Manual nondisruptive using the CLI

ONTAP 9

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Table of Contents

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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`

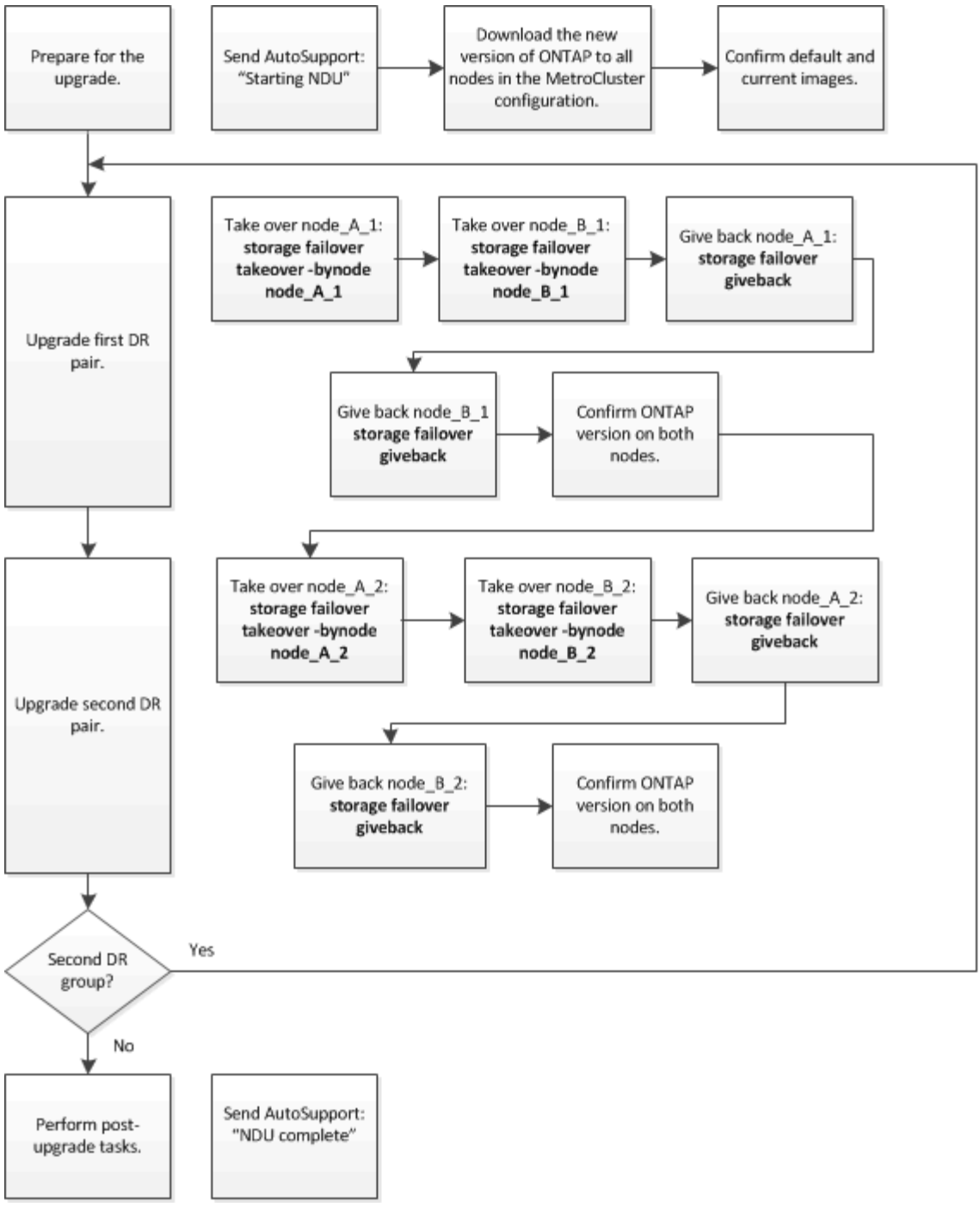
Upgrade any additional HA pairs.

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.

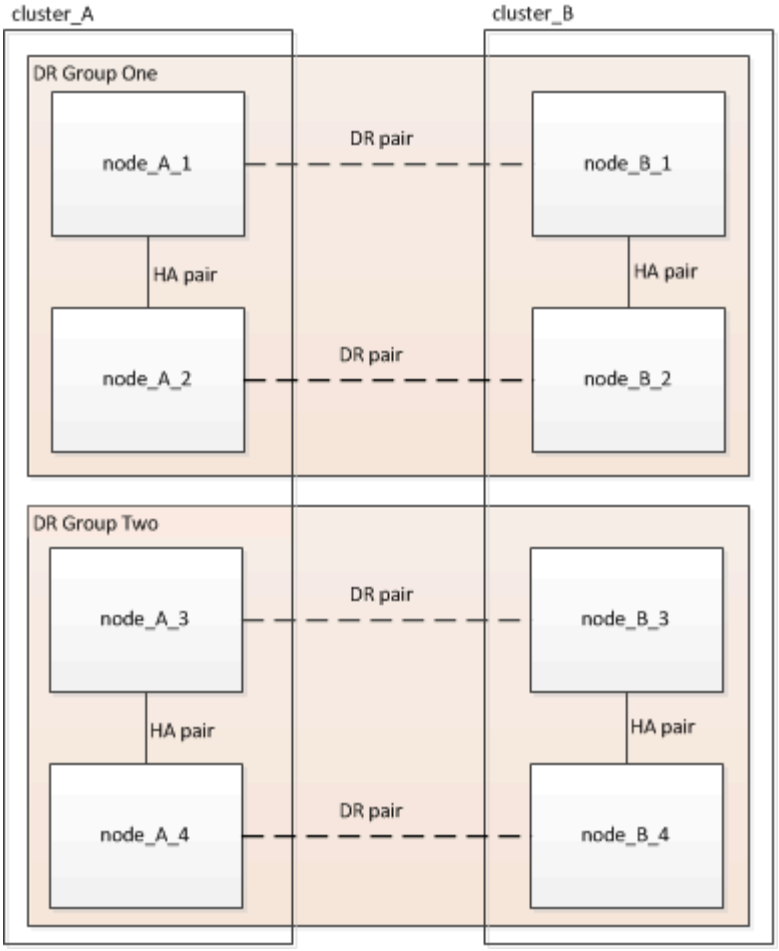
- This task applies to the following configurations:
  - Four-node MetroCluster FC or IP configurations running ONTAP 9.2 or earlier
  - Eight-node MetroCluster FC configurations, regardless of ONTAP version
- If you have a two-node MetroCluster configuration, do not use this procedure.
- The following 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.

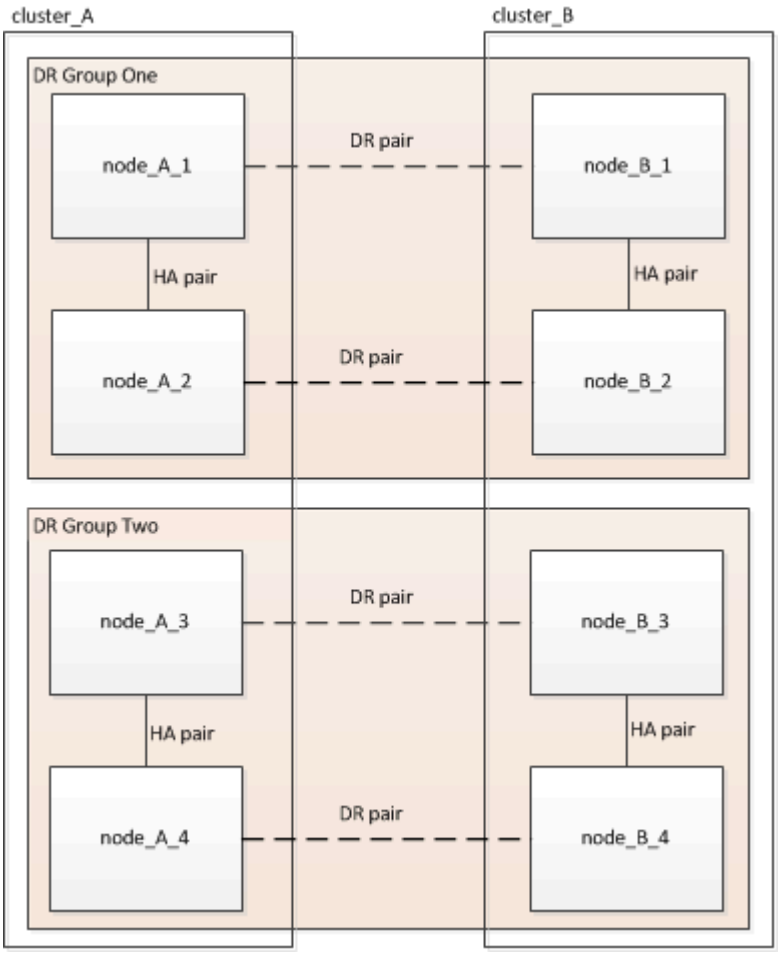
Preparing to update a MetroCluster DR group

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