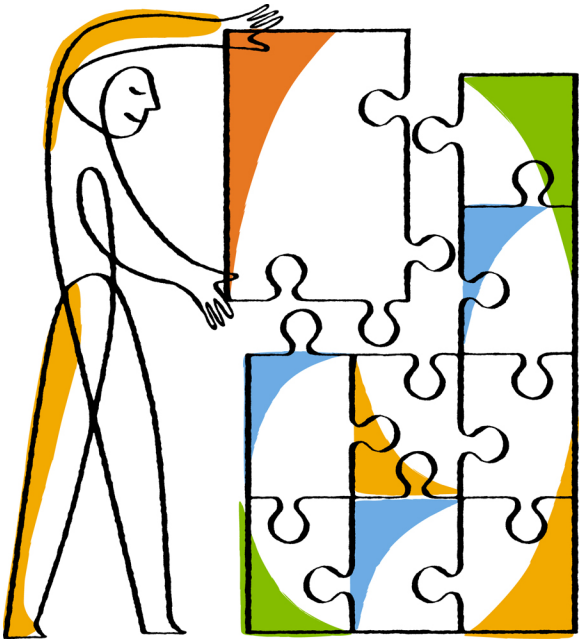
Updated for 8.2.1

Data ONTAP® 8.2

Upgrade and Revert/Downgrade Guide

For 7-Mode



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Part number: 215-08534_B0
February 2014

Contents

Planning your upgrade

Because new features are introduced in each release of Data ONTAP, you must understand these features and their associated upgrade requirements to evaluate how they might impact your current configuration. You are more likely to encounter issues if you are upgrading from a release earlier than the immediately previous version of Data ONTAP.

Note: It is a best practice to use Upgrade Advisor to plan your upgrade. Nonetheless, you might find useful detail and related information in this guide that complements your Upgrade Advisor plan.

If you are not able to use Upgrade Advisor, you should create your own upgrade plan manually by using guidelines provided in this guide.

Before proceeding with the upgrade, you should plan to do the following:

- Review the *Release Notes* for your Data ONTAP upgrade target release.
- Understand any requirements for upgrading to the target release from your existing software.
- Note any potential behavior changes to your system after the upgrade.
- Prepare to address all points in the upgrade checklist.
- Create a back-out plan, in the unlikely event that you need to revert or downgrade to the Data ONTAP release that was running on your system before the upgrade.

Unless otherwise indicated, the requirements and procedures in this guide apply to all supported Data ONTAP 8.2.x platforms. For more information about supported platforms, see the *Release Notes* for this Data ONTAP release.

Planning an upgrade to a Data ONTAP-v system

Platforms that are based on Data ONTAP-v technology, such as Data ONTAP Edge systems, run standard Data ONTAP software and are upgraded in the same manner as other platforms. However, you should verify the versions of the hypervisor and related software before performing an upgrade.

For complete instructions, refer to the section for upgrading Data ONTAP-v systems and to the *Data ONTAP-v Administration Tool Installation Guide*.

Related concepts

Upgrading Data ONTAP-v systems on page 103

Planning your upgrade with Upgrade Advisor

You should use the Upgrade Advisor tool (if it is available in your environment) to ensure that you have met the requirements for upgrading to the current release and to generate an upgrade plan.

Before you begin

To use the Upgrade Advisor tool, your system must meet the following requirements:

- It must have a valid support contract.
- It must be enabled to send AutoSupport messages to NetApp.

Attention: If your system does not meet these requirements, you should consult the *Release Notes* and *Upgrade Guide* for this Data ONTAP release to prepare a detailed upgrade plan.

About this task

Upgrade Advisor is an online tool, available on the NetApp Support Site, that simplifies the process of planning Data ONTAP upgrades. When you submit your system identification and target release to Upgrade Advisor, the tool compares AutoSupport data about your system to known requirements and limitations of the target release. Upgrade Advisor then generates an upgrade plan (and optionally a back-out plan) with recommended preparation and execution procedures.

To generate an upgrade plan, you must have identifying information for your system (host name, system ID, or serial number) and you must have selected a target upgrade release. You can also select other options, including the following:

- Create a plan for an HA pair, including nondisruptive upgrades.
- Create a back-out plan.
- Compare upgrade scenarios.

For more information about Upgrade Advisor, see the Upgrade Advisor Help screens.

Steps

1. Locate and record the system host name, system ID, or serial number of your system by entering the following command at the command line:

   `sysconfig`

   The system identification information is near the top of the display.
2. From a web browser, log in to the My AutoSupport home page on the NetApp Support Site at the following URL: *support.netapp.com/NOW/asuphome*
3. Click the **Launch My AutoSupport** link.
4. Enter the host name, system ID, or serial number of your system when prompted.
5. Select the system that you want to upgrade from those listed.

6. Select the latest AutoSupport record from the ASUPs row.
7. Click the **Upgrade Advisor** tab.
8. Select the Data ONTAP release to which you want to upgrade from the **Target Versions** menu.
9. Select the upgrade method and the level of detail you want included in your upgrade plan.
10. Click **Continue** to generate your upgrade plan.

After you finish

It is not necessary to follow further instructions in this *Upgrade Guide* after you generate and execute an upgrade plan by using Upgrade Advisor. Nonetheless, you might want to consult this guide for details and background information.

Related information

Upgrade Advisor: support.netapp.com/NOW/asuphome

Upgrade process steps

Before beginning to upgrade Data ONTAP software, you should plan the upgrade and familiarize yourself with the required steps.

Steps

1. Plan your upgrade by familiarizing yourself with requirements and issues before you upgrade.

   Plan to do the following:

   - Review the Release Notes for your Data ONTAP upgrade target release.
   - Understand any requirements for upgrading to the target release from your existing software.

     Attention: You should use the Upgrade Advisor tool (if it is available in your environment) to assess your upgrade conditions and generate an upgrade plan.
   - Create a back-out plan, in the unlikely event that you need to revert or downgrade to the Data ONTAP release that was running on your system before the upgrade.
   - Be prepared to note any changes to your system after the upgrade.
   - If you have storage systems in an HA pair, select the appropriate upgrade method and ensure that the HA configuration is correct.
   - If your storage system is in a SAN environment, ensure that your SAN configuration is fully supported.

     All SAN components—including target Data ONTAP software version, host OS and patches, required Host Utilities software, and adapter drivers and firmware—should be listed in the Interoperability Matrix.
   - If you run the SnapMirror software, identify storage systems with destination and source volumes.

- If you are running MetroCluster systems, verify that all MetroCluster components are compatible with the target release.

2. If necessary, perform any required preliminary procedures before upgrading to the new Data ONTAP release.

   Required procedures might include the following:

   - Resolve upgrade issues, including performing an intermediate upgrade.
   - Ensure that you have a current Snapshot copy of the root volume of any system being upgraded.
   - Ensure that you have a current Snapshot copy of the SnapMirror source and destination volumes.
     This helps avoid a baseline transfer if you need to revert or downgrade the system to a previous Data ONTAP release.
   - Update disk firmware.
   - Update disk shelf firmware.
   - Update storage system firmware.

3. Obtain the appropriate software image from the NetApp Support Site.

   These images must be available to your storage system directly or to an HTTP server on your network.

4. Install the Data ONTAP software image on your storage system.

   You can extract the system files from the software image before or during the download process.

5. Download the new Data ONTAP system files to the boot device.

   The upgrade process is finished when the HA pair or single system reboots with the new version of Data ONTAP.

   Note: The Data ONTAP kernel boots from a boot device, not from a boot volume on disk. For more information about booting Data ONTAP, see the *Data ONTAP System Administration Guide for 7-Mode*.

6. Verify that your systems are operating as expected after the upgrade.

   Before returning storage systems to production, you should check the status of configured functionality and re-enable any functionality that was suspended before the upgrade.

Related concepts

Planning your upgrade on page 7
Updating firmware on page 58
Obtaining Data ONTAP software images on page 34
Installing Data ONTAP software images on page 40
Downloading and upgrading new Data ONTAP software on page 44
Reverting to an earlier Data ONTAP release family on page 69
Downgrading to an earlier release in the same release family on page 87

Related tasks

Preparing for the upgrade on page 25

Related information

Upgrade Advisor: support.netapp.com/NOW/asuphome
Download Software: support.netapp.com/NOW/cgi-bin/software
Interoperability Matrix: support.netapp.com/NOW/products/interoperability

Guidelines for estimating the duration of the upgrade process

For each HA pair, you should plan for approximately 30 minutes to complete preparatory steps, 60 minutes to perform the upgrade, and 30 minutes to complete post-upgrade steps.

The 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.

Recommendations for all systems upgrading to this release

You should follow certain guidelines to ensure that your storage system upgrade goes smoothly.

You should do the following:

- Review the “Important cautions” section of the *Release Notes* for this Data ONTAP release.
  It contains important information that could affect the behavior of your system during and after upgrading.
- Upgrade during non-peak hours.
- Avoid performing a quota initialization prior to upgrading.
  If a quota initialization is in process prior to upgrading, wait for the initialization to finish.

You might also need to consider the following points based on your configuration:

- If you require system access during the `download` process
  You can set the `telnet.distinct.enable` option, which enables you to open a Telnet or SSH-interactive session while the `download` command is running separately on the console. For more information about alternative methods of accessing the storage system, see the *Data ONTAP System Administration Guide for 7-Mode*.

Upgrade host requirements

An *upgrade host*, the client system or server from which you upgrade Data ONTAP, must meet certain requirements. You can upgrade Data ONTAP from a Windows or UNIX client, or from an HTTP server.

The host from which you upgrade your storage system must have access to at least one of the following items:

- The NetApp Support Site, from which you can obtain Data ONTAP software images
- Data ONTAP software images in your environment
  The following are ways you can make software images available to storage systems:
  - Portable storage media (such as a CD-R or USB drive) containing the images
  - An HTTP server containing Data ONTAP software images

You can install Data ONTAP system files after you prepare the upgrade host.

Related concepts

Installing Data ONTAP software images on page 40

Requirements when upgrading from a Windows or UNIX client using the CIFS or NFS protocols

If the CIFS or NFS protocols are licensed on your storage system, you can upgrade from a Windows or UNIX client using those protocols. You must be able to administer the storage system from the UNIX or Windows client. This client is usually the storage system's administration (admin) host.

Any UNIX or Windows admin host client with a network connection can be used to obtain Data ONTAP software images and copy them to a storage system.

For information about admin hosts, see the *Data ONTAP Software Setup Guide for 7-Mode*.

Note: The iSCSI protocol provides limited CIFS functionality that is not sufficient to allow you to upgrade using this method. With this limited functionality, you cannot create shares on the storage system for the software image.

Requirements when upgrading from an HTTP server

To upgrade from an HTTP server, you must be able to serve the upgrade package from the HTTP server, and you must know the exact URL (including any necessary host and port information) to enter at the storage system console.

Using an HTTP server is a good choice in these circumstances:

- The storage system does not have a CIFS or NFS license.
- You want to distribute Data ONTAP upgrade packages to multiple storage systems.

- You want to use installation scripts.

For information about the console, see the *Data ONTAP System Administration Guide for 7-Mode*.

Related concepts

Obtaining images for HTTP servers on page 34

Upgrade requirements for SnapMirror

If you are upgrading Data ONTAP on storage systems that are running SnapMirror, the order in which you upgrade the systems that have SnapMirror destination volumes and the systems that have SnapMirror source volumes depends on whether you are replicating volumes or qtrees.

Volume SnapMirror replication

You must upgrade the destination system *before* you upgrade the source system. In addition, the destination system must be running a Data ONTAP version that is same or later than the version running on the SnapMirror source system. If you upgrade the source volumes first, subsequent volume SnapMirror transfers will fail.

Synchronous and semi-synchronous and bidirectional volume SnapMirror replication

You must ensure that the source and destination systems are running the same Data ONTAP version. You must also ensure that the Data ONTAP upgrade process on both the systems occurs simultaneously. If not, SnapMirror goes into asynchronous mode. When SnapMirror is in asynchronous mode, the source system replicates data to the destination system every minute until a synchronous replication can be reestablished; that is, when the source system is upgraded so that the same Data ONTAP version is running on destination and source systems.

Qtree SnapMirror replication or SnapVault or tape

The requirement to upgrade SnapMirror destination volumes first does not apply to SnapMirror for qtree replication, SnapVault, or data restoration for tape using the `restore` command. However, when you upgrade systems that use these features, you should upgrade your SnapMirror destination systems, SnapVault secondary systems, and restoration target systems before the corresponding source systems to maintain backward compatibility.

For more information about running SnapMirror on storage systems configured for network-attached storage (NAS), see the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode*.

Related tasks

Upgrading in a SnapMirror environment on page 44

How SnapMirror upgrade impacts restart checkpoints

SnapMirror creates restart checkpoints during transfers, which allow a transfer to be restarted from the point of interruption. During a SnapMirror upgrade, if the restart checkpoints are deleted, then it is not possible to restart a transfer from the point of interruption and the transfer has to restart from the beginning.

The restart checkpoints can also be deleted during a revert or system controller head swap operation. However, as long as there is a common Snapshot copy between the SnapMirror source and destination volumes, the destination can be updated with incremental transfers.

For more information about SnapMirror restart checkpoints, see the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode*.

Upgrade requirements for systems mirroring each other

To upgrade Data ONTAP on storage systems that are mirroring volumes to each other, you must suspend the mirror relationship, upgrade each system, and resume the mirror relationship.

You can configure SnapMirror to enable two storage systems to mirror each other's volumes. In this case, each storage system is both a source system and a destination system. For example, System A can mirror volumes to System B, and System B can mirror volumes to System A.

In this configuration, there is logically no way to update both destinations before the corresponding source systems. Therefore, to upgrade Data ONTAP on storage systems that are mirroring volumes to each other, you must suspend the mirror relationship, upgrade each system, and resume the mirror relationship.

Preserving Snapshot copies

Before you upgrade, you must preserve Snapshot copies to avoid reinitializing the SnapMirror relationship, in case of a reversion.

About this task

When you upgrade Data ONTAP, the older SnapMirror Snapshot copies are gradually replaced with the newer Snapshot copies. A common Snapshot copy is required to restore the SnapMirror relationship, in case of a reversion.

Step

1. Depending on the type of SnapMirror you are using, perform the following steps to preserve the Snapshot copies:

If you are using...	Then...
Volume SnapMirror	• Create a manual Snapshot copy on the SnapMirror source before upgrading the source to a new version of Data ONTAP. • Update the SnapMirror destination with the manually created Snapshot copy before upgrading the destination to a new version of Data ONTAP. This manually created Snapshot copy enables you to restore the SnapMirror relationship after reverting to an earlier version of Data ONTAP. **Note:** In some cases, you might have to re-initialize the SnapMirror relationship even though there is a common Snapshot copy available. For example, after an upgrade, if you expand the 32-bit volumes or aggregate to the 64-bit format, reversion of the source and the destination systems to an older version of Data ONTAP requires you to delete all the Snapshot copies on both the source and destination systems.
Qtree SnapMirror	• Rename the common Snapshot copy for the qtree SnapMirror relationship on the SnapMirror source before upgrading the source to a new version of Data ONTAP. • Update the SnapMirror destination with the renamed Snapshot copy before upgrading the destination to a new version of Data ONTAP. This renamed Snapshot copy enables you to restore the SnapMirror relationship after reverting to an earlier version of Data ONTAP.

Information about low-memory V-Series system upgrade

While upgrading your low-memory V-Series system (a storage system with physical memory of 8 GB or less; for example V3140, V3160, V3210, and V3240) from a previous Data ONTAP release to Data ONTAP 8.2.1, your system might undergo multiple reboots.

Multiple reboots occur if the number of storage devices discovered by the V-Series system exceeds the maximum number of storage devices allowed for that platform. This happens because, in Data ONTAP 8.2.1, memory is allocated dynamically for storage devices as you present the storage devices to your V-Series system.

For information about the number of storage devices allowed for different platforms, see the *Hardware Universe* at *hwu.netapp.com*.

Note: The term V-Series system refers to the storage systems released prior to Data ONTAP 8.2.1 that can use array LUNs. The FAS systems released in Data ONTAP 8.2.1 and later can use array LUNs if the required license is installed.

Release family upgrade requirements

Each Data ONTAP release family introduces new features. Most issues are resolved automatically in the Data ONTAP software, but a few issues require manual configuration.

Major and minor upgrade types

When you upgrade Data ONTAP, you must select one of two upgrade types: a *major* upgrade *between* release families, or a *minor* upgrade *within* a release family.

In a *major* upgrade, one *between* release families, the release number x.y.z changes in the x or y components from the original to the target release. For example, an upgrade from 8.0.2 to 8.1, or from 7.3.5 to 8.1, is an upgrade between release families.

In a *minor* upgrade, one *within* a release family, the release number x.y.z does not change in the x or y components, but only in the z components of the release number. The following are examples of upgrades within release families:

- 8.1.1 to 8.1.2P2
- 8.1 to 8.1.1P2

For more information about Data ONTAP release families and types of releases, see the Data ONTAP Release Model.

Related information

Data ONTAP Release Model: support.netapp.com/NOW/products/ontap_releasemodel/post70.shtml

Understanding upgrades between release families

A new release family usually includes major changes in infrastructure and subsystems.

When you upgrade from one release family to another, one or more of the following might have been introduced on your platform:

- Fundamental infrastructure changes—for example, changes to WAFL or RAID operation
- Version number changes requiring a file system upgrade—for example, in RAID, WAFL, nonvolatile log (NVLOG), or Java subsystems
- New system firmware

For these reasons, upgrades between release families sometimes take longer, involve more steps, and interrupt storage system services longer than upgrades within a release family.

Nondisruptive upgrades to releases in the Data ONTAP 8.2 release family are supported from any 8.1.x release.

Related concepts

Requirements for nondisruptive upgrades on all systems on page 18

Required intermediate upgrades

If you want to upgrade to a Data ONTAP 8.2.x release from a release earlier than 8.1.x, you must perform an intermediate upgrade (also known as a multi-hop upgrade) to the latest Data ONTAP 8.1.x release before upgrading to the target 8.2.x release.

In addition, if you are running a Data ONTAP 7.2 release earlier than 7.2.3, you must perform a minor NDU to the latest 7.2.x release before performing an intermediate major NDU to the latest 7.3.x release.

Attention: After performing an intermediate upgrade, you must wait at least 10 minutes before proceeding to the final upgrade (or to an additional intermediate upgrade) to ensure that all upgrade processes have finished.

Upgrades within a release family

Upgrades within a release family are usually simpler and involve less service disruption than upgrades between release families.

This is because major changes are not usually introduced within a release family. Rather, these releases usually include bug fixes and minor feature enhancements.

Nondisruptive upgrade requirements

Nondisruptive upgrades do not require downtime and are available on most HA configurations.

In a nondisruptive upgrade (NDU), high-availability technology allows a takeover storage system to assume the functions of the “failed” partner while it is being upgraded. There is a takeover and giveback operation for each HA node (storage system that is part of a high-availability relationship). Because the partner node fulfills service requests during the “failed” system's upgrade, no disruption in service is experienced by the clients.

In addition, because the takeover system assures continuous availability of the “failed” system's disks, more extensive upgrades requiring a system halt—such as system firmware updates and hardware adapter replacements—can be performed without disrupting services based on stateless protocols.

When to use nondisruptive upgrades

You can use the nondisruptive upgrade method on HA configurations that meet certain Data ONTAP requirements. Nondisruptive upgrades are most appropriate when high availability of storage system services is critical.

You can use the nondisruptive method when one or more of the following is being performed:

- Upgrades to the Data ONTAP 8.2 release family from any 8.1.x release

- Upgrades to the Data ONTAP 8.1 release family from any 8.0.x release or from 7.3.2 and later 7.3.x releases
- Upgrades to the Data ONTAP 8.0 release family from an immediately preceding release family (for example, from 7.3.1 to 8.0)

  You can upgrade nondisruptively to any release in the 8.0 release family from any release in the Data ONTAP 7.3 family.

  If you need to upgrade from the 7.2 release family, you can upgrade nondisruptively from Data ONTAP 7.2.5 or later to the most recent 7.3 release, then upgrade nondisruptively to 8.0.
- Upgrades to any release in the Data ONTAP 7.3 release family from an immediately preceding release family (for example, from 7.2.3 to 7.3)

  To upgrade nondisruptively to the 7.3 release family, you must be running Data ONTAP 7.2.3 or a later release in the 7.2 family.
- Data ONTAP upgrades within a release family (for example, from 8.0.1 to 8.0.2)
- System firmware updates
- Certain hardware upgrades

  Note: See the *Data ONTAP High Availability and MetroCluster Configuration Guide for 7-Mode* for more information about changing system hardware nondisruptively.

When not to use nondisruptive upgrades

You cannot use the nondisruptive upgrade method in all circumstances.

Upgrades might be disruptive if any of the following conditions exist:

- You have storage systems actively serving CIFS to clients.

  Because CIFS is session-oriented, sessions must be terminated before upgrade procedures to prevent data loss.
- You have storage systems actively serving File Transfer Protocol (FTP) or Network Data Management Protocol (NDMP) clients that cannot be postponed.

  Because these protocols are session-oriented, outstanding sessions must finish, and these services must be disabled to use nondisruptive upgrades.

For these conditions, disruptive upgrades are recommended.

Related concepts

Disk shelf firmware updates on page 64

Requirements for nondisruptive upgrades on all systems

To ensure optimal service availability during upgrades, your systems must meet configuration and utilization requirements before you begin a nondisruptive upgrade.

Major nondisruptive upgrades (nondisruptive upgrades between release families) to Data ONTAP 8.2 are supported from any 8.1.x release.

Minor nondisruptive upgrades (nondisruptive upgrades within release families) are supported from all previous Data ONTAP 8.2 releases.

To use the nondisruptive upgrade procedure, your systems must meet the following configuration requirements:

- You must have an HA pair in which a partner controller takes over I/O during the upgrade process, and the HA pair must be correct and stable.
- Because failed disk drives prevent giveback operations and can introduce loop instability throughout the storage system, you must remove or replace all failed disk drives *before* beginning the nondisruptive upgrade.
- There should be no old core files in the `/etc/crash` directory.
- If your system serves NFS clients, you must use hard mounts.

  Attention: You should not use soft mounts when there is a possibility of frequent NFS timeouts, which can lead to disruptions during the upgrade process and possible data corruption.
- You must be able to open a terminal session to the console port of both controllers in an HA pair by using one of the following methods:
  - Direct serial connection
  - A console server
  - The systems' Service Processors (SPs), if available
  - The systems' remote LAN modules (RLMs), if available

  Because network connections to the controllers are lost during the takeover and giveback operations that are performed during the nondisruptive upgrade, Telnet and SSH sessions do not work.

You should not exceed the system limits for your platform. For information about system limits in a SAN environment, see the *Data ONTAP SAN Configuration Guide for 7-Mode*. In addition, you should avoid exceeding maximum values for the following system elements on all platforms:

Element	Value (per node)	Command to display values
FlexVol volumes	500	`vol status`
FlexVol volumes enabled for deduplication	500	
Snapshot copies	20,000	`snap list`
CPU utilization *	No greater than 50%	`sysstat -c 10 -x 3`
Disk utilization *	No greater than 50%	

* Before upgrading Data ONTAP, it is a best practice to monitor CPU and disk utilization for 30 seconds. The values in the `CPU` and `Disk Util` columns should not exceed 50 percent for all 10

measurements reported. No additional load should be added to the storage system until the upgrade is complete.

Note: It is a best practice to use the Performance and Statistics Collector (Perfstat) to establish a performance baseline for comparison after the upgrade.

Related concepts

Requirements for nondisruptive upgrades on systems with deduplicated volumes on page 20
Optimal service availability during upgrades on page 99
Considerations for stateless protocols on page 100

Related tasks

Planning your upgrade with Upgrade Advisor on page 8
Creating a performance baseline with Perfstat Converged on page 29

Requirements for nondisruptive upgrades on systems with deduplicated volumes

You can perform major and minor nondisruptive upgrades when deduplication is enabled, provided that no more than 500 FlexVol volumes have deduplication enabled and that no deduplication operations are running during the Data ONTAP upgrade.

The total number of deduplicated and non-deduplicated FlexVol volumes must not exceed the total number of FlexVol volumes supported for nondisruptive upgrades on your system.

Nondisruptive upgrades should be done when deduplication operations are not active. To ensure that no deduplication operations are active, you must take both of the following actions:

- If any deduplication operations are active, you must halt them until the Data ONTAP upgrade has completed.
- You must perform the Data ONTAP upgrade during a time period when deduplication operations are not scheduled to run.

You can use the `sis status` command to determine the status of deduplication operation on a volume. The output of the `sis status` command is similar to the following:

```
 Path              State      Status     Progress
/vol/v457         Enabled    Idle       Idle for 00:12:30
/vol/v458         Enabled    Idle       Idle for 00:12:30
/vol/v459         Enabled    Idle       Idle for 00:12:30
/vol/v460         Enabled    Idle       Idle for 00:12:30
/vol/v461         Enabled    Active     521 MB Scanned
/vol/v462         Enabled    Active     489 MB Scanned
/vol/v463         Enabled    Active     387 MB Scanned
/vol/v464         Enabled    Idle       Idle for 00:12:30
```

You can use the `sis stop` command to abort the active SIS operation on the volume and the `sis start` command to restart it.

Note: If you started the deduplication operation initially using the `sis start -s` command, then you can use the checkpoint when restarting the deduplication operation.

For information about deduplication, see the *Data ONTAP Storage Management Guide for 7-Mode* and the sis(1) man page.

Disruptive upgrade requirements

A disruptive upgrade can be performed on any HA pair, but downtime is required.

In a disruptive upgrade, downtime is required because the HA configuration is disabled and each node is updated. When the HA configuration is disabled, each node behaves as a single-node storage system; in other words, system services associated with the node are interrupted for as long as it takes the system to reboot.

You can also complete other maintenance tasks, such as system firmware and hardware, as part of the disruptive upgrade. These can also take place when the HA pair is disabled.

Although nondisruptive upgrade requirements are not mandatory for disruptive upgrades (when downtime is scheduled), it is a best practice to follow the NDU preparatory procedures for all upgrades to ensure system health before and after the upgrade.

Identifying potential upgrade issues

Every Data ONTAP release family has unique upgrade requirements that you must understand before you decide to upgrade. Depending on your version of Data ONTAP, you might have to upgrade to an intermediate release before upgrading to the current release.

Before you upgrade, you must understand the following:

- Issues you must resolve before upgrading to the new release
- New system behavior after upgrading to the new release

Because significant new features are introduced in each new Data ONTAP release family, you might encounter issues when upgrading to a new release family, especially if you are not upgrading from the immediately previous version of Data ONTAP.

For example, if you are upgrading from a release in the 8.0 family to the current 8.2 release, you must review and resolve upgrade issues associated with the 8.1 and 8.2 release families before upgrading to Data ONTAP 8.2 or later.

Be sure to consult the *Release Notes* for the upgrade target release for a complete listing of upgrade issues. If an intermediate upgrade is required, you should also consult the *Release Notes* for the intermediate release.

Note: It is a best practice to capture the output of the `options` command before beginning the upgrade and comparing it with the output after the upgrade. Doing so helps ensure that you are aware of important changes to `options` settings. For more information, see the "Summary of new and changed commands and options" section in the *Release Notes* for your upgrade target release.

Upgrade issues with the Data ONTAP 8.2 release family

You must understand and resolve any known technical issues before you upgrade your storage system to Data ONTAP 8.2 and later releases.

This topic summarizes significant issues known at publication time. Be sure to check the "Important Cautions" section in the latest *Release Notes* for your target Data ONTAP release to see a complete list of issues that could affect the upgrade.

- Starting with Data ONTAP 8.2.1, there is a change in how Data ONTAP handles file names containing UTF-16 supplementary characters that you must be aware of if your environment uses such file names.
- After you upgrade to Data ONTAP 8.2, the license-list-info ZAPI is no longer supported.
  As a result, you must install Data ONTAP management software versions that are supported by Data ONTAP 8.2 or later.
- During a Data ONTAP upgrade, LUNs are assigned new revision numbers.
  Windows Server 2008 and Windows Server 2012 interpret the LUNs with new revision numbers as new disks and set them offline after a host reboot; this status is shown in Windows management interfaces after the upgrade. Windows Server 2003 ignores LUN revision numbers.
- Stale deduplication-related metadata can exist in the FlexVol volumes and aggregates on your system, resulting in slow deduplication processing or your systems running out of space.
  Your systems can experience this problem if you are upgrading from a Data ONTAP 8.1 release prior to 8.1.2P4, if deduplication is enabled on any FlexVol volume, and if a FlexVol volume or the associated aggregate is more than 70 percent full.
- Starting with Data ONTAP 8.2, all license keys are 28 characters in length.
  Licenses installed prior to Data ONTAP 8.2 continue to work after you upgrade to Data ONTAP 8.2 or later. However, if you need to reinstall a license when you are running Data ONTAP 8.2 or later, the old key is not accepted.
- Starting with Data ONTAP 8.2, a baseline SP firmware image is packaged with the Data ONTAP image.
  By default, the SP automatic update functionality is enabled. You have the option to manually trigger an SP update.
- Starting with Data ONTAP 8.1.2, the software install or upgrade includes new disk shelf firmware versions for DS14mk2 AT and DS4243 disk shelves that provide enhanced disk error detection and prediction capabilities.
  Therefore, after upgrading to this version of Data ONTAP, you might experience an increase in the number of disk failures for certain disk shelf and disk models.
- If you have deployed synchronous SnapMirror in Data ONTAP 8.1.x for 7-Mode, upgrading to Data ONTAP 8.2 can cause performance degradation.
  To avoid this issue, you should remain in Data ONTAP 8.1.x.

- 3210 and 3140 storage systems with Flash Cache modules are not supported in Data ONTAP 8.2 and later 8.2.x releases operating in 7-Mode.

  You cannot upgrade to Data ONTAP 8.2 or later 8.2.x releases if you have Flash Cache modules enabled in your 3210 or 3140 system.
- If you are upgrading to Data ONTAP 8.2 release from a release earlier than Data ONTAP 8.1 release, you must perform an intermediate upgrade.

  During the intermediate upgrade, if you modify the state of deduplication on a volume, then a storage system disruption may occur.
- After an HA failover and giveback, the CIFS protocol might take several minutes to start up.

  If vFiler units are present, they might not be initialized for the duration of the CIFS startup time. The delay in CIFS startup is typically due to network infrastructure issues related to domain controllers and LDAP servers.

Changes to behavior in the Data ONTAP 8.2 release family

You should be aware of changes in Data ONTAP behavior that might occur if you upgrade to Data ONTAP 8.2 or later releases.

Be sure to check the *Known Problems and Limitations* section in the *Release Notes* for your target Data ONTAP release to see a complete list of changes in behavior after upgrade to the target release. This list summarizes significant changes known at publication time:

- Storage system disruption occurs when there are no asynchronous messages to dispatch tasks between different sub-systems within Data ONTAP.

  The number of asynchronous messages per storage system is limited.
- If you are configuring volumes with zero fractional reserve and using certain technologies or Data ONTAP features, you must take some extra precautions to avoid out of space errors.
- The `cf_remote` license is installed by default on all new 32xx and 62xx storage systems for versions of Data ONTAP earlier than 8.2.

  If you upgraded to Data ONTAP 8.2 and are using mirrored aggregates that are not in a MetroCluster configuration, the presence of this license can reduce read performance because data is read from only one plex.
- If V-Series system FC initiator ports are zoned with Hitachi or HP XP array target ports before the storage array parameters are set and the LUNs are mapped to the host groups, you might not be able to see any LUNs presented to the Data ONTAP interface.
- In a single path SnapMirror transfer, you cannot use the `interface.blocked.mgmt_data_traffic` option to block SnapMirror traffic from e0M on the destination storage system.

  You can use this option to block SnapMirror transfer only on the source storage system.
- When an interface name used for configuring the partner interface is applied as a host name alias in the `/etc/hosts` file and the interface name is used in an `ifconfig` command, the host name gets resolved in the local host context and not the partner context, resulting in unavailability of the partner node during takeover.
- Fast path is enabled by default on all storage systems.

However, you might have to disable fast path in certain scenarios to avoid issues such as performance degradation or failed software upgrades.

- If a CIFS client with a NetBIOS name of more than 16 characters attempts to connect to the storage system, authentication fails.
- If domain controllers become unavailable to a vFiler unit, pending CIFS authentication requests accumulate on the storage system.

  If the issue is not resolved, this can prevent other vFiler units on the storage system from successfully completing CIFS authentication requests.
- On a newly installed storage controller without CIFS configured, if you create a qtree on a volume that has security style set to NTFS, the resulting qtree has NTFS as the security style and UNIX as the effective style.

  This means that UNIX clients can set attributes on the NTFS volumes, which normally would not be allowed.
- When you create SnapVault relationships for SnapLock secondary volumes in vfiler0, you also manually set the `snapvault.lockvault_log_volume` option to the name of a SnapLock for SnapVault log volume.

  After this option is set, SnapVault cannot be enabled on any vFiler units on the storage system.
- After upgrading to Data ONTAP 8.2.0 or later releases, some Oracle Linux-based systems using ASMlib can fail to recognize disk groups.

Preparing for the upgrade

Before installing the latest Data ONTAP release on your storage system, you need to verify information and complete some tasks.

Steps

1. Verify that your system meets the minimum requirements.

   For more information about system requirements, see the *Release Notes* for your Data ONTAP upgrade target release.

2. Confirm that all paths to disk are visible to the system by entering the following command:

   `storage show disk –p`

3. Confirm that there are no failed disks by entering the following command:

   `vol status –f`

4. Verify that all aggregates are online by entering the following command:

   `aggr status`

5. If your systems are configured for MultiStore technology, enter the following command to verify that all vFiler units are running:

   `vfiler status -a`

6. Verify that you have resolved any upgrade issues.

   For more information about upgrade issues, see the "Important cautions" section of the *Release Notes* for your Data ONTAP upgrade target release.

7. Ensure that you have a current Snapshot copy of the root volume of any system being upgraded.

   For more information about creating Snapshot copies, see the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode*.

8. If you have storage systems in high-availability configurations, verify that they are correctly configured by using the Config Advisor tool.

9. If you are using SnapMirror, identify the source and destination storage systems, and ensure that the following requirements are met, depending on the type and mode of replication:

If you are using...	Then...
Volume SnapMirror	Ensure that you upgrade the storage systems containing the destination volumes *before* you upgrade the storage systems with the source volumes.

If you are using...	Then...
Synchronous SnapMirror or semi-synchronous SnapMirror	Ensure that the storage systems containing the source volumes and the storage systems containing the destination volumes are running the same Data ONTAP version, so that you can upgrade the systems simultaneously.

These requirements do not apply to qtree SnapMirror.

10. If you are running MetroCluster systems, verify that all MetroCluster components are compatible with the target release.

    For more information, see your MetroCluster documentation and the MetroCluster Compatibility Matrix. If your MetroCluster uses LUNs on storage arrays, see also the *Interoperability Matrix*.

11. If you are using the nondisruptive upgrade method, ensure that your systems meet the requirements for nondisruptive upgrades.

Related concepts

Identifying potential upgrade issues on page 21
Verifying HA configuration before the upgrade

Related tasks

Detecting outdated disk firmware using AutoSupport on page 64

Related information

Interoperability Matrix: support.netapp.com/NOW/products/interoperability
Config Advisor (WireGauge renamed): support.netapp.com/NOW/download/tools/config_advisor/

Verifying system requirements

Before you upgrade, you must make sure your system meets the minimum requirements.

Ensuring that there is adequate free space in every volume containing LUNs

Before upgrading a storage system in a SAN environment, you must ensure that every volume containing LUNs has available at least 1 MB of free space. The space is needed to accommodate changes in the on-disk data structures used by the new version of Data ONTAP.

About this task

“LUNs” in this context refers to the LUNs that Data ONTAP serves to clients, not to the array LUNs used for storage on a storage array.

Steps

1. Check free space in a volume containing LUNs by entering the following command at the storage system command line:

   df

2. If the volume does not have at least 1 MB (1,024 KB) of free space, create free space in the full volume either by deleting unnecessary data or by growing the size of the volume.

Verifying that deduplicated volumes and aggregates contain sufficient free space

Before upgrading Data ONTAP, you must verify that any deduplicated volumes and the aggregates that contain them have sufficient free space for the deduplication metadata. If there is insufficient free space, deduplication will be disabled when the Data ONTAP upgrade is completed.

About this task

Each deduplicated volume must contain at least 4% free space. Each aggregate that contains a deduplicated volume must contain at least 3% free space.

Steps

1. Determine which volumes are deduplicated:

   sis status

2. Determine the free space available on each volume that you identified:

   df *volume_pathname*

   Each deduplicated volume must not contain more than 96% used capacity.

   ### Example

   In this example, the `capacity` field displays the percentage of used space on the deduplicated volume identified earlier (vol_2).

   ```
   Filesystem              kbytes       used      avail capacity  Mounted on
   /vol/vol_2/           19456000     264000   19192000       1%  /
   /vol/vol_2/.snapshot      1024          0       1024       0%  //.snapshot
   ```

   For details on how to increase the size of a volume, see the *Data ONTAP Storage Management Guide for 7-Mode*.

3. Identify the free space available on each aggregate that contains a deduplicated volume:

   df *aggregate_pathname*

   Each aggregate must not contain more than 97% used capacity.

Example

In this example, the `capacity` field displays the percentage of used space on the aggregate containing the deduplicated volume (aggr_2).

```
Aggregate               kbytes       used      avail capacity
aggr_2                344220000   20944000  323276000       6%
aggr_2/.snapshot              0          0          0       0%
```

For details on how to increase the size of an aggregate, see the *Data ONTAP Storage Management Guide for 7-Mode*.

Determining the required firmware for your disks

By viewing the latest required firmware revisions for FC and SAS disks on the NetApp Support Site, you can determine whether you need to update the disk firmware for your system.

Steps

1. Use a web browser to go to the NetApp Support Site at *support.netapp.com*.
2. Click **Software** in the Download section.
3. Select **Firmware > Disk Drive & Firmware Matrix**.
4. When the **Disk Drive & Firmware Matrix** page appears, click the link to the firmware revision needed for drives attached to your system.

Result

A page is displayed that includes installation procedures, other information about the disk firmware, and links to download images.

Verifying the HA pair configuration

You can go to the NetApp Support Site and download the Config Advisor tool to check for common configuration errors.

About this task

Config Advisor is a configuration validation and health check tool for NetApp systems. It can be deployed at both secure sites and non-secure sites for data collection and system analysis.

Note: Support for Config Advisor is limited, and available only online.

Steps

1. Log in to the NetApp Support Site at *support.netapp.com* and go to **Downloads > Utility ToolChest**.

2. Click **Config Advisor (WireGauge renamed)**.
3. Follow the directions on the web page for downloading, installing, and running the utility.
4. After running Config Advisor, review the tool's output and follow the recommendations to address any issues discovered.

Creating a performance baseline with Perfstat Converged

The Performance and Statistics Collector (Perfstat Converged) is a storage system diagnostics data collection tool, available on the NetApp Support Site, that enables you to establish a performance baseline for comparison after the upgrade. You should create a Perfstat report before upgrading.

About this task

You should create a Perfstat report during a typical usage time; this takes about 30 minutes.

Steps

1. Download Perfstat Converged from the NetApp Support Site at *support.netapp.com/NOW/download/tools/perfstat*.
2. Enter the following command during a typical usage period:

   ```
   perfstat8 -n system_name -t 4 -i 5 -z
   ```

After you finish

You should retain the output file for several weeks after the Data ONTAP upgrade is complete.

Preparing for nondisruptive upgrades

You must complete certain steps to ensure a successful nondisruptive upgrade procedure. Configurations that are eligible for nondisruptive upgrades must meet certain protocol and availability requirements.

Steps

1. Ensure that your HA pair is optimally configured and functioning correctly.

   The system clocks on both partner systems should be synchronized with a time server. A discrepancy in system time between the partner systems could cause problems with the upgrade.

   You can verify that your HA pair is properly configured by running the HA Configuration Checker.
2. Ensure that network ports are up and functioning correctly by entering the following command:

   ```
   ifconfig -a
   ```

Example

For each interface, you see a display similar to the following:

```
e0a: flags=0x2f4c867<UP,BROADCAST,RUNNING,MULTICAST,TCPCKSUM,LINK_UP>
mtu 1500
  inet 192.9.200.41 netmask 0xffffff00 broadcast 192.9.200.255
  partner e0a 192.9.200.42
  ether 00:0c:29:56:54:7e (auto-1000t-fd-up) flowcontrol full
```

For each interface that serves data traffic, you must ensure that each of the following is true:

- The interface has a partner that also serves data; that is, the partner is not an e0M or e0P interface.
- The link to the local interface is up.
- The `mtu` parameter settings are the same for both partners.
- Partnered interfaces are on the same LAN (the same broadcast domain).

  For example, an interface named e0a-10 should be partnered only with another VLAN with tag 10, such as e0b-10.
- Partnered interfaces have matching settings for the `interface.blocked.protocol` option.

  For example, if CIFS is blocked on e0a and e0a is partnered with e0b, CIFS should also be blocked on e0b.

If your system includes multiple interface groups, you might also want to confirm their activity with the `ifgrp status` command.

3. If you edited the `/etc/rc` file, ensure that entries are listed in the following order:

```
hostname system_name
ifgrp [commands]
vlan [commands]
ifconfig [commands]
vfiler [commands]
route [commands]
[any other commands]
```

4. If your systems include e0M management interfaces, ensure that they are serving only management traffic on a dedicated management LAN or that they are configured down.

   If an e0M interface is serving management traffic, it should be partnered with another e0M interface.

   For more information about e0M configuration, see the *Data ONTAP System Administration Guide for 7-Mode*.

5. If your systems include e0P interfaces for controlling SAS disk shelves, ensure that they are connected only to a private ACP network or that they are configured down.

   e0P interfaces should not be partnered.

For more information about ACP configuration, see the *Data ONTAP Storage Management Guide for 7-Mode*.

6. Ensure that your clients are optimally configured and functioning correctly.

   Check service protocols and configure client timeout settings to ensure that they meet the availability requirements for a nondisruptive upgrade.

7. Verify that your SAN configuration is fully supported.

   All SAN components—including target Data ONTAP software version, host OS and patches, required Host Utilities software, and adapter drivers and firmware—should be listed in the Interoperability Matrix on the NetApp Support Site.

8. If the automatic giveback option, `cf.giveback.auto.enable`, is set to `on`, disable automatic giveback by entering the following command on one of your storage systems in the HA pair:

   `options cf.giveback.auto.enable off`

   After the upgrade procedure, you can reset this option to `on` (if desired).

9. Ensure that you have no failed disks on either node.

   If either node has failed disks, giveback might fail. To avoid this issue, remove any failed disks before entering the `cf giveback` command.

10. Remove any old core files from the `/etc/crash` directory.

    For more information about managing the contents of the `/etc/crash` directory and deleting old core files, see the savecore(1) man page.

11. If you use deduplication technology, ensure that your system includes no more than 500 deduplicated volumes and that no deduplication operations are active during the Data ONTAP upgrade.

12. If you use SnapMirror technology, ensure that SnapMirror is suspended and no SnapMirror operations are in process while upgrading Data ONTAP.

13. If you use FlexClone technology, enter the following command to ensure that no block sharing operations are in progress on clone volumes:

    `clone status` ***`vol_name`***

    Any automated applications performing clone operations must be stopped to prevent an error when the system reboots. After the node is rebooted, the automated script resumes normal operation.

Related concepts

Optimal service availability during upgrades on page 99
Disk firmware updates on page 62
Disk shelf firmware updates on page 64

Related tasks

Planning your upgrade with Upgrade Advisor on page 8

Preparing for nondisruptive upgrades on systems with VMware ESX server hosts

Before performing a nondisruptive upgrade on storage systems exporting data over NFS to VMware ESX server hosts, you must verify that your client's NAS components are correctly configured, to ensure service availability for VMware guest operating systems during the upgrade.

About this task

These steps must be performed from the ESX server or guest operating systems, not from the storage system.

Steps

1. Increase the NFS datastore's heartbeat time on the ESX server.

   The following parameters should be set to the recommended values:

Parameter	Value
`NFS.HeartbeatFrequency`	12
`NFS.HeartbeatMaxFailures`	10

   For more information about setting ESX server parameters, see the ESX documentation.

2. Set the SCSI Disk timeout value on all guest operating systems to 190 seconds.

   You can obtain scripts to set the recommended SCSI disk settings in the guest operating systems for use with VMware ESX 3.5 and storage systems running Data ONTAP. When downloaded and run on the guest operating systems, the scripts create and modify the necessary files for each guest operating system type. Using the scripts ensures that the correct timeout settings are used in the guest operating systems to achieve maximum I/O resiliency when the guest operating systems are connected to storage systems.

   For more information about obtaining and running the scripts, see the knowledgebase article *VMware ESX Guest OS I/O Timeout Settings for NetApp Storage Systems* on the NetApp Support Site.

3. Align the file systems that use virtual machine disk format (VMDK) on Windows with the storage systems' WAFL file system.

   This step is optional but recommended for best performance.

   Virtual machines store their data on virtual disks. As with physical disks, these disks are formatted with a file system. When formatting a virtual disk, the file systems with VMDK format,

the datastore, and the storage array should be in proper alignment. Misalignment of the virtual machine's file system can result in degraded performance.

When aligning the partitions of virtual disks for use with storage systems, the starting partition offset value must be divisible by 4,096. The recommended starting offset value for Windows 2000, 2003, and XP operating systems is 32,768. Windows 2008 and Vista default at 1,048,576; that value does not require any adjustments.

For more information about aligning virtual disks and WAFL file systems, see *Virtual Machine Partition Alignment* in the Technical Report *NetApp and VMware Virtual Infrastructure 3, Storage Best Practices*.

Related information

NetApp and VMware Virtual Infrastructure 3, Storage Best Practices: media.netapp.com/documents/tr-3428.pdf

VMware ESX Guest OS I/O Timeout Settings for NetApp Storage Systems: kb.netapp.com/support (Search for the article 2010823)

Obtaining Data ONTAP software images

You must copy a software image from the NetApp Support Site to your storage system using UNIX or Windows client connections. Alternatively, you can copy software images to an HTTP server on your network, and then storage systems can access the images using the `software` command.

To upgrade the storage system to the latest release of Data ONTAP, you need access to software images. Software images, firmware version information, and the latest firmware for your storage system model are available on the NetApp Support Site. Note the following important information:

- Software images are specific to storage system models.
  Be sure to obtain the correct image for your system.
- Software images include the latest version of system firmware that was available when a given version of Data ONTAP was released.

Related information

Download Software: support.netapp.com/NOW/cgi-bin/software

System Firmware + Diagnostics Download: support.netapp.com/NOW/cgi-bin/fw

Obtaining images for HTTP servers

If you have an HTTP server that is accessible to your storage system, you can copy Data ONTAP software images to the HTTP server and use the `software` command to download and install Data ONTAP software images to your storage system.

For more information, see the software (1) man page.

Related concepts

Installing Data ONTAP software images on page 40

Copying the software image to the HTTP server

You must copy the software image file to the HTTP server. This task prepares the HTTP server to serve software images to storage systems in your environment.

Step

1. Copy the software image (for example, `821_q_image.tgz`) from the NetApp Support Site or another system to the directory on the HTTP server from which the file is served.

Copying software images from the HTTP server without installing the images

You can copy software images to your storage system without immediately installing them. You might copy them, for instance, if you want to perform the installation later.

Step

1. Enter the following command from the storage system console:

   software get *url* -f *filename*

   url is the HTTP location from which you want to copy the Data ONTAP software images.

   Use the following URL syntax if you need to specify a user name, password, host, and port to access files on the HTTP server using Basic Access Authentication (RFC2617):

   http://*username:password@host:port/path*

   Use the `-f` flag to overwrite an existing software file of the same name in the storage system's `/etc/software` directory. If a file of the same name exists and you do not use the `-f` flag, the download fails and you are prompted to use `-f`.

   filename is the file name you specify for the software file being downloaded to your storage system. If no destination file name is specified, Data ONTAP uses the file name listed in the URL from which you are downloading and places the copy in the `/etc/software` directory on the storage system.

Example

In the following example, the `software get` command uses a new destination file name:

software get http://www.example.com/downloads/x86-64/821_q_image.tgz 821_mailboxes_q.tgz

You see a message similar to the following:

```
software: copying to /etc/software/821_mailboxes_q.tgz
software: 100% file read from location.
software: /etc/software/821_mailboxes_q.tgz has been copied.
```

Obtaining images for UNIX clients

If you are using a UNIX client to copy a Data ONTAP software image to your storage system, you need access to both the storage system's console and the system's upgrade host. If the upgrade host

does not have a web connection, you must also have access to a client system that can reach the NetApp Support Site.

Related concepts

Upgrade host requirements on page 12
Installing Data ONTAP software images on page 40

Mounting the storage system on your client

Before you copy a software image to your storage system, you must mount the system on your UNIX upgrade host.

Steps

1. As root user, mount the storage system's root file system to the client's `/mnt` directory by using the following command:

   `mount system:/vol/vol0 /mnt`

   `system` is the name of the storage system.

   `/mnt` is the directory on the client where you want to mount the storage system's root file system.

2. Change to the *`/mnt`* directory by using the following command on your UNIX client console:

   `cd /mnt`

   `/mnt` is the directory on the client where you mounted the storage system's root file system.

3. To acquire Data ONTAP files, download the Data ONTAP files by using a web browser from the NetApp Support Site.

Obtaining software images for UNIX clients

You can use a web browser to copy the software image from the NetApp Support Site to a UNIX client.

About this task

You can copy the software image directly to your upgrade host. If your upgrade host does not have web access, you can copy the software image to portable storage media attached to a different client, then copy the image from portable storage to the upgrade host.

Steps

1. Use a web browser to log in to the NetApp Support Site.
2. Navigate to the Download Software area.
3. In the Software Download table, click the **Select Platform** list box in the Data ONTAP product row.

4. Select your storage system type from the list, and then click **Go**.
5. Follow the prompts to reach the software download page.
6. After you choose the software image that corresponds to your platform, complete one of the following actions, depending on your web environment:

If you are connecting to the NetApp Support Site from...	Then...
An upgrade host	Save the image to the `.../etc/software` directory on the mountpoint that you chose when you mounted the storage system on your client.
Another UNIX client	**a.** Save the image to portable storage media. **b.** Connect the portable storage media to your upgrade host. **c.** Copy the image to the `.../etc/software` directory on the mountpoint that you chose when you mounted the storage system on your client.

7. Continue with the installation procedures.

Obtaining images for Windows clients

If you are using a Windows client to copy a Data ONTAP software image to your storage system, you need access to both the storage system's console and the system's upgrade host. If the upgrade host does not have a web connection, you must also have access to a client system that can reach the NetApp Support Site.

Related concepts

Upgrade host requirements on page 12
Installing Data ONTAP software images on page 40

Mapping the storage system to your Windows host

Before you copy a software image to your storage system, you must map the root directory of the system to your Windows upgrade host.

Before you begin

The CIFS service must be running, and the Administrator user must be defined in CIFS as having authority to access the `C$` directory.

Steps

1. Log in to your client as Administrator, or log in using an account that has full control on the storage system `C$` directory.

2. Map a drive to the `C$` directory of your storage system.

   Note: On some computers, firewall software might not permit you to map a drive to the `C$` directory of a storage system. To complete this procedure, disable the firewall until you no longer need access to the storage system through your laptop.

3. Copy the software image from the NetApp Support Site.

Obtaining software images for Windows clients

You can use a web browser to copy the software image from the NetApp Support Site to a Windows client.

About this task

You can copy the software image directly to your upgrade host. If your upgrade host does not have web access, you can copy the software image to portable storage media attached to a different client, then copy the image from portable storage to the upgrade host.

Steps

1. Use a web browser to log in to the NetApp Support Site.
2. Navigate to the Download Software area.
3. In the Software Download table, click the **Select Platform** list box in the Data ONTAP product row.
4. Select your storage system type from the list and click **Go**.
5. Follow the prompts to reach the software download page.
6. After you have chosen the software image that corresponds to your platform, complete one of the following actions, depending on your web environment:

If you are connecting to the NetApp Support Site from...	Then do this...
An upgrade host	Save the image to the `\etc\software` directory on the mountpoint that you chose previously, when you mounted the storage system on your client.
Another Windows client	**a.** Save the image to portable storage media. **b.** Connect the portable storage media to your upgrade host. **c.** Copy the image to the `\etc\software` directory on the mountpoint that you chose previously, when you mounted the storage system on your client.

7. Continue with the installation procedures.

Commands for managing files in the /etc/software directory

After you have copied Data ONTAP system files to the `/etc/software` directory on your storage system, you can manage them from the storage system console by using the `software` command.

You use the `software` command to manage files in the /etc/software directory:

If you want to...	**Then use the following command...**
List the contents of the `/etc/software` directory	`software list`
Delete files from the `/etc/software` directory	`software delete`

For more information, see the software(1) command man page.

Installing Data ONTAP software images

You should use the `software update` command to extract and install the system files on a storage system.

You can use the `software update` command to install a software image you have already copied to your storage system, or to copy and install the image from an HTTP server.

You must know the location of and have access to the software image. The `software update` command requires one of the following as an argument:

- The name of the software image you copied to the `/etc/software` directory
- The URL of the HTTP server that you configured to serve software images

The `software update` command enables you to perform several operations at one time. For example, if you use an HTTP server to distribute software images, you can copy an image from the HTTP server, extract and install the system files, download the files to the boot device, and reboot your system with one command.

For more information about the `software update` command and its options, see the software(1) man page.

Installing software images from an HTTP server

To install software images, you must know the URL of an HTTP server in your environment that is configured to serve software images.

Step

1. From the storage system prompt, enter the following command:

   `software update` ***`url options`***

   - *`url`* is the URL of the HTTP server and subdirectory.
   - *`options`* is one or more of the following:
     - The `-d` option prevents the `download` command from being run automatically after the system files are installed.
     - The `-f` option overwrites the existing image in the `/etc/software` directory.
     - The `-r` option prevents the system from rebooting automatically after the `download` command has finished (default).
     - The `-R` option causes the system to reboot automatically after the `download` command has finished.

Example

You can use the following commands to copy and install the Data ONTAP software image:

If you want to...	Then you can enter...
Copy and install the image from your HTTP server	**software update http://www.example.com/downloads/x86-64/my_new_setup_i.tgz -d**
Copy and install the image from your HTTP server and overwrite an existing image	**software update http://www.example.com/downloads/x86-64/my_new_setup_i.tgz -d -f**
Copy and install the image from your HTTP server, then download the new system files to the boot device immediately after installing them	**software update http://www.example.com/downloads/x86-64/my_new_setup_i.tgz**
Copy and install the image from your HTTP server to a single system, then download the new system files and reboot immediately	**software update http://www.example.com/downloads/x86-64/my_new_setup_i.tgz -R**

When you use the `software update` command without the options, a message similar to the following appears on your storage system console:

```
software: You can cancel this operation by hitting Ctrl-C in the next
6 seconds.
software: Depending on system load, it might take many minutes
software: to complete this operation. Until it finishes, you will
software: not be able to use the console.
software: copying to <filename>
software: 100% file read from location.
software: /etc/software/<filename> has been copied.
software: installing software, this could take a few minutes...
software: Data ONTAP Package Manager Verifier 1
software: Validating metadata entries in /etc/boot/NPM_METADATA.txt
software: Checking sha1 checksum of file checksum file: /etc/boot/
NPM_FCSUM-pc.sha1.asc
software: Checking sha1 file checksums in /etc/boot/NPM_FCSUM-
pc.sha1.asc
software: installation of <filename> completed.
Mon Oct 2 13:26:17 PDT [filer: rc:info]: software: installation of
<filename> completed.
software: Reminder: You might need to upgrade Volume SnapMirror
destination
software: filers associated with this filer. Volume SnapMirror can
not mirror
software: if the version of ONTAP on the source filer is newer than
that on
software: the destination filer.
Mon Oct 2 13:26:17 PDT [filer: download.request:notice]
```

After you finish

Complete the installation by downloading to HA pairs or single systems.

Related concepts

Downloading and upgrading new Data ONTAP software on page 44

Installing software images from the /etc/software directory

To install software images, the new software image must be present in the `/etc/software` directory on your storage system.

Step

1. From the storage system prompt, enter the following command:

   `software update` ***`file options`***

   - *`file`* is the name of the software image you copied to the `/etc/software` directory.
   - *`options`* is one or more of the following:
     - The `-d` option prevents the `download` command from being run automatically after the system files are installed.
     - The `-f` option overwrites the existing image in the `/etc/software` directory.
     - The `-r` option prevents the system from rebooting automatically after the `download` command has finished (default).
     - The `-R` option causes the system to reboot automatically after the `download` command has finished.

Example

Use the following commands to copy and install the Data ONTAP software image:

If you want to...	Then you can enter...
Install the new system files from the `/etc/software` directory	**`software update my_new_setup_i.tgz -d`**
Download the new system files to the boot device immediately after installing them	**`software update my_new_setup_i.tgz`**
Perform an upgrade on a single system and reboot immediately	**`software update my_new_setup_i.tgz -R`**

When you use the `software update` command without the options, a message similar to the following appears on your storage system console:

```
software: You can cancel this operation by hitting Ctrl-C in the next
6 seconds.
software: Depending on system load, it might take many minutes
software: to complete this operation. Until it finishes, you will
software: not be able to use the console.
software: copying to <filename>
software: 100% file read from location.
software: /etc/software/<filename> has been copied.
software: installing software, this could take a few minutes...
software: Data ONTAP Package Manager Verifier 1
software: Validating metadata entries in /etc/boot/NPM_METADATA.txt
software: Checking sha1 checksum of file checksum file: /etc/boot/
NPM_FCSUM-pc.sha1.asc
software: Checking sha1 file checksums in /etc/boot/NPM_FCSUM-
pc.sha1.asc
software: installation of <filename> completed.
Mon Oct 2 13:26:17 PDT [filer: rc:info]: software: installation of
<filename> completed.
```

```
software: Reminder: You might need to upgrade Volume SnapMirror
destination
software: filers associated with this filer. Volume SnapMirror can
not mirror
software: if the version of ONTAP on the source filer is newer than
that on
software: the destination filer.
Mon Oct 2 13:26:17 PDT [filer: download.request:notice]
```

After you finish

Complete the installation by downloading to HA pairs or single systems.

Related concepts

Downloading and upgrading new Data ONTAP software on page 44

Downloading and upgrading new Data ONTAP software

You must select an upgrade method based on your source release and service requirements.

You can select one of the following four upgrade methods:

- Nondisruptive upgrade of high-availability configurations between release families (major NDU)
- Nondisruptive upgrade of high-availability configurations within a release family (minor NDU)
- Standard upgrade of high-availability configurations
- Standard upgrade of single systems

Before initiating any of these procedures, preparatory requirements must be satisfied and Data ONTAP upgrade images must be installed on the systems.

If you are upgrading systems in a SnapMirror environment, you must also follow these instructions:

- Upgrade them in the correct order.
- Suspend SnapMirror operations before performing a nondisruptive upgrade.

Related concepts

Release family upgrade requirements on page 15
Disruptive upgrade requirements on page 21
Nondisruptive upgrade requirements on page 17

Upgrading in a SnapMirror environment

You can upgrade Data ONTAP on systems that use SnapMirror for volume replication, synchronous and semi-synchronous replication, and bidirectional volume replication. The order in which you upgrade the systems is critical. If you do not upgrade in the correct order, SnapMirror transfers might not work correctly.

About this task

If you are upgrading nondisruptively or if you have a system that has destination volumes and source volumes, you must suspend SnapMirror operations before upgrading, and resume SnapMirror operations after the upgrade is finished.

SnapMirror source volumes can be replicated to single or multiple destination volumes. Replication to multiple destination volumes is also referred to as *cascading destinations*. In addition, when you upgrade storage systems in a cascading series, you should upgrade the systems in order, depending on the type of SnapMirror replication.

Steps

1. Identify any destination volumes by entering the following command on the storage system with the source volume:

   snapmirror destinations

   The `snapmirror` command lists all destination volumes, including cascaded destinations.

2. Upgrade the systems containing the source volumes and the systems containing the destination volumes, depending on the type and mode of SnapMirror replication:

If you are using...	Then...
Volume SnapMirror	Upgrade the storage systems containing the destination volumes, beginning with the furthest system in the topology (that is, the last system in a series of cascading destinations), and then upgrade the storage systems containing the source volumes.
Synchronous SnapMirror or semi-synchronous SnapMirror	Upgrade the storage systems containing the source volumes and the storage systems containing the destination volumes simultaneously.
Qtree SnapMirror	Upgrade the storage systems containing the source volumes before or after you upgrade the storage systems containing the destination volumes.

Upgrading nondisruptively in a SnapMirror environment

You must suspend SnapMirror operations before performing a nondisruptive upgrade of Data ONTAP.

About this task

The requirement to suspend SnapMirror operations applies to both synchronous and asynchronous SnapMirror modes.

For more information about SnapMirror operations, see the snapmirror(1) man page and the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode*.

Steps

1. For each destination volume, enter the following command to allow existing SnapMirror transfers to finish:

   snapmirror quiesce *destination*

   #### Example

   To quiesce transfers involving the destination volume toaster-cl1-cn:vol1, enter the following command:

   snapmirror quiesce toaster-cl1-cn:vol1

2. Enter the following command on both source and destination systems to disable SnapMirror operations:

   snapmirror off

   As an alternative, you can set the `snapmirror.enable` option to `off`.

3. Complete the nondisruptive upgrade according to your upgrade plan.
4. Enter the following command to reenable SnapMirror operations:

   snapmirror on

Upgrading HA configurations from an earlier release family nondisruptively

You can upgrade HA pairs to a new Data ONTAP release family while maintaining storage system availability. This nondisruptive upgrade method has several steps: initiating a failover operation on one system, updating the "failed" system (and if necessary, its firmware), initiating giveback, and repeating the process on the other system.

Before you begin

Prerequisites must be satisfied before a nondisruptive upgrade can be performed.

Steps

1. Trigger an AutoSupport notification by entering the following command at the console of each storage system controller:

   options autosupport.doit starting_NDU

   This AutoSupport notification includes a record of the system status just prior to upgrade. It saves useful troubleshooting information in case there is a problem with the upgrade process.

   If your system is not configured to send AutoSupport messages, a copy of the notification is saved locally.

2. At the console of each storage system, enter the following command to verify that the HA pair is enabled:

   cf status

   The `cf status` command output should be similar to the following:

   ```
   Cluster enabled, systemA is up.
   ```

   If the output indicates that the HA pair is not enabled, do the following:

   a. Enable the HA pair:

      cf enable

b. Verify that the HA pair is re-enabled:

`cf status`

3. Choose one of the following options depending on whether you have already installed new system files:

If you...	Then...

Have already installed system files	At the console of each system, enter the following command to activate the new code on the storage system's boot device:
	`download`
	The `download` command provides an acknowledgment similar to the following:
	`Tue Jun 19 10:03:22 GMT [download.request:notice]: Operator requested download initiated`
	`download: Downloading boot device`
	`.....`
	`download: Downloading boot device (Service Area)`
	Then a message similar to the following appears:
	`Tues Jun 19 10:11:51 GMT [download.requestDone:notice]: Operator requested download completed`
	The storage system console is unavailable until the `download` procedure is complete.

Are installing and downloading system files in the same operation	At the console of each system, enter the following command: **`software update`** ***`file_name`*** **`-r`** When you use the `software update` command without the `-d` option, the `download` command is executed by default.

Activating Data ONTAP 8.x software images with the `download` command takes significantly longer than on earlier releases. The process for Data ONTAP 8.x usually finishes in 20 to 60 minutes.

4. If CIFS is in use in System A, terminate it by entering the following command:

`cifs terminate -t` ***`nn`***

nn is a notification period (in minutes) appropriate for your clients after which CIFS services are terminated. After that period of time, go to the next step.

5. At the console of system B, enter the following command:

`cf takeover`

This causes system A to shut down gracefully, leaving system B in takeover mode.

6. Wait 8 minutes to ensure the following conditions:

- Client multipathing (if deployed) is stabilized.
- Clients are recovered from the pause in I/O that occurs during takeover.
  The recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

7. Enter the following command at the console of system B:

```
cf giveback
```

Attention: The giveback is not initiated and an error message is returned if any conditions such as the following are detected:

- Open client sessions (such as CIFS sessions)
- Long-running operations
- Operations that cannot be restarted (such as tape backup or SyncMirror resynchronization)
- Error conditions (such as disk connectivity mismatch between the nodes)

If giveback is not initiated, complete the following steps:

a. Address the condition described in the error message, ensuring that any identified operations are terminated gracefully.

b. Re-initiate giveback with the `-f` option:

```
cf giveback -f
```

For more information about the `-f` option, see the cf(1) man page.

The command causes system A to reboot with the new system configuration—a Data ONTAP version and any new system firmware and hardware changes—and resume normal operation as an HA pair partner.

Note: At this point in the upgrade procedure, with system A running the new Data ONTAP version and system B running an earlier Data ONTAP release family, the systems are in a state of *version mismatch*. This means that normal high-availability functions such as NVRAM mirroring and automatic takeover are not in effect. You might see error messages indicating version mismatch and mailbox format problems. This is expected behavior; it represents a temporary state in a major nondisruptive upgrade and is not harmful.

You should complete the upgrade procedure as quickly as possible; do not allow the two systems to remain in a state of version mismatch longer than necessary.

8. Wait 8 minutes to ensure the following conditions:

- Client multipathing (if deployed) is stabilized.
- Clients are recovered from the pause in I/O that occurs during takeover.
  The recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

9. If CIFS is in use in System B, terminate it by entering the following command:

```
cifs terminate -t nn
```

nn is a notification period (in minutes) appropriate for your clients after which CIFS services are terminated. After that period of time, go to the next step.

10. At the console of system A, enter the following command:

```
cf takeover -n
```

This causes system B to shut down cleanly, flushing file-system information in memory to disk.

Note: The `-n` option of the `cf takeover` command should only be used for major nondisruptive upgrades. If run during a minor nondisruptive upgrade or a non-upgrade takeover, it generates an error and the command terminates.

11. Wait 8 minutes to ensure the following conditions:

- Client multipathing (if deployed) is stabilized.
- Clients are recovered from the pause in I/O that occurs during takeover.
  The recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

12. Enter the following command at the console of system A:

```
cf giveback
```

Attention: The giveback is not initiated and an error message is returned if any conditions such as the following are detected:

- Open client sessions (such as CIFS sessions)
- Long-running operations
- Operations that cannot be restarted (such as tape backup or SyncMirror resynchronization)
- Error conditions (such as disk connectivity mismatch between the nodes)

If giveback is not initiated, complete the following steps:

a. Address the condition described in the error message, ensuring that any identified operations are terminated gracefully.

b. Re-initiate giveback with the `-f` option:

```
cf giveback -f
```

For more information about the `-f` option, see the cf(1) man page.

System B reboots with the new system configuration—a Data ONTAP version and any system firmware and hardware changes—and resumes normal operation as high-availability partner.

When the reboot is finished, the two high-availability nodes are running the same Data ONTAP version.

13. Trigger another AutoSupport notification by entering the following command at the console of each storage system controller:

```
options autosupport.doit finishing_NDU
```

Upgrading HA pairs within a release family nondisruptively

You can upgrade HA pairs within a Data ONTAP release family while maintaining storage system availability. This nondisruptive upgrade method has several steps: initiating a failover operation on one system, updating the “failed” system (and if necessary, its firmware), initiating giveback, and repeating the process on the other system.

Steps

1. Trigger an AutoSupport notification by entering the following command at the console of each storage system controller:

   `options autosupport.doit starting_NDU`

   This AutoSupport notification includes a record of the system status just prior to upgrade. It saves useful troubleshooting information in case there is a problem with the upgrade process.

   If your system is not configured to send AutoSupport messages, a copy of the notification is saved locally.

2. At the console of each storage system, enter the following command to verify that the HA pair is enabled:

   `cf status`

   The `cf status` command output should be similar to the following:

   ```
   Cluster enabled, systemA is up.
   ```

   If the output indicates that the HA pair is not enabled, do the following:

   a. Enable the HA pair:

      `cf enable`

   b. Verify that the HA pair is re-enabled:

      `cf status`

3. Choose one of the following options depending on whether you have already installed new system files:

If you...	Then...

Have already installed system files	At the console of each system, enter the following command to activate the new code on the storage system's boot device:
	`download`
	The `download` command provides an acknowledgment similar to the following:
	`Tue Jun 19 10:03:22 GMT [download.request:notice]: Operator requested download initiated`
	`download: Downloading boot device`
	`.....`
	`download: Downloading boot device (Service Area)`
	Then a message similar to the following appears:
	`Tues Jun 19 10:11:51 GMT [download.requestDone:notice]: Operator requested download completed`
	The storage system console is unavailable until the `download` procedure is complete.

Are installing and downloading system files in the same operation	At the console of each system, enter the following command: **`software update`** ***`file_name`*** **`-r`** When you use the `software update` command without the `-d` option, the `download` command is executed by default.

Activating Data ONTAP 8.x software images with the `download` command takes significantly longer than on earlier releases. The process for Data ONTAP 8.x usually finishes in 20 to 60 minutes.

4. If CIFS is in use in System A, terminate it by entering the following command:

`cifs terminate -t` ***`nn`***

nn is a notification period (in minutes) appropriate for your clients after which CIFS services are terminated. After that period of time, go to the next step.

5. At the console of system B, enter the following command:

`cf takeover`

System A shuts down gracefully and leaves system B in takeover mode.

6. Wait 8 minutes to ensure the following conditions:

- Client multipathing (if deployed) is stabilized.
- Clients are recovered from the pause in I/O that occurs during takeover.

  The recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

7. Enter the following command at the console of system B:

cf giveback

Attention: The giveback is not initiated and an error message is returned if any conditions such as the following are detected:

- Open client sessions (such as CIFS sessions)
- Long-running operations
- Operations that cannot be restarted (such as tape backup or SyncMirror resynchronization)
- Error conditions (such as disk connectivity mismatch between the nodes)

If giveback is not initiated, complete the following steps:

a. Address the condition described in the error message, ensuring that any identified operations are terminated gracefully.

b. Re-initiate giveback with the `-f` option:

cf giveback -f

For more information about the `-f` option, see the cf(1) man page.

System A reboots with the new system configuration—a Data ONTAP version or other system firmware and hardware changes—and resumes normal operation as an HA pair partner.

8. Wait 8 minutes to ensure the following conditions:

- Client multipathing (if deployed) is stabilized.
- Clients are recovered from the pause in I/O that occurs during takeover.
  The recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

9. Repeat Step *4* on page 51 through Step *7* on page 51 to update the partner storage system.

System B is brought down and updated while partner A is in takeover mode.

10. Trigger another AutoSupport notification by entering the following command at the console of each storage system controller:

options autosupport.doit finishing_NDU

Upgrading HA configurations using the disruptive method

If you can take HA pairs offline to update software and other components, you can use the disruptive upgrade method. This method has several steps: disabling the HA configuration from the console of one of the systems, updating each system (and if necessary, its firmware), and reenabling the HA configuration between the two systems.

Before you begin

The following prerequisites must be satisfied.

Steps

1. Disable the HA configuration by entering the following command at the console of one of the storage systems:

   `cf disable`

2. Choose one of the following options depending on whether you have already installed new system files:

If you...	Then...

Have already installed system files	At the console of each system, enter the following command to activate the new code on the storage system's boot device:
	`download`
	The `download` command provides an acknowledgment similar to the following:
	`Tue Jun 19 10:03:22 GMT [download.request:notice]: Operator requested download initiated`
	`download: Downloading boot device`
	`.....`
	`download: Downloading boot device (Service Area)`
	Then a message similar to the following appears:
	`Tues Jun 19 10:11:51 GMT [download.requestDone:notice]: Operator requested download completed`
	The storage system console is unavailable until the `download` procedure is complete.

Are installing and downloading system files in the same operation	At the console of each system, enter the following command: **`software update`** ***`file_name`*** **`-r`** When you use the `software update` command without the `-d` option, the `download` command is executed by default.

   Activating Data ONTAP 8.x software images with the `download` command takes significantly longer than on earlier releases. The process for Data ONTAP 8.x usually finishes in 20 to 60 minutes.

3. Enter the following command at the console of system A:

   `halt`

   After the system shuts down, the LOADER prompt appears.

4. After halting the system, check the Boot Loader messages for a warning similar to the following:
   `Warning: The CompactFlash contains newer firmware image (x.y.z). Please run "update_flash" at Loader prompt to update your system firmware (x.x.x).`

5. Perform one of the following actions:

If you...	Then...
Do not see this warning	BIOS firmware is updated automatically if needed. At the boot environment prompt, enter the following command to reboot the system using the new software and, if applicable, the new firmware: **bye**
See this warning	You must update BIOS firmware manually. After the new BIOS system firmware is installed, future system firmware updates take place automatically. **a.** At the boot environment prompt, enter the following command to reset the system: **bye** **b.** To display the boot environment prompt at the system B console, press Ctrl-c at the system B console when instructed after the boot sequence starts. You can also display the boot environment prompt by pressing Ctrl-c at the system A console when the `Waiting for giveback` message appears at the console of system B. When prompted to halt the node rather than wait, enter **y**. **c.** Enter the following command at the boot environment prompt: **update_flash** The system updates the firmware, displays several status messages, and displays the boot environment prompt. **d.** At the boot environment prompt, enter the following command to reboot the system using the new software and, if applicable, the new firmware: **bye**

6. While the HA configuration is disabled, repeat Step 3 through Step 5 at the console of system B.

   Attention: Do not proceed to the next step until both systems in the HA configuration have been rebooted with the new version of Data ONTAP.

7. Re-enable the HA configuration by entering the following command on one of the storage systems:

   cf enable

Related tasks

Installing software images from the /etc/software directory on page 42

Upgrading single systems

You upgrade a single system by updating the system software and updating its firmware, and then rebooting.

Before you begin

The following prerequisites must be satisfied.

Steps

1. Choose the following option depending on whether you have already installed new system files:

If you...	Then...

Have already installed system files	At the console of each system, enter the following command to activate the new code on the storage system's boot device:
	`download`
	The `download` command provides an acknowledgment similar to the following:
	`Tue Jun 19 10:03:22 GMT [download.request:notice]:`
	`Operator requested download initiated`
	`download: Downloading boot device`
	`.....`
	`download: Downloading boot device (Service Area)`
	Then a message similar to the following appears:
	`Tues Jun 19 10:11:51 GMT [download.requestDone:notice]:`
	`Operator requested download completed`
	The storage system console is unavailable until the `download` procedure is complete.

Are installing and downloading system files in the same operation	At the console of each system, enter the following command: **`software update`** ***`file_name`*** **`-r`** When you use the `software update` command without the `-d` option, the `download` command is executed by default, activating the new code on the storage system's boot device.

Activating Data ONTAP 8.x software images with the `download` command takes significantly longer than on earlier releases. The process for Data ONTAP 8.x usually finishes in 20 to 60 minutes.

2. Enter the following command to shut down the storage system:
   `halt`

After the system shuts down, the boot environment prompt appears.

3. After halting the system, check the Boot Loader messages for a warning similar to the following:
   `Warning: The CompactFlash contains a newer firmware image (x.y.z). Please run 'update_flash' at the Loader prompt to update your system firmware (x.x.x).`

If you...	Then...
Do not see this warning	BIOS firmware is updated automatically if needed. At the boot environment prompt, enter the following command to reboot the system using the new software and, if applicable, the new firmware: **bye**
See this warning	You must update BIOS firmware manually. After the new BIOS system firmware is installed, future system firmware updates take place automatically. **a.** At the boot environment prompt, enter the following command to reset the system: **bye** **b.** To display the boot environment prompt at the system B console, press Ctrl-c at the system B console when instructed after the boot sequence starts. You can also display the boot environment prompt by pressing Ctrl-c at the system A console when the `Waiting for giveback` message appears at the console of system B. When prompted to halt the node, rather than wait, enter **y**. **c.** Enter the following command at the boot environment prompt: **update_flash** The system updates the firmware, displays several status messages, and displays the boot environment prompt. **d.** At the boot environment prompt, enter the following command to reboot the system using the new software and, if applicable, the new firmware: **bye**

Related tasks

Installing software images from the /etc/software directory on page 42

Verifying system status after an upgrade

It is a best practice to verify that upgraded systems are functioning as expected before returning them to production. This entails verifying the status of configured functionality and reenabling any functionality that was suspended before the upgrade.

About this task

These tasks should be performed on each partner of an HA pair and on each system that was upgraded.

Steps

1. If your systems are in an HA pair configuration, enter the following command to verify that the HA relationship is operational:

   cf status

2. If you disabled automatic giveback to prepare for a nondisruptive upgrade and you want to reenable it, enter the following command:

   options cf.giveback.auto.enable on

3. Verify that the intended target release is installed and running by entering the following command:

   version

4. Confirm that all paths to disk are visible to the system by entering the following command:

   storage show disk –p

5. Confirm that there are no failed disks by entering the following command:

   vol status –f

6. Verify that all aggregates are online by entering the following command:

   aggr status

7. Confirm that network interfaces are online by entering the following command:

   ifconfig –a

8. If your systems are configured for MultiStore technology, enter the following command to verify that all vFiler units are running:

   vfiler status -a

9. If you disabled SnapMirror functionality, enter the following command to reenable it:

   snapmirror on

10. If you quiesced SnapMirror transfers, enter the following command for each destination volume to resume them:

    snapmirror resume *destination*

11. Because data compression on the volumes is disabled by default during the upgrade, if you enabled data compression on any 64-bit volume, enter the following command to reenable it:

    sis config -C true -I true *path_name*

Updating firmware

Because upgrading Data ONTAP includes upgrading your firmware, you must consider the requirements for upgrading system, disk, and disk shelf firmware, as well as firmware for other components that might be installed on your system. You might also need to update firmware between Data ONTAP upgrades.

System firmware updates

When you perform a Data ONTAP software upgrade, the firmware service image included with the Data ONTAP upgrade package is copied to your storage system's boot device. You can also update system firmware by downloading the most recent firmware for your system from the NetApp Support Site and installing the files.

If you are upgrading system firmware between Data ONTAP upgrades, you can use nondisruptive or disruptive methods to update system firmware manually. You can obtain system firmware and information about how to install it from the NetApp Support Site.

Related information

System Firmware + Diagnostics Download: support.netapp.com/NOW/cgi-bin/fw

How BIOS system firmware is updated

Beginning with the Data ONTAP 8.0 release, the minimum BIOS release required to support Data ONTAP also enables automatic BIOS updates. If you are upgrading from an earlier release family, you must update BIOS firmware manually during the Data ONTAP upgrade.

After the minimum version is running, subsequent updates take place automatically during the boot sequence whenever Data ONTAP detects that a version resident on the boot device is more recent than the running version.

However, to update firmware from an earlier version to the latest version available, you must run the `update_flash` command manually from the boot prompt on the system being upgraded. Subsequent system firmware updates are automatic.

Updating system firmware nondisruptively

The nondisruptive update method is appropriate when you need to maintain service availability during the firmware update.

Before you begin

Your HA configuration must be functioning correctly, including meeting the requirements for nondisruptive upgrades.

Your Windows or UNIX client or HTTP server must already include firmware downloaded from the NetApp Support Site.

Steps

1. Obtain the firmware download files by using the `software update` command, following directions on the NetApp Support Site.
2. On each storage system, referred to as system A and system B in the following steps, enter the following command as directed:

   `priv set advanced`

   The asterisk (*) after the storage system name indicates that you are in advanced mode.
3. On each storage system, enter the `download -d` command in `priv set advanced` mode as directed.

   If necessary, format the service partition according to the instructions.
4. If CIFS is in use in System A, terminate it by entering the following command:

   `cifs terminate -t` ***`nn`***

   nn is a notification period (in minutes) appropriate for your clients after which CIFS services are terminated. After that period of time, proceed to the next step.
5. If the automatic giveback option (`cf.giveback.auto.enable`) is set to `on`, disable automatic giveback by entering the following command on one of your storage systems in the high-availability configuration:

   `options cf.giveback.auto.enable off`

   After the upgrade procedure, reset this option to `on` (if desired).
6. At the console of system B, enter the following command:

   `cf takeover`

   This command causes system A to shut down gracefully and leaves system B in takeover mode.
7. To display the LOADER boot prompt at the system A console, press Ctrl-c at the system A console when instructed after the boot sequence starts.

   You can also display the LOADER prompt by pressing Ctrl-c at the system A console when the `Waiting for giveback` message appears at the console of system A. When prompted to halt the node, rather than wait, enter **`y`**.
8. After halting the node, check the Boot Loader messages for a warning similar to the following:
   `Warning: The CompactFlash contains newer firmware image (1.6.0). Please run "update_flash" at Loader prompt to update your system firmware (1.5X3).`
9. Take one of the following actions:

If you...	Then...
Do not see this warning	BIOS firmware is updated automatically if needed; go to Step 10.
See this warning	You must update BIOS firmware manually. After the new BIOS system firmware is installed, future system firmware updates take place automatically. **a.** At the boot prompt, enter the following command to reset the system: **`bye`** **b.** To display the LOADER boot prompt at the system B console, press Ctrl-c at the system B console when instructed after the boot sequence starts. You can also display the LOADER prompt by pressing Ctrl-c at the system A console when the `Waiting for giveback` message appears at the console of system B. When prompted to halt the node rather than wait, enter **`y`**. **c.** Enter the following command: **`update_flash`** The system updates the firmware, displays several status messages, and displays the boot prompt. **d.** Go to Step 10.

10. Enter the following command to reboot the system using the new firmware and software:

`bye`

11. Wait 8 minutes to ensure the following conditions:

- Client multipathing (if deployed) is stabilized.
- Clients are recovered from the pause in I/O that occurs during takeover.
  The recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

12. Enter the following command at the console of system B:

`cf giveback`

Attention: The giveback is not initiated and an error message is returned if any conditions such as the following are detected:

- Open client sessions (such as CIFS sessions)
- Long-running operations
- Operations that cannot be restarted (such as tape backup or SyncMirror resynchronization)
- Error conditions (such as disk connectivity mismatch between the nodes)

If giveback is not initiated, complete the following steps:

a. Address the condition described in the error message, ensuring that any identified operations are terminated gracefully.

b. Initiate giveback with the `-f` option:

```
cf giveback -f
```

For more information about the `-f` option, see the cf(1) man page.

System A reboots with the new system configuration—a Data ONTAP version or other system firmware and hardware changes—and resumes normal operation as an HA pair partner.

13. Repeat Step 4 through Step 12 to update the partner storage system.

    System B is brought down and updated while partner A is in takeover mode

After you finish

If desired, reenable automatic giveback.

Updating system firmware using the disruptive method

The disruptive firmware update method is appropriate when you can schedule downtime for the system firmware update.

Before you begin

You must have obtained the system firmware from the NetApp Support Site on your Windows or UNIX client or your HTTP server.

Steps

1. On each system you are upgrading, enter the following command:

   ```
   priv set advanced
   ```

   The asterisk (*) after the storage system name indicates that you are in advanced mode.

2. On each storage system, enter the `download -d` command in `priv set advanced` mode, as directed.

   If necessary, format the service partition according to the instructions.

3. On either system, disable the HA configuration by entering the following command:

   ```
   cf disable
   ```

4. Continue installing the firmware on each system by following directions from the NetApp Support Site.

5. Reenable the HA configuration by entering the following command on one of the systems:

   ```
   cf enable
   ```

Disk firmware updates

Disk firmware is bundled with the Data ONTAP upgrade package and updated automatically during Data ONTAP upgrades. You can also obtain disk firmware from the NetApp Support Site and update it manually.

Related information

Disk Drive and Firmware Matrix: support.netapp.com/NOW/download/tools/diskfw

How disk firmware is updated

When you upgrade Data ONTAP, disk firmware is updated automatically if the firmware on the disks is older than the firmware that is bundled with the Data ONTAP upgrade package. You can also update disk firmware by downloading the most recent firmware package from the NetApp Support Site and installing the files.

Each storage system is shipped with a `/etc/disk_fw` directory that contains the latest firmware revisions. Disk firmware is updated automatically when one of the following is true:

- You add new disks or a disk shelf.
  Disk firmware updates are applied from the `/etc/disk_fw` directory.

  Note: When hot-adding SAS shelves, firmware is not updated automatically. You must manually check and update out-of-date drive, shelf, and ACP firmware.
- Data ONTAP detects disk firmware updates in the `/etc/disk_fw` directory.
  Data ONTAP scans the `/etc/disk_fw` directory for new disk firmware every two minutes.

Disk firmware updates can be added to the `/etc/disk_fw` directory at the following times:

- During a Data ONTAP upgrade
  Disk firmware updates are often included with an upgrade to a new release family. Disk firmware updates are occasionally included in Data ONTAP upgrades within release families.
- After obtaining a disk firmware update package
  You might be directed to download a disk firmware update from the NetApp Support Site if you encounter problems with certain disk types or you receive a notice from NetApp.
  You must download and install the latest disk firmware before upgrading Data ONTAP.
- When you hot-add a SAS shelf

Automatic background disk firmware updates are enabled by the `raid.background_disk_fw_update.enable` option, which is set to `on` by default. You should not change the default value unless you are directed to do so by technical support.

Automatic background disk firmware updates are overridden when the `disk_fw_update` command is issued. This command makes disks inaccessible for up to two minutes. In earlier Data ONTAP releases, the command was required for certain disk firmware updates. It is no longer recommended that you use this command unless you are directed to do so by technical support.

Each disk drive manufacturer has its own disk drive firmware. Therefore, disk firmware updates can include updates to firmware for one or more disk drive types. Because your storage system might use drives from multiple drive manufacturers, whether you are affected by a disk firmware update depends on the types and numbers of drives on your system.

When you need to update the Disk Qualification Package

The Disk Qualification Package (DQP) adds full support for newly qualified drives. Before you update drive firmware or add new drive types or sizes to a storage system, you must update the DQP. A best practice is to also update the DQP regularly; for example, every quarter or semi-annually.

You can obtain the DQP from the NetApp Support Site. You need to download and install the DQP in the following situations:

- Whenever you add a new drive type or size to the node
  For example, if you already have 1-TB drives and add 2-TB drives, you need to check for the latest DQP update.
- Whenever you update the disk firmware
- Whenever newer disk firmware or DQP files are available

Related information

Disk Qualification Package Instructions: support.netapp.com/NOW/download/tools/diskqual
Disk Drive & Firmware Matrix: support.netapp.com/NOW/download/tools/diskfw

Service availability during disk firmware updates

By default, disk firmware updates take place automatically in the background so as to ensure the continuity of storage system services.

In Data ONTAP 8.0.2 and later releases, automatic background disk firmware updates are available for nonmirrored RAID4 aggregates, in addition to all other RAID types. If your system includes nonmirrored RAID4 aggregates, it is no longer necessary to perform a disruptive disk firmware update before upgrading Data ONTAP.

You can download the disk firmware package to your systems at any time and the firmware is updated nondisruptively in the background. However, you must wait until the disk firmware update has finished before initiating a nondisruptive upgrade.

Background disk firmware updates take place one disk at a time and require approximately 2.5 minutes per disk. Although it is not likely that all the disks attached to your systems would need firmware updates at the same time, it is a best practice to wait at least 2.5 minutes for every disk attached to a controller before proceeding with a Data ONTAP NDU.

For example, if a controller has 192 disks attached, you should wait at least 480 minutes, or 8 hours. You should wait until both controllers in the HA pair have completed the firmware update before proceeding with the NDU. Disk firmware can be updated in parallel on both controllers in an HA pair.

Detecting outdated disk firmware using AutoSupport

AutoSupport messages include information about disk firmware installed on your storage systems. The Installed Systems pages use these messages to monitor the firmware versions on your system and to post notices when installed disk firmware on your system has been superseded.

Before you begin

To use the Installed Systems service to monitor disk firmware versions, your storage systems must meet the following requirements:

- AutoSupport must be already enabled on your systems.
  For more information about AutoSupport, see the *Data ONTAP System Administration Guide for 7-Mode*.
- You must have registered your NetApp products.

Steps

1. Use a web browser to go to the NetApp Support Site at *support.netapp.com*.
2. Select **My Support > View Installed Systems**.
3. Display the product details for the system you are upgrading by entering search criteria for a specific system or displaying a list of systemsat your company.
4. In the AutoSupport Status category, click **Health Check Details**.

Result

If a firmware update is available for your storage system, you see a message with a link to a Firmware Analysis page. If the Firmware Analysis page contains a message that newer disk firmware is available for your system, a disk firmware update takes place during your next Data ONTAP upgrade. If there is no disk firmware message, the disk firmware on your system is up-to-date.

Related information

Systems: support.netapp.com/eservice/Systems.jsp

Disk shelf firmware updates

Disk shelf firmware (firmware for modules on disk shelves) is bundled with the Data ONTAP upgrade package and updated automatically during Data ONTAP upgrades. You can also obtain disk shelf firmware from the NetApp Support Site and update it manually.

Disk shelf firmware updates are mandatory when hot-adding a disk shelf. See your disk shelf documentation for more information.

Related concepts

How disk shelf firmware is updated on page 65

Related information

Disk shelf firmware: support.netapp.com/NOW/download/tools/diskshelf

How disk shelf firmware is updated

When you upgrade Data ONTAP, disk shelf firmware is updated automatically if the firmware on the shelves is older than the firmware that is bundled with the Data ONTAP upgrade package. You can also update disk shelf firmware by downloading and installing the most recent firmware for your shelf modules from the NetApp Support Site.

The AT series, ESH series, and SAS shelf I/O module (IOM) series in a disk shelf provide for the connection of the disks to the host bus adapter interface, including signal integrity when disks are swapped. There are two modules in the middle of the rear of the disk shelf, one for Channel A and one for Channel B. SAS modules can also be internal components in certain systems. Updated firmware for these modules is made available periodically.

Each storage system is shipped with the latest disk shelf firmware versions.

Disk shelf firmware updates can be loaded onto the system at the following times:

- After a Data ONTAP upgrade
  Disk shelf firmware updates are often included in Data ONTAP upgrade packages. After the Data ONTAP upgrade process is completed on each node in an HA pair, if the new disk shelf firmware version is later than the installed version, the new version is downloaded and installed on the disk shelves attached to both nodes in the HA pair.
- During a manual firmware update
  You might need to download a disk shelf firmware update from the NetApp Support Site if you plan to perform a nondisruptive upgrade of Data ONTAP software, or if you receive a notice from NetApp.
- When you hot-add a SAS shelf

The following events can also trigger an automatic disk shelf firmware update when there is new firmware on the system:

- The `reboot` command is issued.
- The `cf giveback` command is issued.
- New disk drives are inserted.
- New shelf modules are inserted.

For more information about disk shelves and disk shelf modules, see the *Data ONTAP High Availability and MetroCluster Configuration Guide for 7-Mode* and the *Installation and Service Guide* for your shelves.

Detecting outdated disk shelf firmware

If you want to perform a nondisruptive upgrade of Data ONTAP software, or if you are directed to update disk shelf firmware, you must first determine which firmware version is installed on disk shelves attached to your systems.

Steps

1. Go to the disk shelf firmware information on the NetApp Support Site and determine the most recent firmware version for your shelves.
2. At the storage system command line, enter the following command:

   `sysconfig -v`
3. Locate the shelf information in the `sysconfig -v` output:

   ### Example

   ```
   Shelf 1: DS4143  Firmware rev. IOM3 A: 0110 IOM3 B: 0110
   Shelf 2: DS14-MK2-AT Firmware rev. AT-FCX A: 36 AT-FCX B: 36
   ```

   If the disk shelf firmware version in the command output is earlier than the most recent version on the NetApp Support Site, you must update your disk shelf firmware manually.

Related tasks

Planning your upgrade with Upgrade Advisor on page 8

Related information

Disk Shelf Firmware: support.netapp.com/NOW/download/tools/diskshelf

How ACP firmware is updated

If your disk shelves include ACP functionality, ACP firmware is updated automatically during Data ONTAP upgrades. You can also obtain it from the NetApp Support Site and update it manually.

When you upgrade Data ONTAP, ACP firmware (firmware for ACP processors on disk shelves) is updated automatically if the firmware in the ACP processors is older than the firmware that is bundled with the Data ONTAP upgrade package.

Related information

Disk Shelf Firmware: support.netapp.com/NOW/download/tools/diskshelf

Service Processor firmware updates

Service Processor (SP) is a remote management device that is included in some systems. Starting with Data ONTAP 8.2, a baseline SP firmware image is packaged with the Data ONTAP upgrade package, so that the SP is updated automatically by default.

Any existing connection to the SP is terminated when the SP firmware is being updated. This is the case whether the SP firmware update is automatic or manually triggered.

Note: Data ONTAP detects a failed SP automatic update and triggers a corrective action to retry the SP automatic update up to three times. If all three retries have failed, you should contact technical support.

If you are upgrading SP firmware between Data ONTAP upgrades, you can obtain SP firmware and information about how to install it from the NetApp Support Site. You can download and update the SP firmware by using the Data ONTAP CLI or the SP CLI.

For information about what the SP is and how it works, see the *Data ONTAP System Administration Guide for 7-Mode*.

RLM firmware updates

You can upgrade the Remote LAN Module (RLM) firmware by downloading and updating the RLM firmware using the Data ONTAP CLI or the RLM CLI.

You can obtain RLM firmware and information about how to install it from the NetApp Support Site.

For information about what the RLM is and how it works, see the *Data ONTAP System Administration Guide for 7-Mode*.

How Flash Cache firmware is updated

Firmware for Flash Cache devices is included with the upgrade package for Data ONTAP upgrades. If the running firmware is older than the firmware that is bundled with the Data ONTAP upgrade package, it is updated automatically.

Firmware updates are not available for the original 16-GB PAM devices. Automatic updates occur only to Flash Cache devices, not PAM devices.

If you are upgrading Data ONTAP nondisruptively (NDU), Flash Cache firmware is updated nondisruptively. This is because the reboot required for Flash Cache firmware upgrades occurs before the final reboot of the `cf giveback` process. Consequently, if your system includes Flash Cache devices, you might see multiple reboots during a Data ONTAP NDU; this is expected behavior.

For information about what Flash Cache and PAM are and how they work, see the *Data ONTAP System Administration Guide for 7-Mode*.

Reverting to an earlier Data ONTAP release family

Transitioning a storage system to a Data ONTAP release in an earlier family is referred to as a *reversion*. Reverting requires preparation, using the `revert_to` command, and completing post-reversion procedures.

The `revert_to` command modifies Data ONTAP on-disk structures to be compatible with the earlier target release and ensures that the system is prepared for the reversion.

Attention: *Do not* attempt to revert Data ONTAP by simply downloading and booting (or netbooting) a release in an earlier release family. If you do, you cannot boot the earlier target release. You must use the `revert_to` command for the reversion process.

For more information, see the revert_to(1) man page.

When to revert and when to call technical support

You can revert without assistance when reverting new or test systems, but you should call technical support if you encounter problems during or after upgrading, or if you want to revert a production system.

You can revert to an earlier release family without assistance from technical support only in the following scenarios:

- You upgraded to a new release on a test system and you want to return to the original release when testing is completed.
- You are configuring a new storage system—running a later release of Data ONTAP and not yet in production—in an environment in which you have standardized on an earlier Data ONTAP release.

Do not attempt to revert Data ONTAP in a production environment without assistance. If you encounter any of the following circumstances, contact technical support immediately:

- The upgrade process fails and cannot finish.
- The upgrade process finishes, but the system is unusable in a production environment.
- The upgrade process finishes and the system goes into production, but you are not satisfied with its behavior.

Planning your reversion

Because new features are introduced in each release of Data ONTAP, you must understand reversion requirements and evaluate how they might impact your current configuration.

Before proceeding with the reversion, you should do the following:

- Review the *Release Notes* for the Data ONTAP reversion source release.
- Understand any requirements for reverting to the target release from your existing software.
- Note any potential functionality changes to your system after the reversion.
- Prepare to address all points in the reversion checklist.

Reversion checklist

To ensure a successful reversion, you must check several things before, during, and after the reversion.

Steps for preparing to revert

Preparatory steps are complete when all of the following conditions are true:

- General reversion requirements have been satisfied:
  - Software and hardware support in the target release is confirmed.
  - System status requirements are addressed.
  - Standard system services and processes that could interfere with reversion are not running.
- For production systems being reverted, potential issues in your environment have been identified and preparatory tasks completed as appropriate.
- The target Data ONTAP image has been obtained from the NetApp Support Site and is available to systems being reverted.

Steps for performing the reversion

Software reversion steps are complete when all of the following conditions are true for each partner in an HA pair:

- Any remaining conditions identified by the `revert_to` command have been addressed.
- The `revert_to` command has finished running and each system has booted the target release.
- The correct SP firmware is loaded and running on supported platforms.

Steps for after reverting

Post-reversion steps are complete when all of the following conditions are true:

- HA relationship is restored between partner nodes.
- Services and protocols are functioning as expected.
- For production systems being reverted, potential issues in your environment have been identified and post-reversion tasks completed as appropriate.

General reversion requirements

Before you revert to a previous Data ONTAP version, you must satisfy target release, system status, and operational requirements. If these requirements are not met and the `revert_to` command encounters one of these conditions, it halts until the condition is addressed.

Target release requirements

The following are the target release requirements:

- You cannot revert directly to a release earlier than Data ONTAP 8.1.
- You must disable any 8.1 release family features before reverting.
- If you added hardware components after upgrading from an earlier Data ONTAP release, you must verify that the components continue to work when you revert to the earlier release.

  If you upgraded Data ONTAP for new hardware support, you must disconnect the new hardware and reconfigure your system before reverting.
- You must verify that all components of your configuration are compatible with the target Data ONTAP reversion release by consulting the Interoperability Matrix on the NetApp Support Site.

System status requirements

The following are the system status requirements:

- All disks must be online.
- All volumes and aggregates must be online before reverting.

  If you are reverting to an earlier Data ONTAP release that supports FlexVol volumes, you cannot complete the reversion if there are FlexVol volumes in an `offline` or `restricted` state.
- All volumes and aggregates must be free of file system errors and bad blocks.
- Compressed volumes must be decompressed for reversion.
- Any unsaved core must be recovered or released.
- Snapshot copies made on Data ONTAP release families later than the target release cannot be present on the source system.

  Before reverting to an earlier release family, you must delete those copies.
- All SnapMirror relationships must be broken.
- Metadata for deduplicated volumes must be reverted or removed using the `sis revert_to` command.
- All LUNs in the system must be owned by the default vFiler unit vfiler0.
- You cannot revert if an upgrade is in progress; you must complete the upgrade before reverting.
- You cannot revert if the background quota upgrade is still in process from a previous Data ONTAP upgrade.
- Your storage system clears the cached data in a Flash Cache module when you revert.

  Because there is no cached data in the Flash Cache module, the system serves initial read requests from disk, which results in decreased read performance during this period. The system repopulates the cache as it serves read requests.

Operational requirements

The `revert_to` command halts with an error message if any of these conditions is encountered. You can reenter the `revert_to` after addressing them.

The following services and protocols cannot be running during a Data ONTAP reversion:

- High availability (HA) takeover and giveback
- NFS
- CIFS
- FC
- SnapMirror
- SnapVault

The following jobs cannot be running during a Data ONTAP reversion:

- Dump or restore
- RAID scrubs
- RAID optimized reconstructions
- RAID assimilation
- RAID disk sanitization
- `wafliron`
- Inode file upgrade
- Disk maintenance center testing
- Disk failure processing

Requirements for reverting configured systems

If you configured Data ONTAP features on a new storage system after initial system setup, or if you upgraded a system and modified the configuration, you must satisfy certain requirements before you revert the system to a previous Data ONTAP version, in addition to the general reversion requirements.

Issues to address *before* reverting

You must evaluate your needs for the following Data ONTAP capabilities in the target system and if necessary, prepare your system before reverting:

- Storage capacity
  Your storage system must conform to the maximum capacity limitations of the earlier release.
- Space guarantees
  Space guarantees do not persist through reversions to earlier releases.

If you have implemented any of the following Data ONTAP capabilities, you must evaluate the requirements and if necessary, modify your configuration before reverting:

- SnapMirror
- Interface group configuration in the `/etc/rc` file

- VLANs
- Deduplication
- SSDs
- Brocade switches in fabric-attached MetroCluster configurations

Issues to address *after* reverting

You must evaluate your needs for the following Data ONTAP capabilities in the target system and if necessary, adjust your configuration after reverting:

- Deduplication
- NDMP
- Volumes with rewritten FSIDs
- TOE
- In-order frame delivery on FC switches

Special system files

For storage systems upgraded from a release earlier than Data ONTAP 8.0, some system files exist in every volume of the system. You must not remove or modify these files unless technical support directs you to do so. These files enable you to restore LUNs in Snapshot copies if you revert to a release earlier than Data ONTAP 8.0.

The following system files are in the root level of every volume, including the root volume:

- `.vtoc_internal`
- `.bplusvtoc_internal`

Identifying potential reversion issues

Every Data ONTAP release family has unique reversion requirements that you must understand and resolve before you decide to revert.

For additional information, and to check for reversion issues that might have been discovered later, see the *Data ONTAP Release Notes for 7-Mode* for your source and target releases. The following list summarizes reversion issues known when this guide was published.

- If you gained access to licensed or entitled features by upgrading to Data ONTAP 8.2 or later and these features required a license prior to Data ONTAP 8.2, you might need to install a license after reverting.

  This is the case if a license was not previously installed for the release to which you revert.
- You need to be aware of the licensing implications if you have a node that is shipped with Data ONTAP 8.2 and you want to revert it to a release in the Data ONTAP 8.1 release family.

  If your system is shipped with Data ONTAP 8.2 or later and you reinstall it with a release in the Data ONTAP 8.1 release family, you must install a key for the desired license package in the format supported by the Data ONTAP 8.1 release family.

- If your current SP firmware version is not supported for the Data ONTAP release to which you are downgrading or reverting, you must install a supported SP firmware version for the earlier Data ONTAP release.
- Support for up to 1,024 ACEs in NFSv4 ACLs is a new feature in Data ONTAP 8.2.
  Reverting to a previous release family requires action if you have NFSv4 ACLs in your environment that contain more than 400 ACEs.
- If you configure a Flash Pool (an aggregate that contains both HDDs and SSDs) as your root aggregate and you want to downgrade or revert to any release of Data ONTAP earlier than 8.1.1, including 8.1, you must first move the root aggregate to an HDD or SSD aggregate.
  Otherwise, your system will not boot after the downgrade or revert.
- After an upgrade, if you have converted the 32-bit volumes or aggregate to the 64-bit format, you cannot revert the source and destination systems to an older version of Data ONTAP until you delete all of the Snapshot copies on both the source and the destination volumes.

Preparing to revert Data ONTAP

Before reverting to an earlier Data ONTAP release family, you must verify reversion requirements, resolve any reversion issues, and obtain the Data ONTAP software image for the target release.

Be sure to check the *Release Notes* for this Data ONTAP source release for any updates to reversion notices and procedures.

Commands for addressing reversion requirements

To ensure that your reversion is successful, you can view the status of system conditions and operations that affect Data ONTAP reversions and take appropriate action before issuing the `revert_to` command.

System status

To verify that...	Use this command to check status...	And address the requirement before reverting by...
No disks are offline	`aggr status -f`	Bringing them online or replacing them.
No volumes are offline or restricted	`vol status`	Using one of the following commands: • `vol online` • `vol destroy`
No volumes are compressed	`sis status -l`	Using the `sis undo -C` command.

To verify that...	Use this command to check status...	And address the requirement before reverting by...
No volumes are marked `wafl inconsistent`	`vol status`	Contacting technical support immediately.
No aggregates are offline or restricted	`aggr status`	Using one of the following commands: • `aggr online` • `aggr destroy`
No aggregates are marked `wafl inconsistent`	`aggr status`	Contacting technical support immediately.
No unsaved cores are present	`savecore -i`	Recovering them or releasing them with the `savecore` command.
No Snapshot copies are present	`snap list`	Deleting them with the `snap delete` command. If Snapshot copies are in use by other applications (such as dump, SnapMirror, or clone), you must wait for the operation to finish or terminate the application.
No SnapMirror relationships are present	`snapmirror destinations`	Breaking them with the `snapmirror break` command
Any previous upgrade has been completed	n/a	Waiting at least 10 minutes after an upgrade before beginning a reversion.
No background quota upgrade is in process	`quota status`	Disabling quotas or allowing the quota upgrade to finish.

Services and protocols

To ensure that the following services are not running...	Use this command to check status...	And use this command to halt the operation manually...
High availability takeover and giveback	`cf status`	`cf disable`
NFS	`nfs status`	`nfs stop`
CIFS	`cifs status`	`cifs terminate`

To ensure that the following services are not running...	Use this command to check status...	And use this command to halt the operation manually...
FC	`fcp status`	`fcp stop`
iSCSI	`iscsi status`	`iscsi stop`
SnapMirror	`snapmirror status`	`snapmirror off`
SnapVault	`snapvault status`	`options snapvault.enable off`

Jobs

If any of these jobs are running, you can halt them manually or you can wait until the operation finishes.

To ensure that the following jobs are not running...	Use this command to check status...	And use this command to halt the operation manually...
Dump or restore	`backup status`	`backup terminate`
RAID scrubs	`aggr scrub status`	`aggr scrub stop`
RAID optimized reconstructions	`aggr status`	Allow the operation to finish.
RAID disk sanitization	`disk sanitize status`	`disk sanitize abort`
`wafliron`	`wafliron` should only be run under direction from technical support; consult with them before reverting.	
Inode file upgrade	`*wafl scan status` (This is an advanced command.)	Allow the scan to finish.
Disk maintenance center testing	`disk maint status`	`disk maint abort`
Disk failure processing	`disk show -v` or `storage show disk -a`	Identify and remove any failed disks.

Related concepts

When to revert and when to call technical support on page 69

Preparing to revert production systems

If you are reverting a system that you have configured to serve data to clients in your environment, you must ensure that certain configurations are prepared for the reversion.

Requirements for reverting to a Data ONTAP release with a lower maximum capacity

When you revert to an earlier Data ONTAP release, your storage system must conform to the maximum capacity limitations of the earlier release.

If you upgraded your system to a release that supports greater capacities and you configured storage to utilize the new capacities, you must reconfigure your system to the lower capacity limits before you revert. If you do not reconfigure in this way, the storage system does not boot up following the revert process until the excess capacity has been disconnected.

You can reduce the total capacity of your system by destroying aggregates or by moving aggregates to a different system. The system to which storage is relocated must meet the following requirements:

- It has spare capacity to accommodate the relocated storage.
- It is running the same or a later Data ONTAP release as the system where the disks are currently installed.
- It is running a Data ONTAP release that supports the relocated disks.

For more information about physically moving aggregates, see the *Data ONTAP Storage Management Guide for 7-Mode*.

For more information about maximum capacity limits for a given Data ONTAP release, see the *System Configuration Guide* entries for that release.

Related information

System Configuration Guide: support.netapp.com/NOW/knowledge/docs/hardware/NetApp/syscfg/

Order for SnapMirror system reversions

If you are reverting storage systems configured for volume SnapMirror, you must revert the systems that contain the source volumes before you revert the systems that contain the destination volumes. If you are reverting storage systems configured for synchronous and semi-synchronous SnapMirror, you must revert the source and destination systems simultaneously.

Before reverting a storage system with SnapMirror source volumes, you must disable the features not supported in the earlier release. This means that after reverting, you cannot mirror certain volumes or their contents to the destination system, even if the destination system supports that feature.

Note:

- These revert considerations do not apply to systems configured for qtree SnapMirror.

- For successful bidirectional volume SnapMirror transfers, both, the source and destination must be reverted.
  If only one storage system is reverted, the SnapMirror transfer fails.

Considerations for reverting a system with deduplicated volumes

When you are reverting to a previous release using the `revert_to` command, you might have to revert volumes that have deduplication enabled. You have to downgrade the deduplication metafiles to the specific release by using the `sis revert_to` command. You must also verify the volume size and SnapMirror requirements.

The `sis revert_to` command scans all the data in the volume and the time taken to complete the revert operation depends on the amount of data present in the volume. In the `sis status -l` command output, the Progress field indicates the status of revert operation.

Starting with Data ONTAP 8.1 release family, in a deduplicated volume a block can be shared 32,768 times. However, in Data ONTAP 8.0 and Data ONTAP 7.3 release family, the maximum sharing is 256 times per block. When you revert from Data ONTAP 8.2 to Data ONTAP 8.1, and then to an earlier release, the block sharing is changed to 256 times per block. Running the `sis revert_to` command reduces block sharing and downgrades the metafiles.

Before reverting a system with deduplicated volumes, you must ensure that you meet the following requirements:

- There must be adequate free space in the deduplicated volumes.
  Running the `sis revert_to` command creates downgraded copies of existing deduplication metadata. Before running the command, you must therefore ensure that 4 to 6 percent of the logical data size in the volume is available for the new files.
- If the release you are reverting to does not support your current volume size, you must decrease the size of any deduplicated volume to the limit supported in the target release.
- For deduplication volumes that are replicated using SnapMirror, the destination storage system should support deduplication.
- You must prepare the deduplicated volumes for reversion by running the `sis revert_to` command.
  The general `revert_to` command requires that deduplication metafiles either be downgraded or removed. Running the command without options retains the old files and creates new ones, running it with the `-delete option` deletes the existing metafiles.

For more information about reverting systems with deduplicated volumes, see the sis(1) man page.

Related references

Commands for addressing reversion requirements on page 74

Reverting systems with compressed volumes

Before reverting from the Data ONTAP 8.2 release family, you must ensure that the volumes contain sufficient free space for the revert operation.

Before you begin

If you are reverting from Data ONTAP 8.2 release family, then you must have deleted all the Snapshot copies that have compressed data and decompress the data in the volumes.

About this task

Reverting from a Data ONTAP 8.2 release on a system that has data compression enabled, includes running advanced mode commands. You must contact technical support for assistance.

Steps

1. View the progress of efficiency operations on the volumes by entering the following command:

   sis status ***path***

   path is the complete path to the volume.

2. Stop all active and queued data compression operation by entering the following command:

   sis stop -a ***path***

3. Disable data compression on the volume by entering the following command:

   sis config -C false -I false ***path***

4. Disable deduplication on the volume by entering the following command:

   sis off ***path***

5. Change the privilege level to advanced by entering the following command:

   priv set advanced

6. Downgrade the existing deduplication metadata to a Data ONTAP 8.1 release family by entering the following command:

   sis revert_to ***x.x***

   The `sis revert_to` command scans all the data in the volume and the time it takes to complete the revert operation depends on amount of data present in the volume. In the `sis status -l` command output, the Progress field indicates the status of revert operation.

7. After the revert operation is complete, return to the admin privilege level by entering the following command:

   priv set admin

   For more information about data compression, see the *Data ONTAP Storage Management Guide for 7-Mode*.

Reverting a SnapMirror destination system with volumes that use deduplication or clone operations

For a volume SnapMirror relationship, the destination storage system should use an identical or later release of Data ONTAP than the source system.

In releases prior to Data ONTAP 7.3.1, when replicating volumes with deduplication, the NearStore personality license was required on the destination system. However, for Data ONTAP 7.3.1 and later releases, it is not essential to enable the NearStore personality license on the destination system for replicating such volumes. Therefore, if you revert from Data ONTAP 7.3.1 or later to an earlier release, you should ensure that the NearStore personality license is enabled on the destination system. Otherwise, after the revert operation, volume SnapMirror updates fail for any volumes on the source that use deduplication.

Note: When using SnapMirror to replicate volumes that use deduplication or clone operations, the destination system should support deduplication.

For more information about the NearStore personality license and the storage systems that support deduplication, see the *Data ONTAP Storage Management Guide for 7-Mode*.

Staging the target Data ONTAP image

You must obtain the software image for the target Data ONTAP reversion or downgrade release and make it accessible to the storage system.

About this task

You can copy the target software image (for example `821_setup_i.tgz`) from the NetApp Support Site or another storage system to the HTTP server or client system that you use to stage software images.

Related concepts

Installing Data ONTAP software images on page 40

Performing the reversion process

To revert to an earlier Data ONTAP release, you must halt certain processes, install the target image, and enter the `revert_to` command.

Reverting Data ONTAP

To revert Data ONTAP, you must install the target release on your system and run the `revert_to` command.

Before you begin

The target Data ONTAP image must have been obtained and staged either on a web server that is accessible to your storage system or in the `/etc/software` directory on the storage system.

General reversion requirements must be satisfied. In particular, protocol, system services, and RAID operations must not be running before proceeding with this task.

Note: If any of those operations are running while you attempt to complete this procedure, the `revert_to` command halts and prompts you to correct the condition before proceeding.

About this task

You must revert the partner system in an HA pair before booting the systems into the earlier target release.

Steps

1. Enter the following command to install the target Data ONTAP image on your system and commit it to the boot device:
   `software update` ***`url/file`***

   You must supply the URL of a web server where you staged the image.

   When prompted, confirm that you want to downgrade the file system and perform a revert.

   You see output similar to the following:

```
software: You can cancel this operation by hitting Ctrl-C in the next
6
seconds.
software: Depending on system load, it may take many minutes
software: to complete this operation. Until it finishes, you will
software: not be able to use the console.
software: copying to 812_setup_q.tgz
software: 100% file read from location.
software: /etc/software/812_setup_q.tgz has been copied.
software: installing software, this could take a few minutes...
software: Data ONTAP(R) Package Manager Verifier 1
```

```
software: Validating metadata entries in /etc/boot/NPM_METADATA.txt
software: Downgrade WAFL from version 21057 to 19744 (Y/N)? Y
software: The release that you are installing will Downgrade the file
system
causing the need to use the revert_to command BEFORE a reboot. Do you
wish to continue?
(Y/N) Y
software: Checking sha1 checksum of file checksum file:
          /etc/boot/NPM_FCSUMx86-64.sha1.asc
software: Checking sha1 file checksums in /etc/boot/NPM_FCSUM-
x86-64.sha1.asc
software: installation of 812_setup_q.tgz completed.
Thu Oct 28 17:45:14 GMT [filer: cmds.software.installDone:info]:
Software:
Installation of 812_setup_q.tgz was completed.
...
download: Downloading boot device (Service Area)
...
software: Due to WAFL downgrade, user should use "revert_to" instead
of
"reboot"
Please type "revert_to" for the changes to take effect.
Thu Oct 28 17:45:19 GMT [filer: download.requestDone:notice]:
Operator requested
download completed
```

2. Confirm that HA takeover and giveback is disabled by entering the following command:

   cf status

   If the HA relationship is still enabled, you must disable it by using the `cf disable` command before proceeding.

3. Enter the following command, confirming that you want to proceed when prompted: **revert_to 8.1**

   If you have not satisfied the prerequisites, the reversion process halts and you are prompted to address the problem. After you have done so, you can restart the `revert_to` command.

   You see output similar to the following:

```
You are about to revert the system to work with Data ONTAP 8.1
The system will be halted immediately after the conversion
process completes. Make sure that you have installed Data ONTAP
8.1 onto the boot device, or you will have to run "revert_to" again.

Are you sure you want to proceed? [yes/no]? yes
Mon Nov 15 17:50:24 GMT [filer: revertTo.start:notice]: Starting
revert to
8.1.
...
Reboot the system with Data ONTAP 8.1[.x].
Thu Oct 28 17:50:50 GMT [filer: revertTo.complete:notice]: Revert to
8.1[.x]
was completed.
Setting boot image to 7G.
```

```
Clearing next boot image
...
RAID revert complete. You can reboot the system after partner has
been reverted.
System halting...
```

When the system has halted, the boot environment prompt is displayed.

4. At the boot environment prompt, enter the following command:

   boot_ontap

   The node automatically boots normally on the target Data ONTAP release.

5. If the system is a partner in an HA pair, repeat Steps 1 through 4 on the partner system.

6. If you previously disabled HA takeover and giveback, reenable it by entering the following command from either node:

   cf enable

7. If your system includes a Service Processor (SP), ensure that its firmware is up-to-date.

After you finish

Proceed to post-reversion tasks.

Related references

General reversion requirements on page 71

Updating SP firmware

If your storage system includes a Service Processor (SP), you must verify that it is running the correct firmware version and update the firmware if it is not the correct version.

Before you begin

The reversion or downgrade process should be complete and the storage system should be running the target release.

About this task

Data ONTAP software images include firmware for SP modules. If the firmware version on your SP module is outdated, you must update it before returning the reverted or downgraded system to production status.

Steps

1. Go to the system firmware information on the NetApp Support Site and determine the most recent firmware version for your SP module.

2. Enter the following command at the storage system CLI to determine the SP firmware version:

sp status

You see output similar to the following:

```
Service Processor Status: Online
Firmware Version:   1.2
...
```

If the SP firmware version in the command output is earlier than the most recent version on the NetApp Support Site, you must update your disk shelf firmware manually.

3. Click the **SP_FW.zip** link to download the file from the NetApp Support Site to your HTTP server.
4. At the storage system prompt, enter the following command:

   software update http://*web_server*/SP_FW.zip -f
5. When the `software update` command is finished, enter the following command at the storage system prompt:

   sp update
6. When the system prompts you to update the SP, enter **y** to continue.

   The SP is updated and you are prompted to reboot the SP. Wait approximately 60 seconds to allow the SP to reboot.
7. Verify that the SP firmware has been updated by entering the following command:

   sp status
8. If the system is a partner in an HA pair, repeat Steps 4 through 7 on the partner system.

Result

If your console connection is not through the SP, the connection remains active during the SP reboot.

If your console connection is through the SP, you lose your console connection to the storage system. In approximately one minute, the SP reboots and automatically reestablishes the connection.

Related information

System Firmware + Diagnostics Download: support.netapp.com/NOW/cgi-bin/fw

Completing post-reversion tasks

After reverting to an earlier Data ONTAP release family, you might need to perform additional tasks to ensure storage system health and storage availability.

You should also verify that any services that you halted manually restarted after the reversion. If not, you should restart those services manually and verify that any clients have appropriate access to storage system services.

Re-enabling NDMP on a reverted system

The reversion process removes the registry entry that enables NDMP after a storage system reboots. If you want to continue using NDMP after the reversion, you must re-enable it manually.

Steps

1. To re-enable NDMP immediately, enter the following command:

   `ndmpd on`

2. To enable NDMP at each system reboot, enter the **`ndmpd on`** command in the `/etc/rc` file.

Reinstatement of in-order frame delivery after reversion

If out-of-order frame delivery is enabled and you revert to a previous Data ONTAP release, the out-of-order frame delivery functionality is disabled. You must manually enable out-of-order frame delivery after reverting to a Data ONTAP release that supports this functionality.

If you are reverting to a Data ONTAP release that does not support out-of-order frame delivery, you must manually enable the in-order frame delivery options and port-based policy on FC switches.

For more information about enabling out-of-order frame delivery, see the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode* and your FC switch documentation.

Considerations for downgrading the SP firmware

If your current SP firmware version is not supported for the Data ONTAP release you are downgrading or reverting to, you must install a supported SP firmware version for the earlier Data ONTAP release.

After the Data ONTAP revert or downgrade process is complete, you must take the action to install an SP firmware version that is supported for the Data ONTAP version you reverted or downgraded to. To learn which SP firmware versions are supported by each Data ONTAP release, see the *BIOS Service Processor Support Matrix* on the NetApp Support Site. For instructions about downloading and installing an SP firmware version, see the *System Firmware and Diagnostics Download* page on the NetApp Support Site.

Reinstalling the required V-Series license after revert or downgrade

The licensing scheme for V-Series systems changed in Data ONTAP 8.2. Data ONTAP 8.2 and later requires the V_StorageAttach license package for V-Series systems to be able to access LUNs on storage arrays. Depending on the type of reversion you do, you might need to install the v-series license key for a prior release.

A license key is required for each V-Series system being reverted or downgraded.

If...	Then the V-Series license requirement is...
The V-Series system was upgraded to Data ONTAP 8.2 from the 8.1.x release family and you want to revert to a release in the 8.1.x release family again	You do not have to install the V-Series license for the release to which the system is being reverted. Data ONTAP remembers the V-Series license from when it was upgraded from 8.1.x to 8.2; Data ONTAP reinstalls those licenses when Data ONTAP is downgraded to 8.1.x.
Data ONTAP 8.2 is the first release of Data ONTAP installed on the system and you want to revert to a release in the 8.1.x release family	You must manually install the license key for V-Series systems that is supported for the release to which the system is being reverted. Contact your sales representative to obtain the appropriate license key for your system and release.
You want to downgrade the system from Data ONTAP 8.2.x to an earlier release in the 8.2 release family	You do not have to install the V_StorageAttach license package; Data ONTAP remembers the appropriate license for the release family.

For information about how to install licenses, see the *Data ONTAP System Administration Guide for 7-Mode*.

Downgrading to an earlier release in the same release family

Transitioning a storage system to an earlier release in the same Data ONTAP release family is referred to as a *downgrade*. Doing so requires preparation, downloading and booting the earlier release, and completing post-downgrade procedures.

Downgrading does not require modifications to Data ONTAP on-disk structures; you must simply obtain and boot the target release after verifying requirements and compatibility.

When to downgrade and when to call technical support

You can downgrade without assistance when downgrading new or test systems, but you should call technical support if you encounter problems during or after upgrading, or if you want to downgrade a production system.

You can downgrade to an earlier release family without assistance from technical support only in the following scenarios:

- You upgraded to a new release on a test system and you want to return to the original release when testing is completed.
- You are configuring a new storage system—running a later release of Data ONTAP and not yet in production—in an environment in which you have standardized on an earlier Data ONTAP release.

Do not attempt to downgrade Data ONTAP in a production environment without assistance. If you encounter any of the following circumstances, contact technical support immediately:

- The upgrade process fails and cannot finish.
- The upgrade process finishes, but the system is unusable in a production environment.
- The upgrade process finishes and the system goes into production, but you are not satisfied with its behavior.

Planning your downgrade

Because new features are introduced in each release of Data ONTAP, you must understand downgrade requirements and evaluate how they might impact your current configuration.

Before proceeding with the downgrade, you should plan to do the following:

- Review the *Release Notes* for the Data ONTAP downgrade source release.
- Understand any requirements for downgrading to the target release from your existing software.
- Note any potential functionality changes to your system after the downgrade.

- Be prepared to address all points in the downgrade checklist.

Downgrade checklist

To ensure a successful downgrade, you must check several things before, during, and after the downgrade.

Steps for preparing to downgrade

Preparatory steps are complete when all of the following conditions are true:

- The following general downgrade requirements have been satisfied:
  - Software and hardware support in the target release is confirmed.
  - System status requirements are addressed.
  - Standard system services and processes that could interfere with downgrade are not running.
- Potential issues in your environment have been identified and preparatory tasks completed as appropriate.
- The target Data ONTAP image has been obtained from the NetApp Support Site and is available to systems being downgraded.

Steps for performing a downgrade

Software downgrade steps are complete when all of the following conditions are true for each partner in an HA pair:

- The target release has been downloaded to the boot device.
- Each system has booted the target release.
- The correct SP firmware is loaded and running on supported platforms.

Steps for after downgrading

Post-downgrade steps are complete when all of the following conditions are true:

- HA pair relationship is restored between partner nodes.
- Services and protocols are functioning as expected.

General downgrade requirements

You must satisfy certain system status and operational requirements before downgrading to a previous version of Data ONTAP.

Target release requirements

The following are the requirements for the target release to which you are downgrading:

- You must disable any features not supported in the target release before downgrading.
- If you added hardware components after upgrading from an earlier Data ONTAP release, you must verify that the components will continue to work when you downgrade to the earlier release.

If you upgraded Data ONTAP for new hardware support, you must disconnect the new hardware and reconfigure your system before downgrading.

- You must verify that all components of your configuration are compatible with the target Data ONTAP downgrade release by consulting the Interoperability Matrix on the NetApp Support Site.

System status requirements

The following are the system status requirements:

- All disks must be online.
- All volumes and aggregates must be online.
- All volumes and aggregates must be free of file system errors and bad blocks.
- Any unsaved core must be recovered or released.
- All network interfaces must be online.
- All SnapMirror relationships must be broken.
- If your systems are configured for MultiStore technology, all vFiler units must be running.
- You cannot downgrade if an upgrade is in progress.
  You must complete the upgrade before downgrading.
- You cannot downgrade if the background quota upgrade is still in progress from a previous Data ONTAP upgrade.

Operational requirements

The following jobs cannot be running during a Data ONTAP downgrade:

- Disk failure processing
- Disk maintenance center testing
- Dump or restore
- Inode file upgrade
- RAID assimilation
- RAID disk sanitization
- RAID optimized reconstructions
- RAID scrubs
- wafliron

Identifying downgrade issues

Every Data ONTAP release family has unique downgrade requirements that you must understand and resolve before you decide to downgrade.

For additional information, and to check for downgrade issues that might have been discovered later, see the *Data ONTAP Release Notes for 7-Mode*. The following list summarizes downgrade issues known when this guide was published:

- If your current SP firmware version is not supported for the Data ONTAP release that you are downgrading or reverting to, you must install a supported SP firmware version for the earlier Data ONTAP release.

Preparing to downgrade Data ONTAP

Before downgrading to an earlier Data ONTAP release in the same release family, you must verify reversion requirements, resolve any downgrade issues, and obtain the Data ONTAP software image for the target release.

Plan to do the following:

- Read the *Release Notes* for this Data ONTAP source release.
- Verify that all components of your configuration are compatible with the target Data ONTAP downgrade release by consulting the *NetApp Interoperability Matrix* on the NetApp Support Site.

Commands for addressing downgrade requirements

You must view the status of system conditions and operations that affect Data ONTAP downgrades and take appropriate action before performing the downgrade process.

System status

To verify that...	Use this command to check status...	And address the requirement before downgrading by...
No disks are offline	`aggr status -f`	Bringing them online or replacing them.
No volumes are offline or restricted	`vol status`	Using one of the following commands: • `vol online` • `vol destroy`
No volumes are compressed	`sis status -l`	Using the `sis undo -C` command (this is an advanced command).
No volumes are marked `wafl inconsistent`	`vol status`	Contacting technical support immediately.
No aggregates are offline or restricted	`aggr status`	Using one of the following commands: • `aggr online` • `aggr destroy`

To verify that...	Use this command to check status...	And address the requirement before downgrading by...
No aggregates are marked `wafl inconsistent`	`aggr status`	Contacting technical support immediately.
No unsaved cores are present	`savecore -i`	Recovering them or releasing them with the `savecore` command.
No SnapMirror relationships are present	`snapmirror destinations`	Breaking them with the `snapmirror break` command.
Any previous upgrade has been completed	Waiting at least 10 minutes after an upgrade before beginning a reversion.	
No background quota upgrade is in process	`quota status`	Disabling quotas or allowing the quota upgrade to finish.

Jobs

If any of the following jobs are running, you can halt them manually or you can wait until the operation finishes.

To ensure that the following jobs are not running...	Use this command to check status...	And use this command to halt the operation manually...
Dump or restore	`backup status`	`backup terminate`
RAID scrubs	`aggr scrub status`	`aggr scrub stop`
RAID optimized reconstructions	`aggr status`	Allow the operation to finish.
RAID disk sanitization	`disk sanitize status`	`disk sanitize abort`
`wafliron`	`wafliron` should only be run under direction from technical support; consult with them before downgrading.	
Disk maintenance center testing	`disk maint status`	`disk maint abort`
Disk failure processing	`disk show -v` or `storage show disk -a`	Identify and remove any failed disks.

Staging the target Data ONTAP image

You must obtain the software image for the target Data ONTAP reversion or downgrade release and make it accessible to the storage system.

About this task

You can copy the target software image (for example `821_setup_i.tgz`) from the NetApp Support Site or another storage system to the HTTP server or client system that you use to stage software images.

Performing the downgrade process

You can downgrade to an earlier Data ONTAP release using the nondisruptive or disruptive methods. If your system includes a Service Processor, you might need to update its firmware after the downgrade.

Downgrading Data ONTAP using the nondisruptive method

You can downgrade HA pairs within a Data ONTAP release family while maintaining storage system availability. This nondisruptive downgrade method has several steps: initiating a failover operation on one system, updating the “failed” system (and if necessary, its firmware), initiating giveback, and repeating the process on the other system.

Steps

1. At the console of each storage system, enter the following command to verify that the HA pair is enabled:

   `cf status`

   If the HA pair is enabled, the `cf status` command output should be similar to the following:

   ```
   Cluster enabled, systemA is up.
   ```

   a) If not, enter the following command to enable it:

      `cf enable`

   b) Verify that the HA pair is re-enabled by entering the `cf status` command.

2. Choose one of the following options depending on whether you have already installed new system files:

If you...	Then...

Have already installed system files	At the console of each system, enter the following command to activate the new code on the storage system's boot device:
	`download`
	The `download` command provides an acknowledgment similar to the following:
	`Tue Jun 19 10:03:22 GMT [download.request:notice]: Operator requested download initiated`
	`download: Downloading boot device`
	`.....`
	`download: Downloading boot device (Service Area)`
	Then a message similar to the following appears:
	`Tues Jun 19 10:11:51 GMT [download.requestDone:notice]: Operator requested download completed`
	Note: The storage system console is unavailable until the `download` procedure is complete.

Are installing and downloading system files in the same operation	At the console of each system, enter the following command: **`software update`** ***`url|file`*** When you use the `software update` command without the `-d` option, the `download` command is executed by default.

3. If CIFS is in use in System A, terminate it by entering the following command:

   `cifs terminate -t` ***`nn`***

   nn is a notification period (in minutes) appropriate for your clients after which CIFS services are terminated. After that period of time, proceed to the next step.

4. At the console of system B, enter the following command:

   `cf takeover`

   This command causes system A to shut down gracefully and leaves system B in takeover mode.

5. Wait 8 minutes to ensure the following conditions:

   - Client multipathing (if deployed) is stabilized.
   - Clients are recovered from the pause in I/O that occurs during takeover.
     The recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

6. Enter the following command at the console of system B:

   `cf giveback`

Attention: The giveback is not initiated and an error message is returned if any conditions such as the following are detected:

- Open client sessions (such as CIFS sessions)
- Long-running operations
- Operations that cannot be restarted (such as tape backup or SyncMirror resynchronization)
- Error conditions (such as disk connectivity mismatch between the nodes)

If giveback is not initiated, complete the following steps:

a. Address the condition described in the error message, ensuring that any identified operations are terminated gracefully.

b. Enter the `cf giveback` command with the `-f` option:

`cf giveback -f`

For more information about the `-f` option, see the cf(1) man page.

System A reboots with the new system configuration—a Data ONTAP version or other system firmware and hardware changes—and resumes normal operation as an HA pair partner.

7. Wait 8 minutes to ensure the following conditions:

- Client multipathing (if deployed) is stabilized.
- Clients are recovered from the pause in I/O that occurs during takeover.

  Recovery time is client-specific and may take longer than 8 minutes depending on the characteristics of the client applications.

8. Repeat Step 3 through Step 7 to update the partner storage system.

System B is brought down and updated while partner A is in takeover mode.

Downgrading Data ONTAP using the disruptive method

If you can schedule downtime to downgrade Data ONTAP, you can take HA pairs offline, then install the target release on your systems, download it to the boot device, and reboot.

Before you begin

You must have obtained the target Data ONTAP image and staged it on a web server that is accessible to your storage system.

You must have verified that protocol, system services, and RAID operations were not running before proceeding with this task.

About this task

You must downgrade the partner system in an HA pair before booting the systems into the earlier target release.

Steps

1. If your systems are in an HA configuration, disable it by entering the following command at the console of one of the storage systems:

   `cf disable`

2. Choose one of the following options depending on whether you have already installed new system files:

If you...	Then...

Have already installed system files	At the console of each system, enter the following command to activate the new code on the storage system's boot device:
	`download`
	The `download` command provides an acknowledgment similar to the following:
	`Tue Jun 19 10:03:22 GMT [download.request:notice]: Operator requested download initiated`
	`download: Downloading boot device`
	`.....`
	`download: Downloading boot device (Service Area)`
	Then a message similar to the following appears:
	`Tues Jun 19 10:11:51 GMT [download.requestDone:notice]: Operator requested download completed`
	Note: The storage system console is unavailable until the `download` procedure is complete.

Are installing and downloading system files in the same operation	At the console of each system, enter the following command: **`software update`** ***`url|file`*** When you use the `software update` command without the `-d` option, the `download` command is executed by default.

3. Enter the following command at the console of system A:

   `reboot`

If your systems are...	Then...
Stand-alone	The downgrade is complete.
In an HA pair	Proceed to the next step.

4. While the HA configuration is disabled, repeat Step 2 through Step 3 at the console of system B.

   Attention: Do not proceed to Step 5 until both systems in the HA configuration have been rebooted with the new version of Data ONTAP.

5. Reenable the HA configuration by entering the following command on one of the storage systems:

   ```
   cf enable
   ```

After you finish

If your system includes a Service Processor (SP), ensure that its firmware is up to date. Otherwise, proceed to post-downgrade tasks.

Updating SP firmware

If your storage system includes a Service Processor (SP), you must verify that it is running the correct firmware version and update the firmware if it is not the correct version.

Before you begin

The reversion or downgrade process should be complete and the storage system should be running the target release.

About this task

Data ONTAP software images include firmware for SP modules. If the firmware version on your SP module is outdated, you must update it before returning the reverted or downgraded system to production status.

Steps

1. Go to the system firmware information on the NetApp Support Site and determine the most recent firmware version for your SP module.
2. Enter the following command at the storage system CLI to determine the SP firmware version:

   ```
   sp status
   ```

   You see output similar to the following:

   ```
   Service Processor Status: Online
   Firmware Version:   1.2
   ...
   ```

   If the SP firmware version in the command output is earlier than the most recent version on the NetApp Support Site, you must update your disk shelf firmware manually.
3. Click the **SP_FW.zip** link to download the file from the NetApp Support Site to your HTTP server.
4. At the storage system prompt, enter the following command:

   software update http://*web_server*/SP_FW.zip -f

5. When the `software update` command is finished, enter the following command at the storage system prompt:

   `sp update`

6. When the system prompts you to update the SP, enter **`y`** to continue.

   The SP is updated and you are prompted to reboot the SP. Wait approximately 60 seconds to allow the SP to reboot.

7. Verify that the SP firmware has been updated by entering the following command:

   `sp status`

8. If the system is a partner in an HA pair, repeat Steps 4 through 7 on the partner system.

Result

If your console connection is not through the SP, the connection remains active during the SP reboot.

If your console connection is through the SP, you lose your console connection to the storage system. In approximately one minute, the SP reboots and automatically reestablishes the connection.

Related information

System Firmware + Diagnostics Download: support.netapp.com/NOW/cgi-bin/fw

Completing post-downgrade tasks

After downgrading to an earlier Data ONTAP release, you might need to perform additional tasks.

You should verify that any services you halted manually restarted after the downgrade. If not, you should restart them manually and verify that any clients have appropriate access to storage system services.

Reinstalling the required V-Series license after revert or downgrade

The licensing scheme for V-Series systems changed in Data ONTAP 8.2. Data ONTAP 8.2 and later requires the V_StorageAttach license package for V-Series systems to be able to access LUNs on storage arrays. Depending on the type of reversion you do, you might need to install the v-series license key for a prior release.

A license key is required for each V-Series system being reverted or downgraded.

If...	Then the V-Series license requirement is...
The V-Series system was upgraded to Data ONTAP 8.2 from the 8.1.x release family and you want to revert to a release in the 8.1.x release family again	You do not have to install the V-Series license for the release to which the system is being reverted. Data ONTAP remembers the V-Series license from when it was upgraded from 8.1.x to 8.2; Data ONTAP reinstalls those licenses when Data ONTAP is downgraded to 8.1.x.
Data ONTAP 8.2 is the first release of Data ONTAP installed on the system and you want to revert to a release in the 8.1.x release family	You must manually install the license key for V-Series systems that is supported for the release to which the system is being reverted. Contact your sales representative to obtain the appropriate license key for your system and release.
You want to downgrade the system from Data ONTAP 8.2.x to an earlier release in the 8.2 release family	You do not have to install the V_StorageAttach license package; Data ONTAP remembers the appropriate license for the release family.

For information about how to install licenses, see the *Data ONTAP System Administration Guide for 7-Mode*.

Optimal service availability during upgrades

Service availability during Data ONTAP upgrades can be optimized through planning and configuration. In many cases, upgrades can be completely nondisruptive from a client perspective.

How upgrades impact service availability

You can review the factors that can affect the availability of storage system services before you begin the upgrade.

The following factors impact service availability:

- Whether the systems being upgraded (upgrade host) are single nodes or HA configuration partners

  Systems in high-availability configurations are designed to provide optimal service availability.
- The types of protocols used and services licensed, and their susceptibility to timeout errors
- Whether you need to make decisions about Data ONTAP issues and new features between or within release families

  Upgrading between Data ONTAP release families involves more steps and is potentially more disruptive than upgrades within a release family.
- Whether a system firmware update is required

  Some system firmware updates require a system halt and reboot. This can disrupt services in single-system upgrades and HA configuration upgrades when downtime is scheduled, but it does not affect services in nondisruptive HA configuration upgrades.
- The types of applications in use and their susceptibility to timeout errors

  The availability of client applications during upgrades depends on features, protocols, and configuration. See your application documentation for more information.

Note: All hardware and software upgrades in any storage solution are potentially at least somewhat disruptive to storage system services. Make sure that you review upgrade options carefully to determine the best method of upgrading for maintaining optimal service availability.

Related concepts

Upgrade host requirements on page 12
Considerations for services and protocols during upgrades on page 100
Identifying potential upgrade issues on page 21
Updating firmware on page 58
Disk shelf firmware updates on page 64

Considerations for services and protocols during upgrades

In general, services based on stateless protocols—such as NFS, FC, and iSCSI—are less susceptible to service interruptions during upgrades than session-oriented protocols—such as CIFS, FTP, NDMP, and HTTP.

During an upgrade, the storage system must be rebooted (by issuing the `reboot` command or by initiating an HA configuration takeover and giveback) to load the new software. Services based on stateless protocols usually remain available during nondisruptive upgrades of systems in an HA configuration.

Stateless protocols usually include a timeout procedure. For example, if a message is sent and receipt is not acknowledged within a timeout period, a transmission error is assumed to have occurred. In a storage system environment, if the client's timeout period is greater than the disruption period on the storage system (for example, the amount of time a reboot or HA configuration giveback takes), the client does not perceive a disruption of storage system services.

In session-oriented protocols, there is no concept of timeout to protect the service from disruption. If session-oriented storage system services are disrupted, state information about any operation in progress is lost and the user must restart the operation.

Considerations for stateless protocols

Configurations that include client connections using stateless NAS and SAN protocols generally do not experience adverse effects during upgrades if the clients are configured according to recommended guidelines.

If you are using stateless protocols, consider the following:

- NFS hard mounts

  No adverse behavior is experienced on the clients during upgrade. Clients might receive some messages similar to the following until the storage system reboots:
  `NFS server not responding, retrying`

  In general, read/write directories should be hard-mounted. Hard mounts are the default type of mount.
- NFS soft mounts

  You should not use soft mounts when there is a possibility of frequent NFS timeouts. Race conditions can occur as a result of these timeouts, which can lead to data corruption. Furthermore, some applications cannot properly handle errors that occur when an NFS operation reaches a timeout using soft mounts.

  Situations that can cause frequent timeouts include nondisruptive upgrades or any takeover or giveback event in an HA configuration.

  In general, soft mounts should be used only when reading solely from a disk; even then, understand that any soft mount is unreliable.
- SAN protocols

No adverse behavior is experienced on FC or iSCSI clients if they are configured according to recommended guidelines.
For more information, see the Interoperability Matrix on the NetApp Support Site.

Related information

Interoperability Matrix: support.netapp.com/NOW/products/interoperability

Considerations for session-oriented protocols

Storage systems and session-oriented protocols might cause adverse effects on clients and applications in certain areas during upgrades.

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

- CIFS
  Client sessions are terminated. You should direct users to end their sessions before you upgrade. To do so, you can issue the `cifs terminate -t` command before the HA configuration takeover.
  Alternatively, you can issue the `reboot -t` command before the reboot.
- FTP, NDMP, and HTTP
  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.

  Attention: 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 Data ONTAP reboot time to minimize adverse effects.

Understanding background disk firmware updates

When a storage system reboots and there is new disk firmware present, the affected drives are automatically and sequentially taken offline, and the storage system responds normally to read and write requests.

If any request affects an offline drive, the read requests are satisfied by reconstructing data from other disks in the RAID group, while write requests are written to a log. When the disk firmware update is complete, the drive is brought back online after resynchronizing any write operations that took place while the drive was offline.

During a background disk firmware update, the storage system functions normally. You see status messages as disks are taken offline to update firmware and brought back online when the firmware update is complete. Background disk firmware updates proceed sequentially for active data disks and for spare disks. Sequential disk firmware updates ensure that there is no data loss through double-disk failure.

Offline drives are marked with the annotation `offline` in the `vol status -r` command output. While a spare disk is offline, it cannot be added to a volume or selected as a replacement drive for reconstruction operations. However, a disk would normally remain offline for a very short time (a few minutes at most) and therefore would not interfere with normal system operation.

The background disk firmware update is completed unless the following conditions are encountered:

- Degraded aggregates are on the storage system.
- Disks needing a firmware update are present in an aggregate or plex that is in an offline state.

Automatic background disk firmware updates resume when these conditions are addressed. For more information about determining aggregate status and state, see the *Data ONTAP Storage Management Guide for 7-Mode*.

Upgrading Data ONTAP-v systems

Upgrading Data ONTAP software on platforms based on Data ONTAP-v technology, for example, the Data ONTAP Edge product, requires a few additional preparatory steps.

Platforms that are based on Data ONTAP-v technology run standard Data ONTAP software, but like some of the hardware platforms that run Data ONTAP, the image you must download is unique.

Upgrade process overview for Data ONTAP-v systems

Before beginning to upgrade Data ONTAP software, you should plan the upgrade and familiarize yourself with the required steps.

1. Plan your upgrade by familiarizing yourself with requirements and issues before you upgrade:
   - Review the *Release Notes* for your upgrade target release.
   - Understand any requirements for upgrading to the target release from your existing software.
   - Create a back-out plan, in the unlikely event that you need to revert or downgrade to the Data ONTAP release that was running on your system before the upgrade.
   - Note any potential changes to your system after the upgrade.
   - If you run the SnapMirror software, identify storage systems with destination and source volumes.
2. If necessary, perform any required preparatory procedures before upgrading to the new Data ONTAP release:
   - Verify that any versions of VMware vSphere are compatible with your upgrade target release.
     If the new version of Data ONTAP software requires new vSphere software, upgrade the vSphere software first.
     For more information about software compatibility, see the *Release Notes* and the Interoperability Matrix for your Data ONTAP upgrade target release.
   - Ensure that you have a current Snapshot copy of the root volume of any system being upgraded.
3. Obtain the appropriate software image from the NetApp Support Site.
   Copy the image to your storage system or to an HTTP server on your network.
4. Install the Data ONTAP software image on your storage system.
   Extract the system files from the software image you copied to your system.
5. Download the new Data ONTAP system files to the boot device.
   The upgrade process is finished when your system reboots with the new version of Data ONTAP.
6. Verify that the version of dvadmin (the Data ONTAP-v administration tool) is compatible with your upgrade target release.

See the *Release Notes* and the Interoperability Matrix for your Data ONTAP upgrade target release.

If you need to upgrade dvadmin, you should install the upgrade after the new version of Data ONTAP has been installed. For dvadmin upgrade instructions, see the *Data ONTAP-v Administration Tool Installation Guide*.

7. Verify that your systems are operating as expected after the upgrade.

   Before returning storage systems to production, you should check the status of configured functionality and re-enable any functionality that was suspended before the upgrade.

Related information

Download Software: support.netapp.com/NOW/cgi-bin/software

NetApp Interoperability Matrix: support.netapp.com/NOW/products/interoperability

Recommendations for Data ONTAP-v systems upgrading to this release

You should follow these simple guidelines to ensure your storage system upgrade is successful.

- Review the "Important cautions" section of the Release Notes for this Data ONTAP release. It contains important information that could affect the behavior of your system during and after upgrading.
- Upgrade during non-peak hours.
- Avoid performing a quota initialization prior to upgrading.

  If a quota initialization is in process prior to upgrading, wait for the initialization to finish.

Preparing for a Data ONTAP-v system upgrade

Before installing the latest Data ONTAP release on your storage system, you need to verify information and complete some tasks.

Steps

1. Verify that your system meets the minimum requirements.

   For more information about system requirements, see the Release Notes for your Data ONTAP upgrade target release.

2. Create a backup of Data ONTAP-v system information, including the virtual machine configuration and all of the information on the Data ONTAP-v system disks, by entering the following dvadmin command:

   ```
   vm config backup <vm_name> <backup_name>
   ```

3. Connect to the storage system and confirm that all paths to disks are visible to the system by entering the following Data ONTAP command:

   ```
   disk show
   ```

4. Confirm that there are no failed disks by entering the following command:

   ```
   vol status –f
   ```

5. Verify that all aggregates are online by entering the following command:

   ```
   aggr status
   ```

6. Ensure that you have a current Snapshot copy of the root volume of any system being upgraded.

   For more information about creating Snapshot copies, see the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode*.

7. If you are running SnapMirror, identify storage systems with destination volumes and upgrade them before upgrading storage systems with source volumes.

Obtaining software images for Data ONTAP-v systems

To upgrade the storage system to the latest release of Data ONTAP, you need access to software images. Software images are available on the NetApp Support Site.

You can copy software images to an HTTP server on your network and then Data ONTAP-v storage systems can access the images by using the `software` command.

Software images are specific to storage system models. Be sure to obtain the correct image for your system.

Related information

Download Software: support.netapp.com/NOW/cgi-bin/software

Copying the software image to the HTTP server

If you have an HTTP server that is accessible to your storage system, you can copy Data ONTAP software images to the HTTP server. This task prepares the HTTP server to serve software images to storage systems in your environment.

Steps

1. Locate the Data ONTAP software in the Data ONTAP Edge Software Downloads area of the NetApp Support Site.
2. Copy the software image (for example, `821_v_image.tgz`) from the NetApp Support Site to the directory on the HTTP server from which the file is served.

Copying the software image from the HTTP server to the storage system

You can copy software images to the `/etc/software` directory of your storage system if you plan to perform the installation later. If you want to copy the image and perform the installation in one step, see the section on Installing Software Images.

Step

1. Enter the following command from the storage system console:

   `software get` *`url`* `[-f] [`*`filename`*`]`

   `url` is the URL that provides the location of the package to be fetched. Standard URL schemes, including HTTP, FTP, TFTP and FILE, are accepted.

   Use the following URL syntax if you need to specify a user name, password, host, and port to access files on the HTTP server using Basic Access Authentication (RFC2617):

   `http://`*`username:password@host:port/path`*

   Use the `-f` flag to overwrite an existing software file of the same name in the storage system's `/etc/software` directory. If a file of the same name exists and you do not use the `-f` flag, the download fails and you are prompted to use `-f`.

   `filename` optionally allows you to use a different target name for the source software file being downloaded to your storage system. If you do not specify a different name, Data ONTAP uses the file name listed in the URL.

Example

In the following example, the `software get` command copies the file `821_v_image.tgz` to the storage system:

`software get http://www.example.com/downloads/x86-64/821_v_image.tgz`

You see a message similar to the following:

```
software: copying to /etc/software/821_v_image.tgz
software: 100% file read from location.
software: /etc/software/821_v_image.tgz has been copied.
```

Installing software images on Data ONTAP-v systems

You use the `software update` command to extract and install new Data ONTAP software images on your storage system.

You must know the location of and have access to the software image. The `software update` command requires one of the following as an argument:

- The name of the software image in the `/etc/software` directory

- The URL of the HTTP server that you configured to serve software images

The `software update` command allows you to perform several operations at one time. For example, you can use a single command to copy an image from the HTTP server, extract and install the system files, download the files to the boot device, and reboot your system.

For more information about the `software update` command and its options, see the appropriate man page.

Installing software images

You can install software from an HTTP server or from a software image you copied to the storage system.

Step

1. From the storage system prompt, enter the following command:

   software update *{url|file_name}* options

   - *`url`* is the URL of the HTTP server, subdirectory, and file name.
   - *`file_name`* is the name of the file you copied to the `/etc/software` directory.
   - *`options`* are one or more of the following:
     - The `-d` option prevents the `download` command from being run automatically after the system files are installed.
     - The `-f` option overwrites the existing image in the `/etc/software` directory when you install software from an HTTP server.
     - The `-r` option prevents the system from rebooting automatically after the `download` command has finished (default).
     - The `-R` option causes the system to reboot automatically after the `download` command has finished.

Example

Enter the following command to copy and install the image from your HTTP server, download the new system files to the boot device, and reboot the system:

software update http://www.example.com/downloads/x86-64/821_v_image.tgz -R

Enter the following command to install the image from the `/etc/software` directory, download the new system files to the boot device, and reboot the system:

software update /etc/software/821_v_image.tgz -R

Verifying Data ONTAP-v system status after an upgrade

It is a best practice to verify that upgraded systems are functioning as expected before returning them to production. This entails verifying the status of configured functionality and re-enabling any functionality that was suspended before the upgrade.

About this task

These tasks should be performed on each system that was upgraded.

Steps

1. Verify that the intended target release is installed and running by entering the following command:

   `version`

2. Confirm that all paths to disks are visible to the system by entering the following command:

   `disk show`

3. Confirm that there are no failed disks by entering the following command:

   `vol status –f`

4. Verify that all aggregates are online by entering the following command:

   `aggr status`

5. Confirm that network interfaces are online by entering the following command:

   `ifconfig –a`

6. If you disabled SnapMirror functionality, enter the following command to re-enable it:

   `snapmirror on`

7. If you quiesced SnapMirror transfers, enter the following command for each destination volume to resume them:

   `snapmirror resume` ***`destination`***

After you finish

If the new Data ONTAP version requires that you upgrade the dvadmin software, you should install the new Data ONTAP-v Installer virtual machine and dvadmin software at this time. See the *Data ONTAP-v Administration Tool Installation Guide* for upgrade instructions.

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