

MetroCluster configurations

ONTAP 9

NetApp May 12, 2022

Table of Contents

M	letroCluster configurations	1
	Manual nondisruptive upgrade of a four- or eight-node MetroCluster configuration using the CLI	1
	Manual nondisruptive upgrade of a two-node MetroCluster configuration in ONTAP 9.2 or earlier using	
	the CLI	4

MetroCluster 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

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

b. Confirm the version on cluster B: system image show

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 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

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 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

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 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:

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:

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:

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.

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 NOTE: 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.

- + NOTE: 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.
- a. 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.
```

- 1. 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.

2. 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.

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

1. 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.

- 2. If any aggregates have not been returned, do the following:
- d. Review the veto workaround to determine whether you want to address the "veto" condition or override the veto.
- e. If necessary, address the "veto" condition described in the error message, ensuring that any identified operations are terminated gracefully.
- f. Reenter the storage failover giveback command.

If you decided to override the "veto" condition, set the -override-vetoes parameter to true. 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.
- 1. Set the privilege level from admin to advanced, entering **y** when prompted to continue: set -privilege advanced

The advanced prompt (*>) appears.

2. 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
   --- ----- ----- ----- ----- -----
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::>
```

3. 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:

4. 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.

5. 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.
- 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 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.

- 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
- $\begin{tabular}{ll} \textbf{d. Simulate the switchover operation:} & \textbf{metrocluster switchover -simulate} \\ \end{tabular}$
- 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

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