



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

ONTAP 9

Thom Illingworth
July 02, 2021

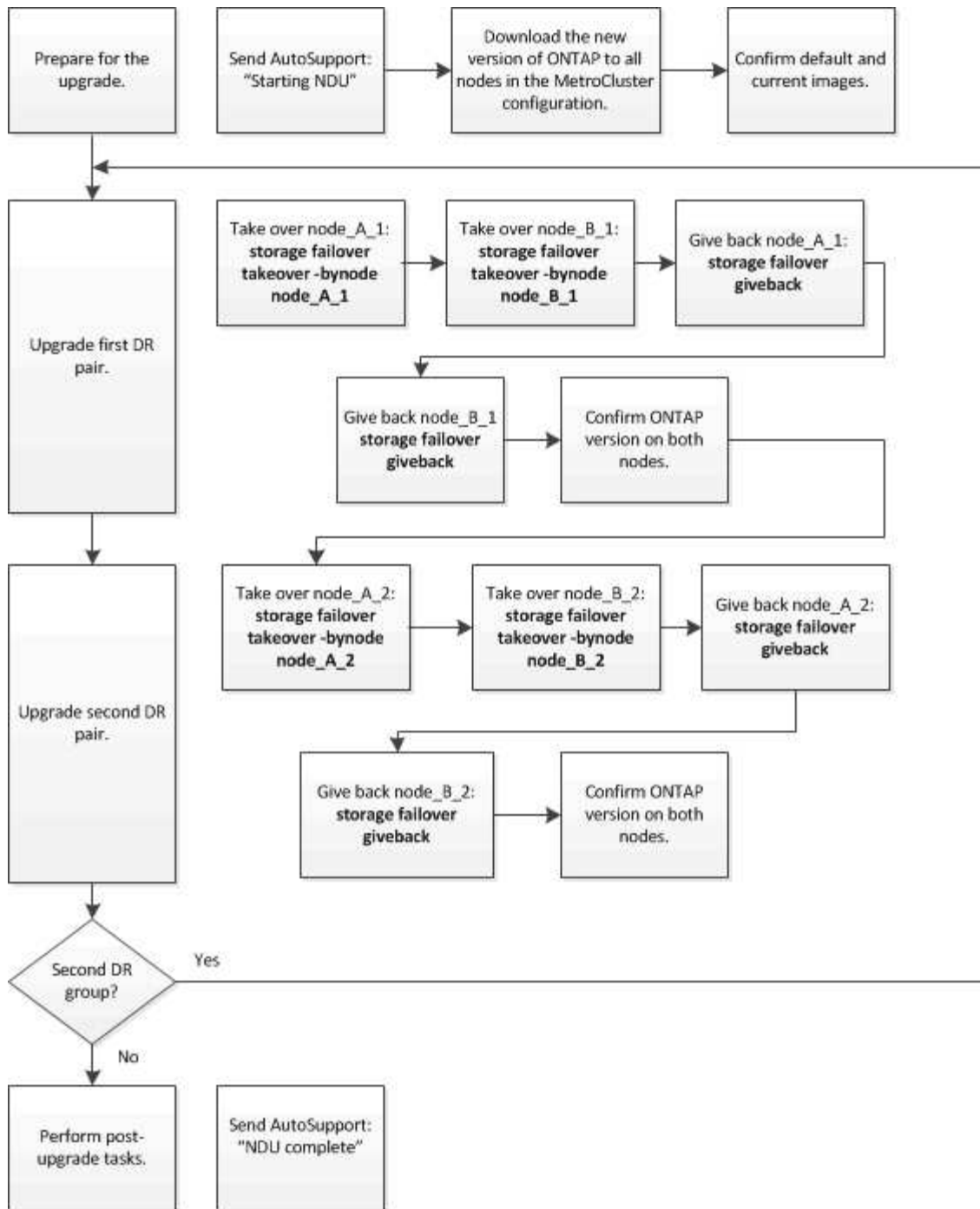
Table of Contents

- Manual nondisruptive upgrade of a four- or eight-node MetroCluster configuration using the CLI 1
 - Differences when updating software on an eight-node or four-node MetroCluster configuration 2
 - Preparing to update a MetroCluster DR group 3
 - Updating the first DR pair in a MetroCluster DR group 7
 - Updating the second DR pair in a MetroCluster DR group 11

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.

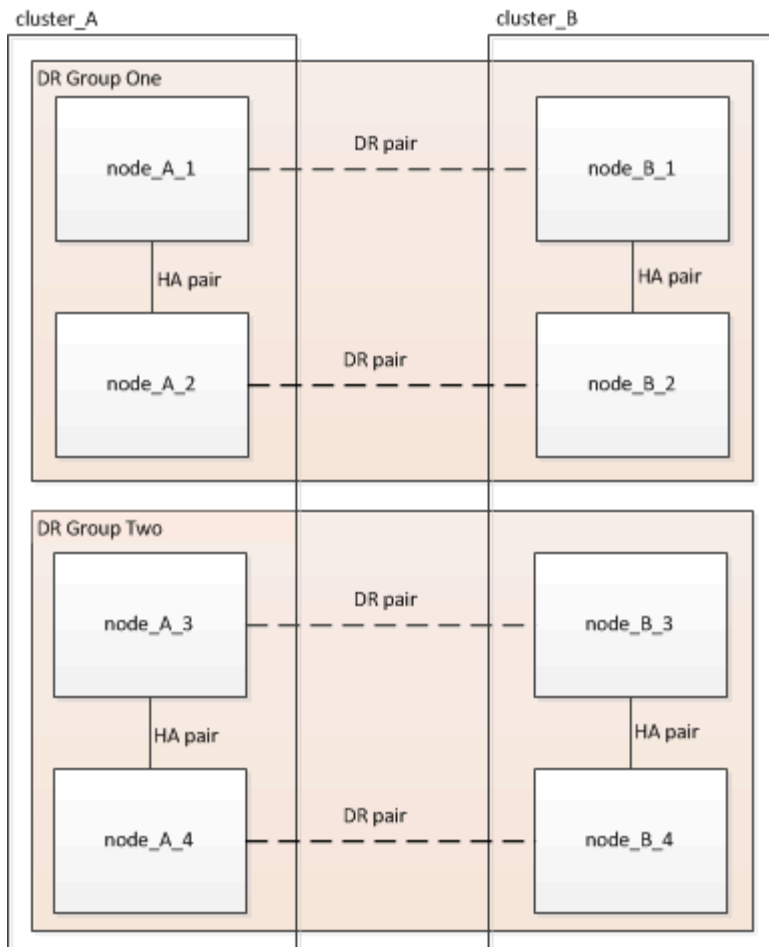
- This task applies to the following configurations:
 - Four-node MetroCluster FC or IP configurations running ONTAP 9.2 or earlier
 - Eight-node MetroCluster FC configurations, regardless of ONTAP version
- If you have a two-node MetroCluster configuration, do not use this procedure.
- The following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

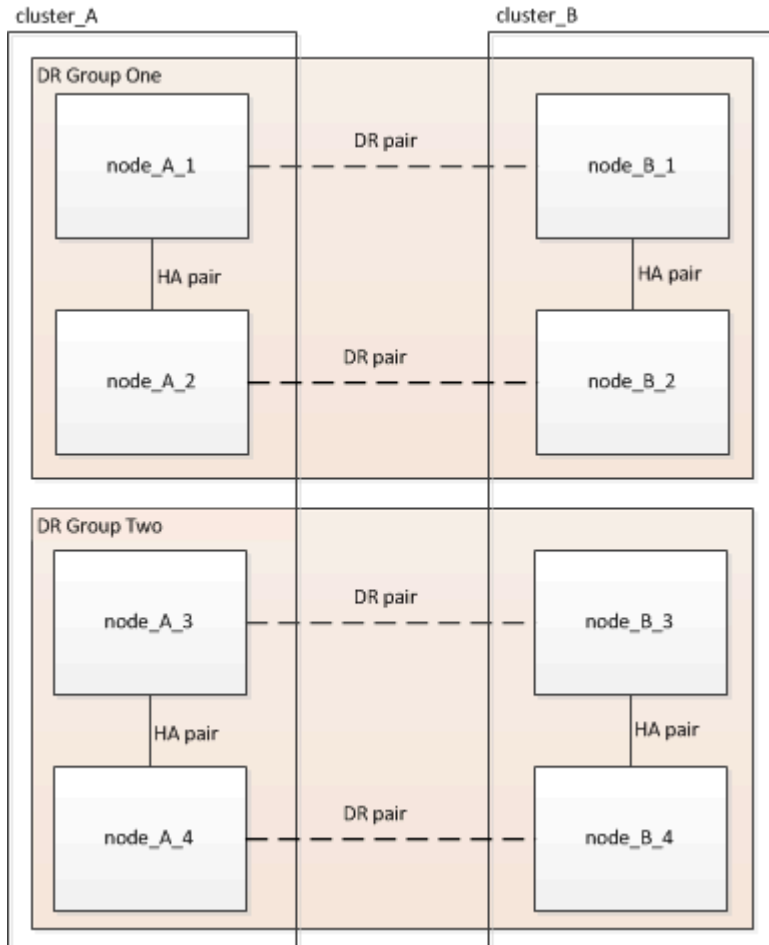
Preparing to update a MetroCluster DR group

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
Node           Partner           Takeover
-----
-----
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 be the default and current version on node_A_1:

```
cluster_A::*> system image show
Node      Image      Is      Is      Version  Install
          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
Node      Image      Is      Is      Version  Install
          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:

```
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	<code>storage failover takeover -ofnode node_B_2</code>
ONTAP 9.0 or Data ONTAP 8.3.x	<code>storage failover takeover -ofnode node_B_2 -option allow-version-mismatch</code> NOTE: The <code>allow-version-mismatch</code> 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

Node           Partner           Takeover
-----
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
Node      Image      Is      Is      Install
           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::>
```

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:

```
cluster_B::*> system image show
Node      Image      Is      Is      Version      Install
           Image    Default Current      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::>
```

- 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.
```


Copyright Information

Copyright © 2021 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system- without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark Information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.