Which upgrade method should I use?

ONTAP 9

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The method you use to upgrade depends upon your configuration. If available, the automated nondisruptive upgrade (ANDU) using System Manager is the preferred method.

- **Nondisruptive upgrade**: In a nondisruptive upgrade, update procedures are performed in the background while maintaining service to clients. Nondisruptive upgrades can be performed using an automated or manual method.
  - **Automated nondisruptive upgrade (ANDU)** can be executed using System Manager or the ONTAP command line interface (CLI). If available for your configuration, ANDU using System Manager is the recommended method of upgrade. With ANDU, ONTAP automatically installs the target ONTAP image on each node, validates the cluster components to ensure that the cluster can be upgraded nondisruptively, and then executes the upgrade in the background.
  - **Manual nondisruptive upgrade** involves manual steps to confirm the ONTAP configuration on each node and then uses the rolling update method to perform the upgrade. In the rolling update method, a node is taken offline and upgraded while its partner takes over its storage. When the node upgrade is complete, the partner node gives control back to the original owning node and the process is repeated, this time on the partner node. Each additional HA pair is upgraded in sequence until all HA pairs are running the target release. Manual nondisruptive upgrades are executed using the ONTAP CLI.
- **Disruptive**: In a disruptive upgrade, storage failover is disabled for each HA pair, and then each node is rebooted one at a time. Disruptive upgrades can be performed more quickly than nondisruptive upgrades, and require fewer steps to complete. However, you should not perform a disruptive upgrade unless you can take the cluster offline for the duration of the upgrade. If you are operating in a SAN environment, you should be prepared to shut down or suspend all SAN clients before performing a disruptive upgrade. Disruptive upgrades are performed using the ONTAP CLI.

You should only use a manual method if ANDU is not supported for your configuration.

Non-MCC configurations

The upgrade methods available for each configuration are listed in order of recommended usage.

ONTAP version	Number of nodes	Upgrade method
9.0 or later	2, 4, 8	• Automated nondisruptive using System Manager • Automated nondisruptive using the CLI • Manual nondisruptive using the CLI (the Rolling Method) • Manual disruptive using the CLI

ONTAP version	Number of nodes	Upgrade method
9.0 or later	12	• Automated nondisruptive using the CLI • Manual nondisruptive using the CLI (the Rolling Method) • Manual disruptive using the CLI
9.2 or later	Single-node	Automated disruptive using the CLI

MCC configurations

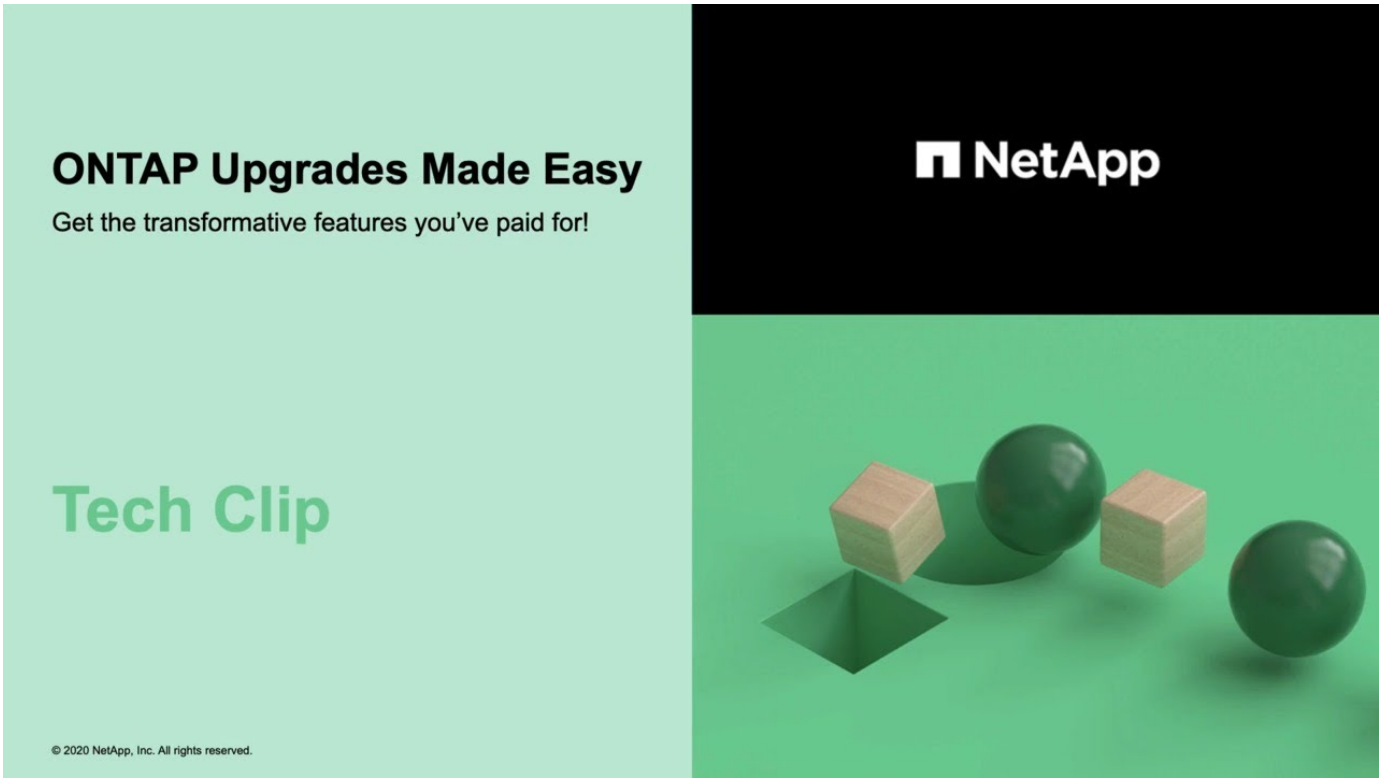
The upgrade methods available for each configuration are listed in order of recommended usage.

ONTAP version	Number of nodes	Upgrade method
9.3 or later	2,4	• Automated nondisruptive using System Manager • Automated nondisruptive using the CLI • Manual disruptive using the CLI
9.3 or later	8	• Automated nondisruptive using the CLI • Manual nondisruptive using the CLI • Manual disruptive using the CLI
9.2 or earlier	2	• Manual nondisruptive (for 2-node clusters) using the CLI • Manual disruptive using the CLI
9.2 or earlier	4, 8	• Manual nondisruptive using the CLI • Manual disruptive using the CLI
9.0 or later	4, 8 (patch only)	Automated nondisruptive using System Manager
9.2 or earlier	2, 4, 8 (patch only)	Automated nondisruptive using System Manager

Automated nondisruptive using System Manager

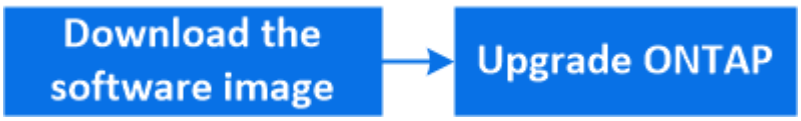
You can nondisruptively update the version of ONTAP on your cluster using System Manager.

Take a look at the simplified ONTAP upgrade capabilities available in ONTAP 9.8 System Manager.



The update process checks your hardware platform and configuration to verify that your system is supported by the ONTAP version to which you are upgrading. ONTAP automatically shifts workloads during an upgrade between clusters so you can continue serving data.

This procedure updates your system to the specified version of ONTAP. It is assumed that your hardware platform and configuration is supported for the target release.



If issues are encountered during your automated upgrade, you can view EMS messages and details in ONTAP System Manager: Click **Events & Jobs** > **Events**.

Steps

1. If you want to download the software image to an HTTP or FTP server on your network, copy the software image from the NetApp support site to the directory on the HTTP or FTP server from which the image will be served.

   If you want to download the software image to a local folder, then click the software image on the NetApp support site, select **Save As**, and then choose the local folder to place the image.

2. Depending on the System Manager version that you are running, perform one of the following steps:

ONTAP version	Steps
ONTAP 9.8 or later	Click **Cluster > Overview**.

ONTAP version	Steps
ONTAP 9.5, or 9.6	Click **Configuration** > **Cluster** > **Update**.
ONTAP 9.4 or earlier	Click **Configuration** > **Cluster Update**.

3. In the right corner of the Overview pane, click ⋮.
4. Click **ONTAP Update**.
5. In the Cluster Update tab, add a new image or select an available image.

If you want to…	Then…
Add a new software image from the local client **Note:** You should have already downloaded the image to the local client. Download and install the ONTAP software images	a. Under Available Software Images, click **Add from Local**. b. Browse to the location you saved the software image, select the image, and then click **Open**. The software image uploads after you click **Open**.
Add a new software image from the NetApp Support Site	a. Click **Add from Server**. b. In the Add a New Software Image dialog box, enter the URL of the HTTP server or FTP server on which you have saved the image that was downloaded from the NetApp Support Site. For anonymous FTP, you must specify the URL in the ftp://anonymous@ftpserver format. c. Click **Add**.
Select an available image	Choose one of the listed images.

6. Click **Validate** to run the pre-update validation checks to verify whether the cluster is ready for an update.

   The validation operation checks the cluster components to validate that the update can be completed nondisruptively, and then displays any errors or warnings. It also displays any required remedial action that you must perform before updating the software.

   You must perform all of the required remedial actions for the errors before proceeding with the update. Although you can ignore the remedial actions for the warnings, the best practice is to perform all of the remedial actions before proceeding with the update.

7. Click **Next**.
8. Click **Update**.

   Validation is performed again.

- When the validation is complete, a table displays any errors and warnings, along with any required remedial actions to be taken before proceeding.
- If the validation is completed with warnings, you can choose to select the **Continue update with warnings** checkbox, and then click **Continue**.

  When the validation is complete and the update is in progress, the update might be paused because of errors. You can click the error message to view the details, and then perform the remedial actions before resuming the update.

After the update is completed successfully, the node reboots, and you are redirected to the ONTAP System Manager login page. If the node takes a long time to reboot, you must refresh your browser.

Resuming an upgrade (using System Manager) after an error in the automated upgrade process

If an automated upgrade pauses because of an error, you can resolve the error and resume the automated upgrade, or you can cancel the automated upgrade and complete the process manually. If you choose to continue the automated upgrade, do not perform any of the upgrade steps manually.

1. Depending on the System Manager version that you are running, perform one of the following steps:
   - ONTAP 9.4 or earlier: Click **Configuration** > **Cluster Update**.
   - ONTAP 9.5 or 9.6: Click **Configuration** > **Cluster** > **Update**.
   - ONTAP 9.7 or later: Click **Cluster** > **Overview**

     Then in the right corner of the Overview pane, click the three blue vertical dots, and **ONTAP Update**.
2. Continue the automated update or cancel it and continue manually.

If you want to…	Then…
Resume the automated updated	Click **Resume**.
Cancel the automated updated and continue manually	Click **Cancel**.

Automated nondisruptive using the CLI

You can use the command line interface (CLI) to verify that the cluster can be upgraded nondisruptively, install the target ONTAP image on each node, and then, execute an upgrade in the background.

If you do not plan to monitor the progress of the upgrade process, it is a good practice to request EMS notifications of errors that might require manual intervention.

- You must have met the upgrade preparation requirements.
- For each HA pair, each node should have one or more ports on the same broadcast domain.

When a set of nodes is upgraded during a batch upgrade, the LIFs are migrated to the HA partner nodes. If the partners do not have any ports in the same broadcast domain, then the LIF migration fails.

- If you are upgrading from ONTAP 9.3 to 9.7, you must have obtained the software image for 9.5 and 9.7.
- If you are upgrading from ONTAP 9.5 to 9.9.1, you must have obtained the software image for 9.7 and 9.9.1.

The cluster image validate command checks the cluster components to validate that the upgrade can be completed nondisruptively, and then provides the status of each check and any required action you must take before performing the software upgrade.

Modifying the setting of the storage failover modify-auto-giveback command option before the start of an automatic nondisruptive upgrade (ANDU) has no impact on the upgrade process. The ANDU process ignores any preset value to this option during the takeover/giveback required for the update. For example, setting -autogiveback to false prior to beginning ANDU does not interrupt the automatic upgrade before giveback.

1. Delete the previous ONTAP software package:`cluster image package delete -version previous_ONTAP_Version`
2. Download the target ONTAP software package: `cluster image package get -url location`

If you are upgrading from ONTAP 9.3 to 9.7, download the software package for ONTAP 9.5, and then use the same command to download the software package for 9.7. If you are upgrading from ONTAP 9.5 to 9.9.1, download the software package for ONTAP 9.7, and then use the same command to download the software package for 9.9.1.

```
cluster1::> cluster image package get -url
http://www.example.com/software/9.7/image.tgz

Package download completed.
Package processing completed.
```

3. Verify that the software package is available in the cluster package repository: `cluster image package show-repository`

```
cluster1::> cluster image package show-repository
Package Version  Package Build Time
---------------- ------------------
9.7              MM/DD/YYYY 10:32:15
```

4. Verify that the cluster is ready to be upgraded nondisruptively: `cluster image validate -version package_version_number`
   - If you are upgrading a two-node or four-node MetroCluster configuration, you must run this command on both clusters before proceeding.
   - If you are upgrading from ONTAP 9.3 to 9.7, use the 9.7 package for verification. You do not need to validate the 9.5 package separately.

- If you are upgrading from ONTAP 9.5 to 9.9.1, use the 9.9.1 package for verification. You do not need to validate the 9.7 package separately.

```
cluster1::> cluster image validate -version 9.7

WARNING: There are additional manual upgrade validation checks that must
be performed after these automated validation checks have completed...
```

5. Monitor the progress of the validation: `cluster image show-update-progress`
6. Complete all required actions identified by the validation.
7. Generate a software upgrade estimate: `cluster image update -version package_version_number -estimate-only`

   The software upgrade estimate displays details about each component to be updated, and the estimated duration of the upgrade.

8. Perform the software upgrade: `cluster image update -version package_version_number`
   - If you are upgrading from ONTAP 9.3 to 9.7, use the 9.7 package_version_number in the above command.
   - If you are upgrading from ONTAP 9.5 to 9.9.1, use the 9.9.1 package_version_number in the above command.
   - For any MetroCluster configuration, except a 2-node MetroCluster system, the upgrade process starts simultaneously on both of the clusters (the disaster recovery cluster and the production cluster) after the user provides a confirmation. For a 2-node MetroCluster system, the update is started first on the disaster recovery site, that is, the site where the upgrade is not initiated. After the update is fully completed on the disaster recovery site, the upgrade begins on the production site.
   - If the cluster consists of 2 through 6 nodes, a rolling upgrade is performed. If the cluster consists of 8 or more nodes, a batch upgrade is performed by default. If desired, you can use the -force-rolling parameter to specify a rolling upgrade instead.
   - After completing each takeover and giveback, the upgrade waits for 8 minutes to enable client applications to recover from the pause in I/O that occurs during the takeover and giveback. If your environment requires more or less time for client stabilization, you can use the -stabilize-minutes parameter to specify a different amount of stabilization time.

```
cluster1::> cluster image update -version 9.7

Starting validation for this update. Please wait..

It can take several minutes to complete validation...

WARNING: There are additional manual upgrade validation checks...

Pre-update Check      Status     Error-Action
--------------------- ----------
-----------------------------------------
...
20 entries were displayed

Would you like to proceed with update ? {y|n}: y
Starting update...

cluster-1::>
```

9. Display the cluster update progress: `cluster image show-update-progress`

> If you are upgrading a 4-node or 8-node MetroCluster configuration, the `cluster image show-update-progress` command only displays the progress for the node on which you run the command. You must run the command on each node to see individual node progress.

10. Verify that the upgrade was completed successfully on each node.

```
cluster1::> cluster image show-update-progress

                                          Estimated         Elapsed
Update Phase         Status                 Duration        Duration
-------------------- ----------------- --------------- ---------------
Pre-update checks    completed               00:10:00        00:02:07
Data ONTAP updates   completed               01:31:00        01:39:00
Post-update checks   completed               00:10:00        00:02:00
3 entries were displayed.

Updated nodes: node0, node1.

cluster1::>
```

11. Trigger an AutoSupport notification: `autosupport invoke -node * -type all -message "Finishing_NDU"`

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

Related information

Launch Active IQ

Active IQ documentation

Resuming an upgrade (using the CLI) after an error in the automated upgrade process

If an automated upgrade pauses because of an error, you can resolve the error and resume the automated upgrade, or you can cancel the automated upgrade and complete the process manually. If you choose to continue the automated upgrade, do not perform any of the upgrade steps manually.

If you want to manually complete the upgrade, use the cluster image cancel-update command to cancel the automated process and proceed manually. If you want to continue the automated upgrade, complete the following steps.

1. View the upgrade error: `cluster image show-update-progress`
2. Resolve the error.
3. Resume the update: `cluster image resume-update`

Automated disruptive using the CLI (single-node cluster only)

Beginning with ONTAP 9.2, you can perform an automated update of a single-node cluster. Because single-node clusters lack redundancy, updates are always disruptive.

- You must have satisfied upgrade preparation requirements.

1. Delete the previous ONTAP software package: `cluster image package delete -version previous_package_version`
2. Download the target ONTAP software package: `cluster image package get -url location`

```
cluster1::> cluster image package get -url
http://www.example.com/software/9.7/image.tgz

Package download completed.
Package processing completed.
```

3. Verify that the software package is available in the cluster package repository: `cluster image package show-repository`

```
cluster1::> cluster image package show-repository
Package Version  Package Build Time
---------------- ------------------
9.7              M/DD/YYYY 10:32:15
```

4. Verify that the cluster is ready to be upgraded: `cluster image validate -version package_version_number`

```
cluster1::> cluster image validate -version 9.7

WARNING: There are additional manual upgrade validation checks that
must be performed after these automated validation checks have
completed...
```

5. Monitor the progress of the validation: `cluster image show-update-progress`
6. Complete all required actions identified by the validation.
7. Optionally, generate a software upgrade estimate: `cluster image update -version package_version_number -estimate-only`

   The software upgrade estimate displays details about each component to be updated, and the estimated duration of the upgrade.

8. Perform the software upgrade: `cluster image update -version package_version_number`

   > If an issue is encountered, the update pauses and prompts you to take corrective action. You can use the cluster image show-update-progress command to view details about any issues and the progress of the update. After correcting the issue, you can resume the update by using the cluster image resume-update command.

9. Display the cluster update progress: `cluster image show-update-progress`

   The node is rebooted as part of the update and cannot be accessed while rebooting.

10. Trigger a notification: `autosupport invoke -node * -type all -message "Finishing_Upgrade"`

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

Manual nondisruptive using the CLI

Manual nondisruptive (rolling method) using the CLI

The rolling upgrade method enables you to update a cluster of two or more nodes nondisruptively. This method has several steps: initiating a failover operation on each node in an HA pair, updating the “failed” node, initiating giveback, and then repeating the

process for each HA pair in the cluster.

You must have satisfied upgrade preparation requirements.

1. Update the first node in an HA pair

   You upgrade the first node in an HA pair by initiating a takeover by the node's partner. The partner serves the node's data while the first node is upgraded.

2. Update the second node in an HA pair

   After upgrading or downgrading the first node in an HA pair, you upgrade its partner by initiating a takeover on it. The first node serves the partner's data while the partner node is upgraded.

3. Repeat these steps for each additional HA pair.

You should complete post-upgrade tasks.

Updating the first node in an HA pair

You can update the first node in an HA pair by initiating a takeover by the node's partner. The partner serves the node's data while the first node is upgraded.

If you are performing a major upgrade, the first node to be upgraded must be the same node on which you configured the data LIFs for external connectivity and installed the first ONTAP image.

After upgrading the first node, you should upgrade the partner node as quickly as possible. Do not allow the two nodes to remain in a state of version mismatch longer than necessary.

1. Update the first node in the cluster by invoking an AutoSupport message: `autosupport invoke -node * -type all -message "Starting_NDU"`

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

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

2. Set the privilege level to advanced, entering **y** when prompted to continue: `set -privilege advanced`

   The advanced prompt (`*>`) appears.

3. Set the new ONTAP software image to be the default image: `system image modify {-node nodenameA -iscurrent false} -isdefault true`

   The system image modify command uses an extended query to change the new ONTAP software image (which is installed as the alternate image) to the default image for the node.

4. Monitor the progress of the update: `system node upgrade-revert show`
5. Verify that the new ONTAP software image is set as the default image: `system image show`

   In the following example, image2 is the new ONTAP version and is set as the default image on node0:

```
cluster1::*> system image show
                  Is      Is                  Install
Node      Image   Default Current Version     Date
--------- ------- ------- ------- --------- ------------------
node0
          image1  false   true    X.X.X     MM/DD/YYYY TIME
          image2  true    false   Y.Y.Y     MM/DD/YYYY TIME
node1
          image1  true    true    X.X.X     MM/DD/YYYY TIME
          image2  false   false   Y.Y.Y     MM/DD/YYYY TIME
4 entries were displayed.
```

6. Disable automatic giveback on the partner node if it is enabled: `storage failover modify -node nodenameB -auto-giveback false`

   If the cluster is a two-node cluster, a message is displayed warning you that disabling automatic giveback prevents the management cluster services from going online in the event of an alternating-failure scenario. Enter `y` to continue.

7. Verify that automatic giveback is disabled for node's partner: `storage failover show -node nodenameB -fields auto-giveback`

```
cluster1::> storage failover show -node node1 -fields auto-giveback
node     auto-giveback
-------- -------------
node1    false
1 entry was displayed.
```

8. Run the following command twice to determine whether the node to be updated is currently serving any clients `system node run -node nodenameA -command uptime`

   The uptime command displays the total number of operations that the node has performed for NFS, CIFS, FC, and iSCSI clients since the node was last booted. For each protocol, you must run the command twice to determine whether the operation counts are increasing. If they are increasing, the node is currently serving clients for that protocol. If they are not increasing, the node is not currently serving clients for that protocol.

   NOTE: You should make a note of each protocol that has increasing client operations so that after the node is updated, you can verify that client traffic has resumed.

   The following example shows a node with NFS, CIFS, FC, and iSCSI operations. However, the node is currently serving only NFS and iSCSI clients.

```
cluster1::> system node run -node node0 -command uptime
  2:58pm up  7 days, 19:16 800000260 NFS ops, 1017333 CIFS ops, 0 HTTP
ops, 40395 FCP ops, 32810 iSCSI ops

cluster1::> system node run -node node0 -command uptime
  2:58pm up  7 days, 19:17 800001573 NFS ops, 1017333 CIFS ops, 0 HTTP
ops, 40395 FCP ops, 32815 iSCSI ops
```

9. Migrate all of the data LIFs away from the node: `network interface migrate-all -node nodenameA`
10. Verify any LIFs that you migrated: `network interface show`

    For more information about parameters you can use to verify LIF status, see the network interface show man page.

    The following example shows that node0's data LIFs migrated successfully. For each LIF, the fields included in this example enable you to verify the LIF's home node and port, the current node and port to which the LIF migrated, and the LIF's operational and administrative status.

```
cluster1::> network interface show -data-protocol nfs|cifs -role data
-home-node node0 -fields home-node,curr-node,curr-port,home-port,status-
admin,status-oper
vserver lif     home-node home-port curr-node curr-port status-oper
status-admin
------- ------- --------- --------- --------- --------- -----------
------------
vs0     data001 node0     e0a       node1     e0a       up          up
vs0     data002 node0     e0b       node1     e0b       up          up
vs0     data003 node0     e0b       node1     e0b       up          up
vs0     data004 node0     e0a       node1     e0a       up          up
4 entries were displayed.
```

11. Initiate a takeover: `storage failover takeover -ofnode nodenameA`

    Do not specify the -option immediate parameter, because a normal takeover is required for the node that is being taken over to boot onto the new software image. If you did not manually migrate the LIFs away from the node, they automatically migrate to the node's HA partner to ensure that there are no service disruptions.

    The first node boots up to the Waiting for giveback state.

    NOTE: If AutoSupport is enabled, an AutoSupport message is sent indicating that the node is out of cluster quorum. You can ignore this notification and proceed with the update.

12. Verify that the takeover is successful: `storage failover show`

    You might see error messages indicating version mismatch and mailbox format problems. This is expected

behavior and it represents a temporary state in a major nondisruptive upgrade and is not harmful.

The following example shows that the takeover was successful. Node node0 is in the Waiting for giveback state, and its partner is in the In takeover state.

```
cluster1::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- --------
-------------------------------------
node0          node1          -        Waiting for giveback (HA
mailboxes)
node1          node0          false    In takeover
2 entries were displayed.
```

13. Wait at least eight minutes for the following conditions to take effect:
    - Client multipathing (if deployed) is stabilized.
    - Clients are recovered from the pause in an I/O operation that occurs during takeover.

      The recovery time is client specific and might take longer than eight minutes, depending on the characteristics of the client applications.

14. Return the aggregates to the first node: `storage failover giveback -ofnode nodenameA`

    The giveback first returns the root aggregate to the partner node and then, after that node has finished booting, returns the non-root aggregates and any LIFs that were set to automatically revert. The newly booted node begins to serve data to clients from each aggregate as soon as the aggregate is returned.

15. Verify that all aggregates have been returned: `storage failover show-giveback`

    If the Giveback Status field indicates that there are no aggregates to give back, then all aggregates have been returned. If the giveback is vetoed, the command displays the giveback progress and which subsystem vetoed the giveback.

16. If any aggregates have not been returned, perform the following steps:
    a. Review the veto workaround to determine whether you want to address the “veto” condition or override the veto.

       High-availability configuration

    b. If necessary, address the “veto” condition described in the error message, ensuring that any identified operations are terminated gracefully.
    c. Rerun the storage failover giveback command.

       If you decided to override the “veto” condition, set the -override-vetoes parameter to true.

17. Wait at least eight minutes for the following conditions to take effect:
    - Client multipathing (if deployed) is stabilized.
    - Clients are recovered from the pause in an I/O operation that occurs during giveback.

The recovery time is client specific and might take longer than eight minutes, depending on the characteristics of the client applications.

18. Verify that the update was completed successfully for the node:
    a. Go to the advanced privilege level :`set -privilege advanced`
    b. Verify that update status is complete for the node: `system node upgrade-revert show -node nodenameA`

       The status should be listed as complete.

       If the status is not complete, from the node, run the system node upgrade-revert upgrade command. If the command does not complete the update, contact technical support.

    c. Return to the admin privilege level: `set -privilege admin`
19. Verify that the node's ports are up: `network port show -node nodenameA`

    You must run this command on a node that is upgraded to the higher version of ONTAP 9.

    The following example shows that all of the node's ports are up:

```
cluster1::> network port show -node node0
                                                               Speed
(Mbps)
Node   Port      IPspace      Broadcast Domain Link   MTU    Admin/Oper
------ --------- ------------ ---------------- ----- -------
------------
node0
       e0M       Default      -                up       1500  auto/100
       e0a       Default      -                up       1500  auto/1000
       e0b       Default      -                up       1500  auto/1000
       e1a       Cluster      Cluster          up       9000  auto/10000
       e1b       Cluster      Cluster          up       9000  auto/10000
5 entries were displayed.
```

20. Revert the LIFs back to the node: `network interface revert *`

    This command returns the LIFs that were migrated away from the node.

```
cluster1::> network interface revert *
8 entries were acted on.
```

21. Verify that the node's data LIFs successfully reverted back to the node, and that they are up: `network interface show`

    The following example shows that all of the data LIFs hosted by the node have successfully reverted back to the node, and that their operational status is up:

```
cluster1::> network interface show
            Logical    Status     Network            Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port
Home
----------- ---------- ---------- ------------------ -------------
------- ----
vs0
            data001      up/up    192.0.2.120/24     node0         e0a
true
            data002      up/up    192.0.2.121/24     node0         e0b
true
            data003      up/up    192.0.2.122/24     node0         e0b
true
            data004      up/up    192.0.2.123/24     node0         e0a
true
4 entries were displayed.
```

22. If you previously determined that this node serves clients, verify that the node is providing service for each protocol that it was previously serving: `system node run -node nodenameA -command uptime`

    The operation counts reset to zero during the update.

    The following example shows that the updated node has resumed serving its NFS and iSCSI clients:

    ```
    cluster1::> system node run -node node0 -command uptime
      3:15pm up  0 days, 0:16 129 NFS ops, 0 CIFS ops, 0 HTTP ops, 0 FCP
    ops, 2 iSCSI ops
    ```

23. Reenable automatic giveback on the partner node if it was previously disabled: `storage failover modify -node nodenameB -auto-giveback true`

You should proceed to update the node's HA partner as quickly as possible. If you must suspend the update process for any reason, both nodes in the HA pair should be running the same ONTAP version.

Updating the partner node in an HA pair

After updating the first node in an HA pair, you update its partner by initiating a takeover on it. The first node serves the partner's data while the partner node is upgraded.

1. Set the privilege level to advanced, entering **y** when prompted to continue: `set -privilege advanced`

   The advanced prompt (`*>`) appears.

2. Set the new ONTAP software image to be the default image: `system image modify {-node nodenameB -iscurrent false} -isdefault true`

The system image modify command uses an extended query to change the new ONTAP software image (which is installed as the alternate image) to be the default image for the node.

3. Monitor the progress of the update: `system node upgrade-revert show`
4. Verify that the new ONTAP software image is set as the default image: `system image show`

   In the following example, `image2` is the new version of ONTAP and is set as the default image on the node:

```
cluster1::*> system image show
                  Is      Is                Install
Node     Image    Default Current Version    Date
-------- -------  ------- ------- --------- -------------------
node0
         image1   false   false   X.X.X     MM/DD/YYYY TIME
         image2   true    true    Y.Y.Y     MM/DD/YYYY TIME
node1
         image1   false   true    X.X.X     MM/DD/YYYY TIME
         image2   true    false   Y.Y.Y     MM/DD/YYYY TIME
4 entries were displayed.
```

5. Disable automatic giveback on the partner node if it is enabled: `storage failover modify -node nodenameA -auto-giveback false`

   If the cluster is a two-node cluster, a message is displayed warning you that disabling automatic giveback prevents the management cluster services from going online in the event of an alternating-failure scenario. Enter `y` to continue.

6. Verify that automatic giveback is disabled for the partner node: `storage failover show -node nodenameA -fields auto-giveback`

```
cluster1::> storage failover show -node node0 -fields auto-giveback
node     auto-giveback
-------- -------------
node0    false
1 entry was displayed.
```

7. Run the following command twice to determine whether the node to be updated is currently serving any clients: `system node run -node nodenameB -command uptime`

   The uptime command displays the total number of operations that the node has performed for NFS, CIFS, FC, and iSCSI clients since the node was last booted. For each protocol, you must run the command twice to determine whether the operation counts are increasing. If they are increasing, the node is currently serving clients for that protocol. If they are not increasing, the node is not currently serving clients for that protocol.

   NOTE: You should make a note of each protocol that has increasing client operations so that after the node

is updated, you can verify that client traffic has resumed.

The following example shows a node with NFS, CIFS, FC, and iSCSI operations. However, the node is currently serving only NFS and iSCSI clients.

```
cluster1::> system node run -node node1 -command uptime
  2:58pm up  7 days, 19:16 800000260 NFS ops, 1017333 CIFS ops, 0 HTTP
ops, 40395 FCP ops, 32810 iSCSI ops

cluster1::> system node run -node node1 -command uptime
  2:58pm up  7 days, 19:17 800001573 NFS ops, 1017333 CIFS ops, 0 HTTP
ops, 40395 FCP ops, 32815 iSCSI ops
```

8. Migrate all of the data LIFs away from the node: `network interface migrate-all -node nodenameB`
9. Verify the status of any LIFs that you migrated: `network interface show`

   For more information about parameters you can use to verify LIF status, see the network interface show man page.

   The following example shows that node1's data LIFs migrated successfully. For each LIF, the fields included in this example enable you to verify the LIF's home node and port, the current node and port to which the LIF migrated, and the LIF's operational and administrative status.

```
cluster1::> network interface show -data-protocol nfs|cifs -role data
-home-node node1 -fields home-node,curr-node,curr-port,home-port,status-
admin,status-oper
vserver lif     home-node home-port curr-node curr-port status-oper
status-admin
------- ------- --------- --------- --------- --------- -----------
------------
vs0     data001 node1     e0a       node0     e0a       up          up
vs0     data002 node1     e0b       node0     e0b       up          up
vs0     data003 node1     e0b       node0     e0b       up          up
vs0     data004 node1     e0a       node0     e0a       up          up
4 entries were displayed.
```

10. Initiate a takeover: `storage failover takeover -ofnode nodenameB -option allow-version-mismatch`

    Do not specify the -option immediate parameter, because a normal takeover is required for the node that is being taken over to boot onto the new software image. If you did not manually migrate the LIFs away from the node, they automatically migrate to the node's HA partner so that there are no service disruptions.

    The node that is taken over boots up to the Waiting for giveback state.

    NOTE: If AutoSupport is enabled, an AutoSupport message is sent indicating that the node is out of cluster

quorum. You can ignore this notification and proceed with the update.

11. Verify that the takeover was successful: `storage failover show`

    The following example shows that the takeover was successful. Node node1 is in the Waiting for giveback state, and its partner is in the In takeover state.

    ```
    cluster1::> storage failover show
                                  Takeover
    Node           Partner        Possible State Description
    -------------- -------------- --------
    -------------------------------------
    node0          node1          -        In takeover
    node1          node0          false    Waiting for giveback (HA
    mailboxes)
    2 entries were displayed.
    ```

12. Wait at least eight minutes for the following conditions to take effect:
    - 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 might take longer than eight minutes, depending on the characteristics of the client applications.

13. Return the aggregates to the partner node: `storage failover giveback -ofnode nodenameB`

    The giveback operation first returns the root aggregate to the partner node and then, after that node has finished booting, returns the non-root aggregates and any LIFs that were set to automatically revert. The newly booted node begins to serve data to clients from each aggregate as soon as the aggregate is returned.

14. Verify that all aggregates are returned: `storage failover show-giveback`

    If the Giveback Status field indicates that there are no aggregates to give back, then all aggregates are returned. If the giveback is vetoed, the command displays the giveback progress and which subsystem vetoed the giveback operation.

15. If any aggregates are not returned, perform the following steps:
    a. Review the veto workaround to determine whether you want to address the “veto” condition or override the veto.

       High-availability configuration

    b. If necessary, address the “veto” condition described in the error message, ensuring that any identified operations are terminated gracefully.
    c. Rerun the storage failover giveback command.

       If you decided to override the “veto” condition, set the -override-vetoes parameter to true.

16. Wait at least eight minutes for the following conditions to take effect:

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

  The recovery time is client specific and might take longer than eight minutes, depending on the characteristics of the client applications.

17. Verify that the update was completed successfully for the node:
    a. Go to the advanced privilege level :`set -privilege advanced`
    b. Verify that update status is complete for the node: `system node upgrade-revert show -node nodenameB`

       The status should be listed as complete.

       If the status is not complete, from the node, run the system node upgrade-revert upgrade command. If the command does not complete the update, contact technical support.

    c. Return to the admin privilege level: `set -privilege admin`
18. Verify that the node's ports are up: `network port show -node nodenameB`

    You must run this command on a node that has been upgraded to ONTAP 9.4.

    The following example shows that all of the node's data ports are up:

```
cluster1::> network port show -node node1
                                                                 Speed
(Mbps)
Node   Port      IPspace      Broadcast Domain Link   MTU    Admin/Oper
------ --------- ------------ ---------------- ----- -------
------------
node1
       e0M       Default      -                up       1500  auto/100
       e0a       Default      -                up       1500  auto/1000
       e0b       Default      -                up       1500  auto/1000
       e1a       Cluster      Cluster          up       9000  auto/10000
       e1b       Cluster      Cluster          up       9000  auto/10000
5 entries were displayed.
```

19. Revert the LIFs back to the node: `network interface revert *`

    This command returns the LIFs that were migrated away from the node.

```
cluster1::> network interface revert *
8 entries were acted on.
```

20. Verify that the node's data LIFs successfully reverted back to the node, and that they are up: `network interface show`

The following example shows that all of the data LIFs hosted by the node is successfully reverted back to the node, and that their operational status is up:

```
cluster1::> network interface show
            Logical    Status     Network            Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node           Port
Home
----------- ---------- ---------- ------------------ -------------
------- ----
vs0
            data001      up/up    192.0.2.120/24     node1          e0a
true
            data002      up/up    192.0.2.121/24     node1          e0b
true
            data003      up/up    192.0.2.122/24     node1          e0b
true
            data004      up/up    192.0.2.123/24     node1          e0a
true
4 entries were displayed.
```

21. If you previously determined that this node serves clients, verify that the node is providing service for each protocol that it was previously serving: `system node run -node nodenameB -command uptime`

    The operation counts reset to zero during the update.

    The following example shows that the updated node has resumed serving its NFS and iSCSI clients:

    ```
    cluster1::> system node run -node node1 -command uptime
      3:15pm up  0 days, 0:16 129 NFS ops, 0 CIFS ops, 0 HTTP ops, 0 FCP
    ops, 2 iSCSI ops
    ```

22. If this was the last node in the cluster to be updated, trigger an AutoSupport notification: `autosupport invoke -node * -type all -message "Finishing_NDU"`

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

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

23. Confirm that the new ONTAP software is running on both nodes of the HA pair: `system node image show`

    In the following example, image2 is the updated version of ONTAP and is the default version on both nodes:

```
cluster1::*> system node image show
                  Is      Is                 Install
Node      Image   Default Current Version    Date
--------- ------- ------- ------- --------- ------------------
node0
          image1  false   false   X.X.X     MM/DD/YYYY TIME
          image2  true    true    Y.Y.Y     MM/DD/YYYY TIME
node1
          image1  false   false   X.X.X     MM/DD/YYYY TIME
          image2  true    true    Y.Y.Y     MM/DD/YYYY TIME
4 entries were displayed.
```

24. Reenable automatic giveback on the partner node if it was previously disabled: `storage failover modify -node nodenameA -auto-giveback true`
25. Verify that the cluster is in quorum and that services are running by using the cluster show and cluster ring show (advanced privilege level) commands.

    You must perform this step before upgrading any additional HA pairs.

26. Return to the admin privilege level: `set -privilege admin`

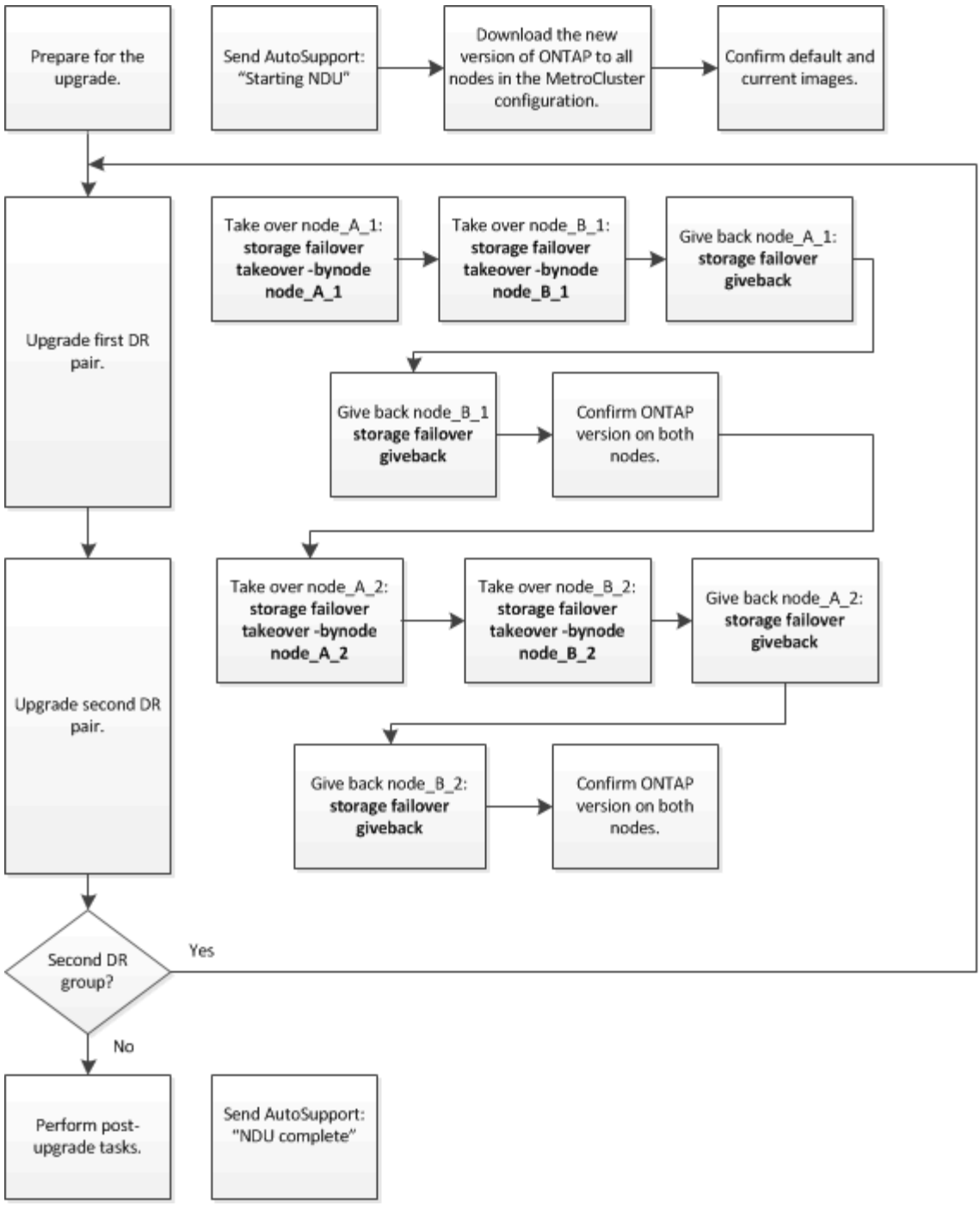
Upgrade any additional HA pairs.

MCC configurations

Manual nondisruptive upgrade of a four- or eight-node MetroCluster configuration using the CLI

The manual update procedure for upgrading or downgrading a four- or eight-node MetroCluster configuration involves preparing for the update, updating the DR pairs in each of the one or two DR groups simultaneously, and performing some post-update tasks.

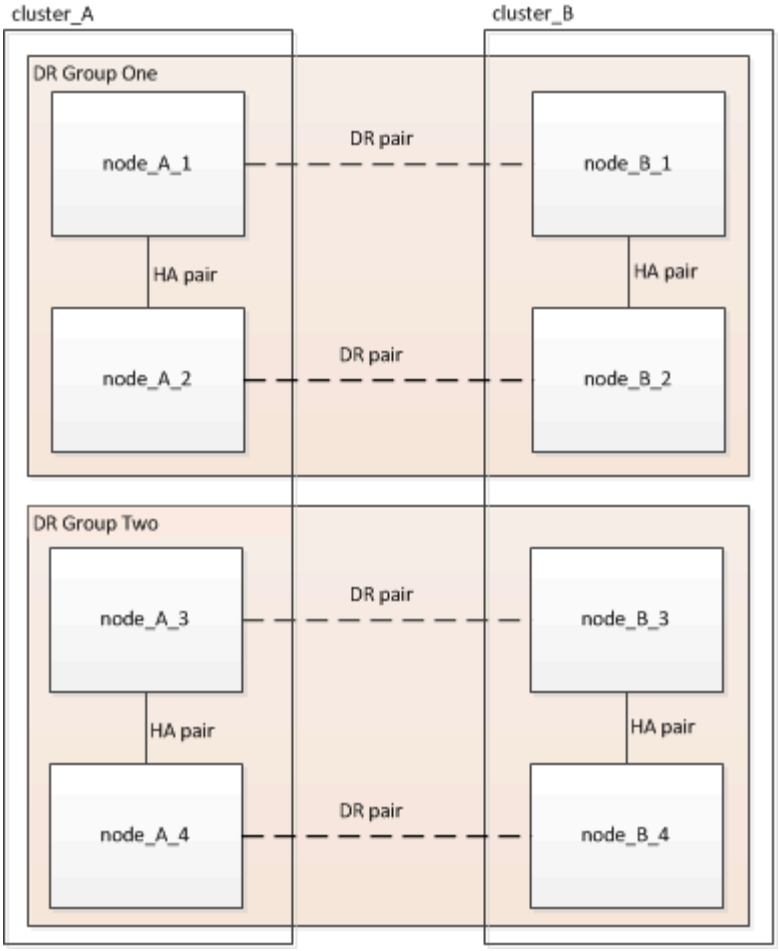
- This task applies to the following configurations:
  - Four-node MetroCluster FC or IP configurations running ONTAP 9.2 or earlier
  - Eight-node MetroCluster FC configurations, regardless of ONTAP version
- If you have a two-node MetroCluster configuration, do not use this procedure.
- The following tasks refer to the old and new versions of ONTAP.
  - When upgrading, the old version is a previous version of ONTAP, with a lower version number than the new version of ONTAP.
  - When downgrading, the old version is a later version of ONTAP, with a higher version number than the new version of ONTAP.
- This task uses the following high-level workflow:



Differences when updating software on an eight-node or four-node MetroCluster configuration

The MetroCluster software update process differs, depending on whether there are eight or four nodes in the MetroCluster configuration.

A MetroCluster configuration consists of one or two DR groups. Each DR group consists of two HA pairs, one HA pair at each MetroCluster cluster. An eight-node MetroCluster includes two DR groups:



The MetroCluster software update procedure involves upgrading or downgrading one DR group at a time.

For four-node MetroCluster configurations:

1. Update DR Group One:
    a. Update node_A_1 and node_B_1.
    b. Update node_A_2 and node_B_2.

For eight-node MetroCluster configurations, you perform the DR group update procedure twice:

1. Update DR Group One:
    a. Update node_A_1 and node_B_1.
    b. Update node_A_2 and node_B_2.
2. Update DR Group Two:
    a. Update node_A_3 and node_B_3.
    b. Update node_A_4 and node_B_4.

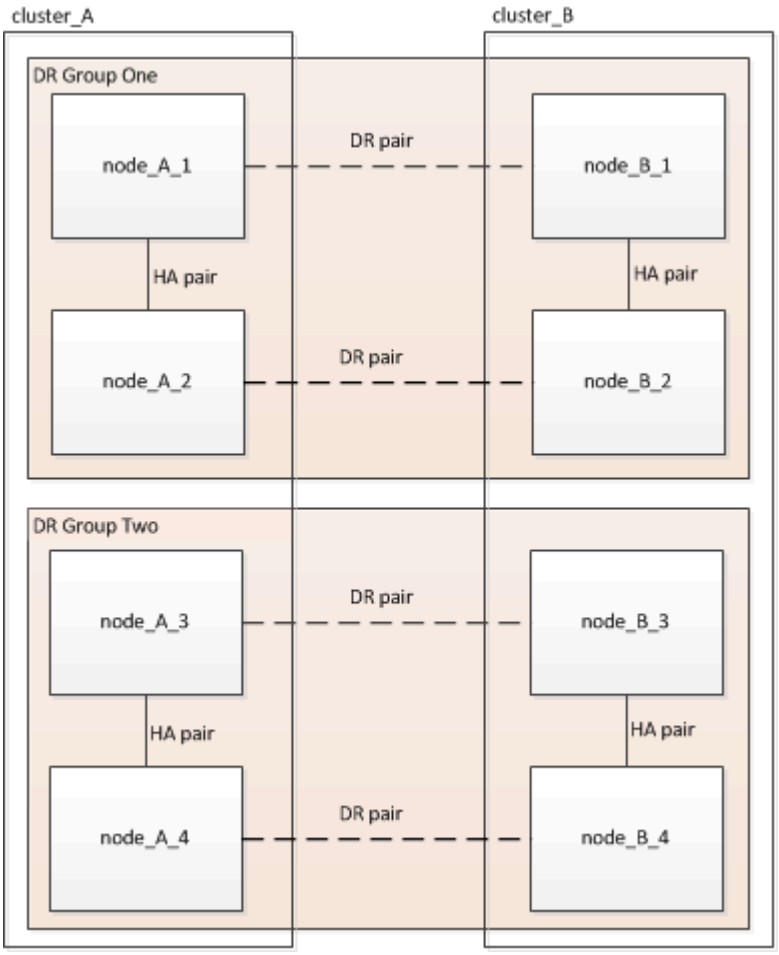
Preparing to update a MetroCluster DR group

Before you actually update the software on the nodes, you must identify the DR relationships among the nodes, send an AutoSupport message that you are initiating an update, and confirm the ONTAP version running on each node.

You must have downloaded and installed the software images.

This task must be repeated on each DR group. If the MetroCluster configuration consists of eight nodes, there are two DR groups. Thereby, this task must be repeated on each DR group.

The examples provided in this task use the names shown in the following illustration to identify the clusters and nodes:



1. Identify the DR pairs in the configuration: `metrocluster node show -fields dr-partner`

```
cluster_A::> metrocluster node show -fields dr-partner
  (metrocluster node show)
dr-group-id cluster     node       dr-partner
----------- -------     --------   ----------
1           cluster_A   node_A_1   node_B_1
1           cluster_A   node_A_2   node_B_2
1           cluster_B   node_B_1   node_A_1
1           cluster_B   node_B_2   node_A_2
4 entries were displayed.

cluster_A::>
```

2. Set the privilege level from admin to advanced, entering **y** when prompted to continue: `set -privilege advanced`

   The advanced prompt (`*>`) appears.

3. Confirm the ONTAP version running on each node:

   a. Confirm the version on cluster_A: `system image show`

```
cluster_A::*> system image show
                  Is      Is                Install
Node     Image    Default Current Version   Date
-------- -------  ------- ------- -------   -------------------
node_A_1
         image1   true    true    X.X.X     MM/DD/YYYY TIME
         image2   false   false   Y.Y.Y     MM/DD/YYYY TIME
node_A_2
         image1   true    true    X.X.X     MM/DD/YYYY TIME
         image2   false   false   Y.Y.Y     MM/DD/YYYY TIME
4 entries were displayed.

cluster_A::>
```

   b. Confirm the version on cluster_B: `system image show`

```
cluster_B::*> system image show
                  Is      Is                 Install
Node     Image    Default Current Version    Date
-------- -------  ------- ------- -------    -------------------
node_B_1
         image1   true    true    X.X.X      MM/DD/YYYY TIME
         image2   false   false   Y.Y.Y      MM/DD/YYYY TIME
node_B_2
         image1   true    true    X.X.X      MM/DD/YYYY TIME
         image2   false   false   Y.Y.Y      MM/DD/YYYY TIME
4 entries were displayed.

cluster_B::>
```

4. Trigger an AutoSupport notification: `autosupport invoke -node * -type all -message "Starting_NDU"`

   This AutoSupport notification includes a record of the system status before the update. It saves useful troubleshooting information if there is a problem with the update process.

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

5. For each node in the first set, set the target ONTAP software image to be the default image: `system image modify {-node nodename -iscurrent false} -isdefault true`

   This command uses an extended query to change the target software image, which is installed as the alternate image, to be the default image for the node.

6. Verify that the target ONTAP software image is set as the default image:

   a. Verify the images on cluster_A: `system image show`

      In the following example, image2 is the new ONTAP version and is set as the default image on each of the nodes in the first set:

```
cluster_A::*> system image show
                  Is      Is               Install
Node     Image    Default Current Version  Date
-------- -------  ------- ------- -------  -------------------
node_A_1
         image1   false   true    X.X.X    MM/DD/YYYY TIME
         image2   true    false   Y.Y.Y    MM/DD/YYYY TIME
node_A_2
         image1   false   true    X.X.X    MM/DD/YYYY TIME
         image2   true   false   Y.Y.Y    MM/DD/YYYY TIME

2 entries were displayed.
```

   b. Verify the images on cluster_B: `system image show`

      The following example shows that the target version is set as the default image on each of the nodes in the first set:

```
cluster_B::*> system image show
                  Is      Is               Install
Node     Image    Default Current Version  Date
-------- -------  ------- ------- -------  -------------------
node_A_1
         image1   false   true    X.X.X    MM/DD/YYYY TIME
         image2   true    false   Y.Y.Y    MM/YY/YYYY TIME
node_A_2
         image1   false   true    X.X.X    MM/DD/YYYY TIME
         image2   true    false   Y.Y.Y    MM/DD/YYYY TIME

2 entries were displayed.
```

7. Determine whether the nodes to be upgraded are currently serving any clients by entering the following command twice for each node: `system node run -node target-node -command uptime`

The uptime command displays the total number of operations that the node has performed for NFS, CIFS, FC, and iSCSI clients since the node was last booted. For each protocol, you need to run the command twice to determine whether the operation counts are increasing. If they are increasing, the node is currently serving clients for that protocol. If they are not increasing, the node is not currently serving clients for that protocol.

NOTE: You should make a note of each protocol that has increasing client operations so that after the node is upgraded, you can verify that client traffic has resumed.

This example shows a node with NFS, CIFS, FC, and iSCSI operations. However, the node is currently serving only NFS and iSCSI clients.

```
 cluster_x::> system node run -node node0 -command uptime
   2:58pm up  7 days, 19:16 800000260 NFS ops, 1017333 CIFS ops, 0 HTTP
ops, 40395 FCP ops, 32810 iSCSI ops

 cluster_x::> system node run -node node0 -command uptime
   2:58pm up  7 days, 19:17 800001573 NFS ops, 1017333 CIFS ops, 0 HTTP
ops, 40395 FCP ops, 32815 iSCSI ops
```

Updating the first DR pair in a MetroCluster DR group

You must perform a takeover and giveback of the nodes in the correct order to make the new version of ONTAP the current version of the node.

All nodes must be running the old version of ONTAP.

In this task, node_A_1 and node_B_1 are updated.

If you have updated the ONTAP software on the first DR group, and are now updating the second DR group in an eight-node MetroCluster configuration, in this task you would be updating node_A_3 and node_B_3.

1. If MetroCluster Tiebreaker software is enabled, disabled it.
2. For each node in the HA pair, disable automatic giveback: `storage failover modify -node target-node -auto-giveback false`

   This command must be repeated for each node in the HA pair.

3. Verify that automatic giveback is disabled: `storage failover show -fields auto-giveback`

   This example shows that automatic giveback has been disabled on both nodes:

```
cluster_x::> storage failover show -fields auto-giveback
node     auto-giveback
-------- -------------
node_x_1 false
node_x_2 false
2 entries were displayed.
```

4. Ensure that I/O is not exceeding ~50% for each controller. Ensure that CPU utilization is not exceeding ~50% per controller.
5. Initiate a takeover of the target node on cluster_A:

   Do not specify the -option immediate parameter, because a normal takeover is required for the nodes that are being taken over to boot onto the new software image.

   a. Take over the DR partner on cluster_A (node_A_1):`storage failover takeover -ofnode node_A_1`

      The node boots up to the "Waiting for giveback" state.

      > If AutoSupport is enabled, then an AutoSupport message is sent indicating that the nodes are out of cluster quorum. You can ignore this notification and proceed with the upgrade.

   b. Verify that the takeover is successful: `storage failover show`

      The following example shows that the takeover is successful. Node_A_1 is in the "Waiting for giveback" state and node_A_2 is in the "In takeover" state.

      ```
      cluster1::> storage failover show
                                    Takeover
      Node           Partner        Possible State Description
      -------------- -------------- --------
      ------------------------------------
      node_A_1       node_A_2       -        Waiting for giveback (HA
      mailboxes)
      node_A_2       node_A_1       false    In takeover
      2 entries were displayed.
      ```

6. Take over the DR partner on cluster_B (node_B_1):

   Do not specify the -option immediate parameter, because a normal takeover is required for the nodes that are being taken over to boot onto the new software image.

   a. Take over node_B_1: `storage failover takeover -ofnode node_B_1`

      The node boots up to the "Waiting for giveback" state.

      > If AutoSupport is enabled, then an AutoSupport message is sent indicating that the nodes are out of cluster quorum. You can ignore this notification and proceed with the upgrade.

   b. Verify that the takeover is successful: `storage failover show`

      The following example shows that the takeover is successful. Node_B_1 is in the "Waiting for giveback" state and node_B_2 is in the "In takeover" state.

```
cluster1::> storage failover show
                                Takeover
Node           Partner          Possible State Description
-------------- -------------- --------
-------------------------------------
node_B_1       node_B_2       -        Waiting for giveback (HA
mailboxes)
node_B_2       node_B_1       false    In takeover
2 entries were displayed.
```

7. Wait at least eight 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 might take longer than eight minutes depending on the characteristics of the client applications.

8. Return the aggregates to the target nodes:

   After upgrading MetroCluster IP configurations to ONTAP 9.5 or later, the aggregates will be in a degraded state for a short period before resynchronizing and returning to a mirrored state.

   a. Give back the aggregates to the DR partner on cluster_A: `storage failover giveback -ofnode node_A_1`

   b. Give back the aggregates to the DR partner on cluster_B: `storage failover giveback -ofnode node_B_1`

      The giveback operation first returns the root aggregate to the node and then, after the node has finished booting, returns the non-root aggregates.

9. Verify that all aggregates have been returned by issuing the following command on both clusters: `storage failover show-giveback`

   If the Giveback Status field indicates that there are no aggregates to give back, then all aggregates have been returned. If the giveback is vetoed, the command displays the giveback progress and which subsystem vetoed the giveback.

10. If any aggregates have not been returned, do the following:

    a. Review the veto workaround to determine whether you want to address the “veto” condition or override the veto.

    b. If necessary, address the “veto” condition described in the error message, ensuring that any identified operations are terminated gracefully.

    c. Reenter the storage failover giveback command.

       If you decided to override the “veto” condition, set the -override-vetoes parameter to true.

11. Wait at least eight minutes to ensure the following conditions:
    - Client multipathing (if deployed) is stabilized.

- Clients are recovered from the pause in I/O that occurs during giveback.

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

12. Set the privilege level from admin to advanced, entering **y** when prompted to continue: `set -privilege advanced`

    The advanced prompt (`*>`) appears.

13. Confirm the version on cluster_A: `system image show`

    The following example shows that System image2 should is the default and current version on node_A_1:

```
cluster_A::*> system image show
                  Is      Is                Install
Node     Image    Default Current Version   Date
-------- -------  ------- ------- --------- -------------------
node_A_1
         image1   false   false    X.X.X    MM/DD/YYYY TIME
         image2   true    true     Y.Y.Y    MM/DD/YYYY TIME
node_A_2
         image1   false   true     X.X.X    MM/DD/YYYY TIME
         image2   true    false    Y.Y.Y    MM/DD/YYYY TIME
4 entries were displayed.

cluster_A::>
```

14. Confirm the version on cluster_B: `system image show`

    The following example shows that System image2 (ONTAP 9.0.0) is the default and current version on node_A_1:

```
cluster_A::*> system image show
                  Is      Is                Install
Node     Image    Default Current Version   Date
-------- -------  ------- ------- --------- -------------------
node_B_1
         image1   false   false    X.X.X    MM/DD/YYYY TIME
         image2   true    true     Y.Y.Y    MM/DD/YYYY TIME
node_B_2
         image1   false   true     X.X.X    MM/DD/YYYY TIME
         image2   true    false    Y.Y.Y    MM/DD/YYYY TIME
4 entries were displayed.

cluster_A::>
```

Updating the second DR pair in a MetroCluster DR group

You must perform a takeover and giveback of the node in the correct order to make the new version of ONTAP the current version of the node.

You should have upgraded the first DR pair (node_A_1 and node_B_1).

In this task, node_A_2 and node_B_2 are updated.

If you have updated the ONTAP software on the first DR group, and are now updating the second DR group in an eight-node MetroCluster configuration, in this task you are updating node_A_4 and node_B_4.

1. Initiate a takeover of the target node on cluster_A:

   Do not specify the -option immediate parameter, because a normal takeover is required for the nodes that are being taken over to boot onto the new software image.

   a. Take over the DR partner on cluster_A:

If you are upgrading from …	Enter this command…
ONTAP 9.1	`storage failover takeover -ofnode node_A_2`
ONTAP 9.0 or Data ONTAP 8.3.x	`storage failover takeover -ofnode node_A_2 -option allow-version-mismatch` The `allow-version-mismatch` option is not required for upgrades from ONTAP 9.0 to ONTAP 9.1 or for any patch upgrades.

   The node boots up to the "Waiting for giveback" state.

   If AutoSupport is enabled, then an AutoSupport message is sent indicating that the nodes are out of cluster quorum. You can ignore this notification and proceed with the upgrade.

   b. Verify that the takeover is successful: `storage failover show`

   The following example shows that the takeover is successful. Node_A_2 is in the "Waiting for giveback" state and node_A_1 is in the "In takeover" state.

```
cluster1::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- --------
-------------------------------------
node_A_1       node_A_2       false    In takeover
node_A_2       node_A_1       -        Waiting for giveback (HA
mailboxes)
2 entries were displayed.
```

2. Initiate a takeover of the target node on cluster_B:

   Do not specify the -option immediate parameter, because a normal takeover is required for the nodes that are being taken over to boot onto the new software image.

   a. Take over the DR partner on cluster_B (node_B_2):

If you are upgrading from…	Enter this command…
ONTAP 9.2 or ONTAP 9.1	`storage failover takeover -ofnode node_B_2`
ONTAP 9.0 or Data ONTAP 8.3.x	`storage failover takeover -ofnode node_B_2 -option allow-version-mismatch` The allow-version-mismatch option is not required for upgrades from ONTAP 9.0 to ONTAP 9.1 or for any patch upgrades.

   The node boots up to the "Waiting for giveback" state.

   If AutoSupport is enabled, an AutoSupport message is sent indicating that the nodes are out of cluster quorum. You can safely ignore this notification and proceed with the upgrade.

   b. Verify that the takeover is successful: `storage failover show`

   The following example shows that the takeover is successful. Node_B_2 is in the "Waiting for giveback" state and node_B_1 is in the "In takeover" state.

```
cluster1::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- --------
-------------------------------------
node_B_1       node_B_2       false    In takeover
node_B_2       node_B_1       -        Waiting for giveback (HA
mailboxes)
2 entries were displayed.
```

3. Wait at least eight 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 might take longer than eight minutes depending on the characteristics of the client applications.

4. Return the aggregates to the target nodes:

   After upgrading MetroCluster IP configurations to ONTAP 9.5, the aggregates will be in a degraded state for a short period before resynchronizing and returning to a mirrored state.

   a. Give back the aggregates to the DR partner on cluster_A: `storage failover giveback -ofnode node_A_2`

   b. Give back the aggregates to the DR partner on cluster_B: `storage failover giveback -ofnode node_B_2`

   The giveback operation first returns the root aggregate to the node and then, after the node has finished booting, returns the non-root aggregates.

5. Verify that all aggregates have been returned by issuing the following command on both clusters: `storage failover show-giveback`

   If the Giveback Status field indicates that there are no aggregates to give back, then all aggregates have been returned. If the giveback is vetoed, the command displays the giveback progress and which subsystem vetoed the giveback.

6. If any aggregates have not been returned, do the following:
   a. Review the veto workaround to determine whether you want to address the “veto” condition or override the veto.

   b. If necessary, address the “veto” condition described in the error message, ensuring that any identified operations are terminated gracefully.

   c. Reenter the storage failover giveback command.

      If you decided to override the “veto” condition, set the -override-vetoes parameter to true.

7. Wait at least eight minutes to ensure the following conditions:
   - Client multipathing (if deployed) is stabilized.

- Clients are recovered from the pause in I/O that occurs during giveback.

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

8. Set the privilege level from admin to advanced, entering **y** when prompted to continue: `set -privilege advanced`

   The advanced prompt (`*>`) appears.

9. Confirm the version on cluster_A: `system image show`

   The following example shows that System image2 (target ONTAP image) is the default and current version on node_A_2:

```
cluster_B::*> system image show
                  Is      Is                  Install
Node     Image    Default Current Version     Date
-------- -------  ------- ------- ----------  -------------------
node_A_1
         image1   false   false     X.X.X     MM/DD/YYYY TIME
         image2   true    true      Y.Y.Y     MM/DD/YYYY TIME
node_A_2
         image1   false   false     X.X.X     MM/DD/YYYY TIME
         image2   true    true      Y.Y.Y     MM/DD/YYYY TIME
4 entries were displayed.

cluster_A::>
```

10. Confirm the version on cluster_B: `system image show`

    The following example shows that System image2 (target ONTAP image) is the default and current version on node_B_2:

```
cluster_B::*> system image show
                  Is      Is                  Install
Node     Image    Default Current Version     Date
-------- -------  ------- ------- ----------  -------------------
node_B_1
         image1   false   false    X.X.X      MM/DD/YYYY TIME
         image2   true    true     Y.Y.Y      MM/DD/YYYY TIME
node_B_2
         image1   false   false    X.X.X      MM/DD/YYYY TIME
         image2   true    true     Y.Y.Y      MM/DD/YYYY TIME
4 entries were displayed.

cluster_A::>
```

11. For each node in the HA pair, enable automatic giveback: `storage failover modify -node target-node -auto-giveback true`

    This command must be repeated for each node in the HA pair.

12. Verify that automatic giveback is enabled: `storage failover show -fields auto-giveback`

    This example shows that automatic giveback has been enabled on both nodes:

```
cluster_x::> storage failover show -fields auto-giveback
node     auto-giveback
-------- -------------
node_x_1 true
node_x_2 true
2 entries were displayed.
```

Manual nondisruptive upgrade of a two-node MetroCluster configuration in ONTAP 9.2 or earlier using the CLI

You can upgrade ONTAP nondisruptively for a two-node MetroCluster configuration. This method has several steps: initiating a negotiated switchover, updating the cluster at the “failed” site, initiating switchback, and then repeating the process on the cluster at the other site.

This procedure is for two-node MetroCluster configurations running ONTAP 9.2 or earlier only.

+
Do not use this procedure if you have a four-node MetroCluster configuration.

+
If you have a two-node MetroCluster configuration running ONTAP 9.3 or later, perform an automated nondisruptive upgrade using System Manager.

1. Set the privilege level to advanced, entering **y** when prompted to continue: `set -privilege advanced`

   The advanced prompt (`*>`) appears.

2. On the cluster to be upgraded, install the new ONTAP software image as the default: `system node image update -package package_location -setdefault true -replace-package true`

   ```
   cluster_B::*> system node image update -package
   http://www.example.com/NewImage.tgz -setdefault true -replace-package
   true
   ```

3. Verify that the target software image is set as the default image: `system node image show`

   The following example shows that `NewImage` is set as the default image:

   ```
   cluster_B::*> system node image show
                        Is      Is                            Install
   Node     Image       Default Current Version               Date
   -------- -------     ------- ------- --------------------
   -------------------
   node_B_1
            OldImage  false   true    X.X.X                 MM/DD/YYYY TIME
            NewImage  true    false   Y.Y.Y                 MM/DD/YYYY TIME
   2 entries were displayed.
   ```

4. If the target software image is not set as the default image, then change it: `system image modify {-node * -iscurrent false} -isdefault true`
5. Verify that all cluster SVMs are in a health state: `metrocluster vserver show`
6. On the cluster that is not being updated, initiate a negotiated switchover: `metrocluster switchover`

   The operation can take several minutes. You can use the metrocluster operation show command to verify that the switchover is completed.

   In the following example, a negotiated switchover is performed on the remote cluster (“cluster_A”). This causes the local cluster (“cluster_B”) to halt so that you can update it.

```
cluster_A::> metrocluster switchover

Warning: negotiated switchover is about to start. It will stop all the
data
         Vservers on cluster "cluster_B" and
         automatically re-start them on cluster
         "cluster_A". It will finally gracefully shutdown
         cluster "cluster_B".
Do you want to continue? {y|n}: y
```

7. Verify that all cluster SVMs are in a health state: `metrocluster vserver show`
8. Resynchronize the data aggregates on the “surviving” cluster: `metrocluster heal -phase aggregates`

   After upgrading MetroCluster IP configurations to ONTAP 9.5 or later, the aggregates will be in a degraded state for a short period before resynchronizing and returning to a mirrored state.

```
cluster_A::> metrocluster heal -phase aggregates
[Job 130] Job succeeded: Heal Aggregates is successful.
```

9. Verify that the healing operation was completed successfully: `metrocluster operation show`

```
cluster_A::> metrocluster operation show
Operation: heal-aggregates
State: successful
Start Time: MM/DD/YYYY TIME
End Time: MM/DD/YYYY TIME
Errors: -
```

10. Resynchronize the root aggregates on the “surviving” cluster: `metrocluster heal -phase root-aggregates`

```
cluster_A::> metrocluster heal -phase root-aggregates
[Job 131] Job succeeded: Heal Root Aggregates is successful.
```

11. Verify that the healing operation was completed successfully: `metrocluster operation show`

```
cluster_A::> metrocluster operation show
Operation: heal-root-aggregates
State: successful
Start Time: MM/DD/YYYY TIME
End Time: MM/DD/YYYY TIME
Errors: -
```

12. On the halted cluster, boot the node from the LOADER prompt: `boot_ontap`
13. Wait for the boot process to finish, and then verify that all cluster SVMs are in a health state: `metrocluster vserver show`
14. Perform a switchback from the “surviving” cluster: `metrocluster switchback`
15. Verify that the switchback was completed successfully: `metrocluster operation show`

```
cluster_A::> metrocluster operation show
Operation: switchback
State: successful
Start Time: MM/DD/YYYY TIME
End Time: MM/DD/YYYY TIME
Errors: -
```

16. Verify that all cluster SVMs are in a health state: `metrocluster vserver show`
17. Repeat all previous steps on the other cluster.
18. Verify that the MetroCluster configuration is healthy:
    a. Check the configuration: `metrocluster check run`

```
cluster_A::> metrocluster check run
Last Checked On: MM/DD/YYYY TIME
Component           Result
------------------- ---------
nodes               ok
lifs                ok
config-replication  ok
aggregates          ok
4 entries were displayed.

Command completed. Use the "metrocluster check show -instance"
command or sub-commands in "metrocluster check" directory for
detailed results.
To check if the nodes are ready to do a switchover or switchback
operation, run "metrocluster switchover -simulate" or "metrocluster
switchback -simulate", respectively.
```

b. If you want to view more detailed results, use the metrocluster check run command: `metrocluster check aggregate showmetrocluster check config-replication showmetrocluster check lif show``metrocluster check node show`

c. Set the privilege level to advanced: `set -privilege advanced`

d. Simulate the switchover operation: `metrocluster switchover -simulate`

e. Review the results of the switchover simulation: `metrocluster operation show`

```
cluster_A::*> metrocluster operation show
    Operation: switchover
        State: successful
   Start time: MM/DD/YYYY TIME
     End time: MM/DD/YYYY TIME
       Errors: -
```

f. Return to the admin privilege level: `set -privilege admin`

g. Repeat these substeps on the other cluster.

You should perform any post-upgrade tasks.

Related information

MetroCluster Disaster recovery

Manual disruptive upgrade using the CLI

If you can take your cluster offline to upgrade to a new ONTAP release, then you can use the disruptive upgrade method. This method has several steps: disabling storage failover for each HA pair, rebooting each node in the cluster, and then reenabling storage failover.

- You must have satisfied preparation requirements.
- If you are operating in a SAN environment, all SAN clients must be shut down or suspended until the upgrade is complete.

  If SAN clients are not shut down or suspended prior to a disruptive upgrade , then the client file systems and applications suffer errors that might require manual recovery after the upgrade is completed.

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

1. Set the privilege level from admin to advanced, entering **y** when prompted to continue: `set -privilege advanced`

   The advanced prompt (`*>`) appears.

2. Set the new ONTAP software image to be the default image: `system image modify {-node * -iscurrent false} -isdefault true`

This command uses an extended query to change the target ONTAP software image (which is installed as the alternate image) to be the default image for each node.

3. Verify that the new ONTAP software image is set as the default image: `system image show`

   In the following example, image 2 is the new ONTAP version and is set as the default image on both nodes:

```
cluster1::*> system image show
                  Is      Is                  Install
Node     Image    Default Current Version     Date
-------- -------  ------- ------- ---------   -------------------
node0
         image1   false   true    X.X.X       MM/DD/YYYY TIME
         image2   true    false   Y.Y.Y       MM/DD/YYYY TIME
node1
         image1   false   true    X.X.X       MM/DD/YYYY TIME
         image2   true    false   Y.Y.Y       MM/DD/YYYY TIME
4 entries were displayed.
```

4. Perform either one of the following steps:

If the cluster consists of…	Do this…
One node	Continue to the next step.
Two nodes	a. Disable cluster high availability: `cluster ha modify -configured false` Enter `y` to continue when prompted. b. Disable storage failover for the HA pair: `storage failover modify -node * -enabled false`
More than two nodes	Disable storage failover for each HA pair in the cluster: `storage failover modify -node * -enabled false`

5. Reboot a node in the cluster: `system node reboot -node nodename -ignore-quorum-warnings`

   Do not reboot more than one node at a time.

   The node boots the new ONTAP image. The ONTAP login prompt appears, indicating that the reboot process is complete.

6. After the node or set of nodes has rebooted with the new ONTAP image, confirm that the new software is running: `system node image show`

In the following example, image1 is the new ONTAP version and is set as the current version on node0:

```
cluster1::*> system node image show
                  Is      Is                    Install
Node     Image    Default Current Version       Date
-------- -------  ------- ------- --------      -------------------
node0
         image1   true    true    X.X.X          MM/DD/YYYY TIME
         image2   false   false   Y.Y.Y         MM/DD/YYYY TIME
node1
         image1   true    false   X.X.X         MM/DD/YYYY TIME
         image2   false   true    Y.Y.Y         MM/DD/YYYY TIME
4 entries were displayed.
```

7. Verify that the upgrade is completed successfully:
   a. Set the privilege level to advanced: `set -privilege advanced`
   b. Verify that the upgrade status is complete for each node: `system node upgrade-revert show -node nodename`

      The status should be listed as complete.

      If the upgrade is not successful, from the node, run the system node upgrade-revert upgrade command. If this command does not complete the node's upgrade, contact technical support immediately.

   c. Return to the admin privilege level: `set -privilege admin`
8. Repeat Steps 2 through 7 for each additional node.
9. If the cluster consists of two or more nodes, enable storage failover for each HA pair in the cluster: `storage failover modify -node * -enabled true`
10. If the cluster consists of only two nodes, enable cluster high availability: `cluster ha modify -configured true`