9.13.1RC1 to 9.13.1P8
  - 9.14.1RC1 to 9.14.1P1

About this task

You must be running ONTAP 9.12.1 or later to set the value using the command described in this procedure.

If `v4.2-xattrs` is already set to `enabled`, it should still be explicitly set to `enabled` to avoid future disruption. If you set `v4.2-xattrs` to disabled, NFSv4.2 clients can receive "invalid argument" responses until they are remounted or the `v4.2-xattrs` option is set to `enabled`.

Steps

- Assign an explicit value to the `v4.2-xattrs` option:

```
nfs modify -v4.2-xattrs <enabled/disabled> -vserver <vserver_name>
```

Related information

NFS v4.2-xattrs field getting flipped after upgrades

Configure LDAP clients to use TLS before an ONTAP upgrade

Before you upgrade ONTAP, you must configure LDAP clients using SSLv3 for secure communications with LDAP servers to use TLS. SSL will not be available after the upgrade.

By default, LDAP communications between client and server applications are not encrypted. You must disallow the use of SSL and enforce the use of TLS.

Steps

1. Verify that the LDAP servers in your environment support TLS.

   If they do not, do not proceed. You should upgrade your LDAP servers to a version that supports TLS.

2. Check which ONTAP LDAP client configurations have LDAP over SSL/TLS enabled:

   ```
   vserver services name-service ldap client show
   ```

   If there are none, you can skip the remaining steps. However, you should consider using LDAP over TLS for better security.

3. For each LDAP client configuration, disallow SSL to enforce the use of TLS:

   ```
   vserver services name-service ldap client modify -vserver <vserver_name>
   -client-config <ldap_client_config_name> -allow-ssl false
   ```

4. Verify that the use of SSL is no longer allowed for any LDAP clients:

   ```
   vserver services name-service ldap client show
   ```

Related information

NFS management

Learn about adverse effects of session-oriented protocols during ONTAP upgrades

Clusters and session-oriented protocols might cause adverse effects on clients and applications in certain areas such as I/O service during upgrades.

If you are using session-oriented protocols, consider the following:

- SMB

  If you serve continuously available (CA) shares with SMBv3, you can use the automated nondisruptive upgrade method (with System Manager or the CLI), and no disruption is experienced by the client.

  If you are serving shares with SMBv1 or SMBv2, or non-CA shares with SMBv3, client sessions are disrupted during upgrade takeover and reboot operations. You should direct users to end their sessions before you upgrade.

  Hyper-V and SQL Server over SMB support nondisruptive operations (NDOs). If you configured a Hyper-V or SQL Server over SMB solution, the application servers and the contained virtual machines or databases remain online and provide continuous availability during the ONTAP upgrade.

- NFSv4.x

  NFSv4.x clients will automatically recover from connection losses experienced during the upgrade using normal NFSv4.x recovery procedures. Applications might experience a temporary I/O delay during this process.

- NDMP

  State is lost and the client user must retry the operation.

- Backups and restores

  State is lost and the client user must retry the operation.

  > Do not initiate a backup or restore during or immediately before an upgrade. Doing so might result in data loss.

- Applications (for example, Oracle or Exchange)

  Effects depend on the applications. For timeout-based applications, you might be able to change the timeout setting to longer than the ONTAP reboot time to minimize adverse effects.

Verify SSH host key algorithm support before ONTAP upgrade

Before you upgrade ONTAP, if SSL FIPS mode is enabled on a cluster where administrator accounts authenticate with an SSH public key, you must ensure that the host key algorithm is supported on the target ONTAP release.

The following table indicates host key type algorithms that are supported for ONTAP SSH connections. These key types do not apply to configuring SSH public authentication.

ONTAP release	Key types supported in FIPS mode	Key types supported in non-FIPS mode

9.11.1 and later	ecdsa-sha2-nistp256	ecdsa-sha2-nistp256 rsa-sha2-512 rsa-sha2-256 ssh-ed25519 ssh-dss ssh-rsa
9.10.1 and earlier	ecdsa-sha2-nistp256 ssh-ed25519	ecdsa-sha2-nistp256 ssh-ed25519 ssh-dss ssh-rsa

Support for the ssh-ed25519 host key algorithm is removed beginning with ONTAP 9.11.1.

For more information, see Configure network security using FIPS.

Existing SSH public key accounts without the supported key algorithms must be reconfigured with a supported key type before upgrading or administrator authentication will fail.

Learn more about enabling SSH public key accounts.

Resolve activity warnings in Autonomous Ransomware Protection (ARP) before an ONTAP upgrade

Before you upgrade to ONTAP 9.16.1 or later, you should respond to any abnormal activity warnings reported by Autonomous Ransomware Protection (ARP). In ONTAP 9.16.1, ARP changed to a machine learning/artificial intelligence (AI)-based model. Because of this change, any unresolved active warnings from the existing ARP in ONTAP 9.15.1 or earlier will be lost after upgrade.

Steps

1. Respond to any abnormal activity warnings reported by ARP and resolve any potential issues.
2. Confirm the resolution of these issues before upgrading by selecting **Update and Clear Suspect File Types** to record your decision and resume normal ARP monitoring.

Reboot SP or BMC to prepare for firmware update during an ONTAP upgrade

You do not need to manually update your firmware prior to an ONTAP upgrade. The firmware for your cluster is included with the ONTAP upgrade package and is copied to each node's boot device. The new firmware is then installed as part of the upgrade process.

Firmware for the following components is updated automatically if the version in your cluster is older than the firmware that is bundled with the ONTAP upgrade package:

- BIOS/LOADER
- Service Processor (SP) or baseboard management controller (BMC)
- Storage shelf

- Disk
- Flash Cache

To prepare for a smooth update, you should reboot the SP or BMC before the upgrade begins.

Use the ONTAP CLI, the SP or the BMC to reboot.

CLI

1. Reboot the SP or BMC:

```
system service-processor reboot-sp -node <node_name>
```

SP

1. Reboot the SP:

```
sp reboot
```

BMC

1. Reboot the BMC:

```
bmc reboot
```

Only reboot one SP or BMC at a time. Wait for the rebooted SP or BMC to completely recycle before rebooting the next.

You can also update firmware manually in between ONTAP upgrades. If you have Digital Advisor, you can view the list of firmware versions currently included in your ONTAP image.

Updated firmware versions are available as follows:

- System firmware (BIOS, BMC, SP)
- Shelf firmware
- Disk and Flash Cache firmware

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