ReReplacing the primary boot media

The primary boot media stores the ONTAP boot image that the system uses when it boots. You can restore the primary boot media image by using the ONTAP image on the secondary boot media, or if necessary, by using a USB flash drive.

**Before you begin**

If your secondary boot media has failed or is missing the `image.tgz` file, you must restore the primary boot media using a USB flash drive. The drive must be formatted to FAT32 and must have the appropriate amount of storage to hold the `image_XXX.tgz` file.

**About this task**

- The replacement process restores the var file system from the secondary boot media or USB flash drive to the primary boot media.
- You must replace the failed component with a replacement FRU component you received from your provider.
- It is important that you apply the commands in these steps on the correct node:
  - The *impaired node* is the node on which you are performing maintenance.
  - The *healthy node* is the HA partner of the impaired node.

**Steps**

1. **Shutting down the impaired controller** on page 1
2. **Healing and switching back aggregates in a two-node MetroCluster configuration** on page 4
3. **Removing the controller module** on page 6
4. **Replacing the boot media** on page 7
5. **Transferring files to the boot media using backup recovery from the second boot media** on page 9
6. **Transferring the boot image to the boot media using a USB flash drive** on page 10
7. **Completing the replacement process** on page 13

**Shutting down the impaired controller**

You can shut down or take over the impaired controller using different procedures, depending on the storage system hardware configuration.

**Shutting down a node in a two-node MetroCluster configuration running ONTAP**

To shut down the impaired node, you must determine the status of the node and, if necessary, switch over the node so that the healthy node continues to serve data from the impaired node storage.

**About this task**

You must leave the power supplies turned on at the end of this procedure to provide power to the healthy node.
Steps

1. Check the MetroCluster status to determine whether the impaired node has automatically switched over to the healthy node:

   `metrocluster show`

2. Depending on whether an automatic switchover has occurred, proceed according to the following table:

<table>
<thead>
<tr>
<th>If the impaired node...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has automatically switched over</td>
<td>Proceed to the next step.</td>
</tr>
<tr>
<td>Has not automatically switched over</td>
<td>Perform a planned switchover operation from the healthy node:</td>
</tr>
<tr>
<td></td>
<td><code>metrocluster switchover</code></td>
</tr>
<tr>
<td>Has not automatically switched over and planned switchover with the <code>metrocluster switchover</code> command fails</td>
<td>a. Halt the impaired node:</td>
</tr>
<tr>
<td></td>
<td><code>system node halt</code></td>
</tr>
<tr>
<td></td>
<td>b. Perform a forced switchover operation:</td>
</tr>
<tr>
<td></td>
<td><code>metrocluster switchover -forced on disaster true</code></td>
</tr>
</tbody>
</table>

3. Resynchronize the data aggregates by running the `metrocluster heal -phase aggregates` command from the surviving cluster.

   **Example**

   ```
   controller_A_1::> metrocluster heal -phase aggregates
   [Job 130] Job succeeded: Heal Aggregates is successful.
   ```

   If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the `-override-vetoes` parameter. If you use this optional parameter, the system overrides any soft vetoes that prevent the healing operation.

4. Verify that the operation has been completed by using the `metrocluster operation show` command.

   **Example**

   ```
   controller_A_1::> metrocluster operation show
   Operation: heal-aggregates
   State: successful
   Start Time: 7/25/2016 18:45:55
   End Time: 7/25/2016 18:45:56
   Errors: -
   ```

5. Check the state of the aggregates by using the `storage aggregate show` command.

   **Example**

   ```
   controller_A_1::> storage aggregate show
   Aggregate     Size Available Used% State   #Vols  Nodes            RAID Status
   --------- -------- --------- ----- ------- ------ ---------------- ------------
   ...        aggr_b2    227.1GB   227.1GB    0% online       0 mcc1-a2          raid_dp, mirrored, normal...
   ```

6. Heal the root aggregates by using the `metrocluster heal -phase root-aggregates` command.
If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the `-override-vetoes` parameter. If you use this optional parameter, the system overrides any soft vetoes that prevent the healing operation.

7. Verify that the heal operation is complete by using the `metrocluster operation show` command on the destination cluster:

Example

```
mcc1A::> metrocluster operation show
Operation: heal-root-aggregates
 State: successful
 End Time: 7/29/2016 20:54:42
 Errors: -
```

8. On the impaired controller module, disconnect the power supplies.

**Shutting down the impaired node**

To shut down the impaired node, you must determine the status of the node and, if necessary, take over the node so that the healthy node continues to serve data from the impaired node storage.

**Before you begin**

- If you have a cluster with more than two nodes, it must be in quorum. If the cluster is not in quorum or a healthy node shows `false` for eligibility and health, you must correct the issue before shutting down the impaired node.

**Steps**

1. Make sure that automatic giveback is disabled:

   `storage failover modify -node local -auto-giveback false`

2. Take the impaired node to the LOADER prompt:

<table>
<thead>
<tr>
<th>If the impaired node is displaying...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>The LOADER prompt</td>
<td>Go to the next step.</td>
</tr>
<tr>
<td>Waiting for giveback...</td>
<td>Press Ctrl-C, and then respond <code>y</code>.</td>
</tr>
<tr>
<td>System prompt or password prompt</td>
<td>Take over or halt the impaired node:</td>
</tr>
<tr>
<td></td>
<td><code>storage failover takeover -ofnode impaired_node_name</code></td>
</tr>
<tr>
<td></td>
<td>When the impaired node shows Waiting for giveback..., press Ctrl-C, and then respond <code>y</code>.</td>
</tr>
</tbody>
</table>
Healing and switching back aggregates in a two-node MetroCluster configuration

After you have completed the FRU replacement in a two-node MetroCluster configuration, you can perform the MetroCluster healing and switchback operations. These operations return the configuration to its normal operating state, with the sync-source storage virtual machines (SVMs) on the formerly impaired site now active and serving data from the local disk pools.

About this task

This task only applies to two-node MetroCluster configurations.

Steps

1. Resynchronize the aggregates by using the `metrocluster heal -phase aggregates` command from the surviving cluster.

   Example
   ```shell
   controller_A_1::> metrocluster heal -phase aggregates
   [Job 130] Job succeeded: Heal Aggregates is successful.
   ```

   If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the `-override-vetoes` parameter. If you use this optional parameter, the system overrides any soft vetoes that prevent the healing operation.

2. Verify that the operation was completed successfully by using the `metrocluster operation show` command.

   Example
   ```shell
   controller_A_1::> metrocluster operation show
   Operation: heal-aggregates
   State: successful
   Start Time: 7/25/2014 18:45:55
   End Time: 7/25/2014 18:45:56
   Errors: -
   ```

3. Check the state of the aggregates by using the `storage aggregate show` command.

   Example
   ```shell
   controller_A_1::> storage aggregate show
   ------------------------  ------  ------  ------  -------  -----------  ------------
   Aggregate   Size     Available  Used%  State       #Vols  Nodes        RAID Status
   ... aggr_b2   227.1GB  227.1GB    0%  online      0 mcc1-a2          raid_dp, mirrored,
   normal...
   ```

4. Switch back the mirrored aggregates by using the `metrocluster heal -phase root-aggregates` command.

   Example
   ```shell
   mcc1A::> metrocluster heal -phase root-aggregates
   [Job 137] Job succeeded: Heal Root Aggregates is successful
   ```

If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the `-override-vetoes` parameter. If you use this optional parameter, the system overrides any soft vetoes that prevent the healing operation.
5. Verify that the heal operation was completed successfully by using the `metrocluster operation show` command on the healthy cluster:

Example

```
mcc1A::> metrocluster operation show
    Operation: heal-root-aggregates
    State: successful
    End Time: 7/29/2014 20:54:42
    Errors: -
```

6. Verify that all nodes are in the enabled state:

```
metrocluster node show
```

Example

```
cluster_B::> metrocluster node show

<table>
<thead>
<tr>
<th>DR Group</th>
<th>Cluster Node</th>
<th>Configuration</th>
<th>State</th>
<th>Mirroring Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cluster_B</td>
<td>configured</td>
<td>enabled</td>
<td>healing roots completed</td>
</tr>
<tr>
<td>1</td>
<td>cluster_A</td>
<td>configured</td>
<td>enabled</td>
<td>waiting for switchback recovery</td>
</tr>
<tr>
<td></td>
<td>controller_A_1</td>
<td>configured</td>
<td>enabled</td>
<td>heal roots completed</td>
</tr>
<tr>
<td>2</td>
<td>controller_B_1</td>
<td>configured</td>
<td>enabled</td>
<td>waiting for switchback recovery</td>
</tr>
</tbody>
</table>

2 entries were displayed.
```

7. Verify that resynchronization is complete on all SVMs:

```
metrocluster vserver show
```

8. Verify that any automatic LIF migrations being performed by the healing operations were completed successfully:

```
metrocluster check lif show
```

9. Perform the switchback by using the `metrocluster switchback` command from any node in the surviving cluster.

10. Verify that the switchback operation has completed:

```
metrocluster show
```

Example

The switchback operation is still running when a cluster is in the waiting-for-switchback state:

```
cluster_B::> metrocluster show

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Configuration</th>
<th>State</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local: cluster_B</td>
<td>configured</td>
<td></td>
<td>switchover</td>
</tr>
<tr>
<td>Remote: cluster_A</td>
<td>configured</td>
<td></td>
<td>waiting-for-switchback</td>
</tr>
</tbody>
</table>
```

The switchback operation is complete when the clusters are in the normal state:

```
cluster_B::> metrocluster show

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Configuration</th>
<th>State</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local: cluster_B</td>
<td>configured</td>
<td>normal</td>
<td></td>
</tr>
<tr>
<td>Remote: cluster_A</td>
<td>configured</td>
<td>normal</td>
<td></td>
</tr>
</tbody>
</table>
```

If a switchback is taking a long time to finish, you can check on the status of in-progress baselines by using the `metrocluster config-replication resync-status show` command.

11. Reestablish any SnapMirror or SnapVault configurations.
Removing the controller module

You must remove the controller module from the chassis when you replace the controller module or replace a component inside the controller module.

Steps

1. If you are not already grounded, properly ground yourself.
2. Loosen the hook and loop strap binding the cables to the cable management device, and then unplug the system cables and SFPs (if needed) from the controller module, keeping track of where the cables were connected.
   Leave the cables in the cable management device so that when you reinstall the cable management device, the cables are organized.
3. Unplug the controller module power supply from the source, and then unplug the cable from the power supply.
4. Remove the cable management device from the controller module and set it aside.
5. Press down on both of the locking latches, and then rotate both latches downward at the same time.
   The controller module moves slightly out of the chassis.
6. Slide the controller module out of the chassis.
   Make sure that you support the bottom of the controller module as you slide it out of the chassis.
7. Place the controller module on a stable, flat surface, and then open the air duct:
a. Press in the locking tabs on the sides of the air duct toward the middle of the controller module.
b. Slide the air duct toward the fan modules, and then rotate it upward to its completely open position.

### Replacing the boot media

You must locate the failed boot media in the controller module by removing the middle PCIe module on the controller module, locate the failed boot media by the lit LED near the boot media, and then replace the boot media.

**About this task**

You need a Phillips head screw driver to remove the screw that holds the boot media in-place.

**Steps**

1. If you are not already grounded, properly ground yourself.
2. Locate the boot media:
   a. Open the air duct, if needed.
   b. If needed, remove Riser 2, the middle PCIe module, by unlocking the locking latch and then removing the riser from the controller module.
3. Locate the failed boot media by the lit LED on the controller module motherboard.

4. Remove the boot media from the controller module:
   a. Using a Phillips head screwdriver, remove the screw holding down the boot media and set the screw aside in a safe place.
   b. Grasping the sides of the boot media, gently rotate the boot media up, and then pull the boot media straight out of the socket and set it aside.

5. Align the edges of the replacement boot media with the boot media socket, and then gently push it into the socket.

6. Check the boot media to make sure that it is seated squarely and completely in the socket.
   If necessary, remove the boot media and reseat it into the socket.

7. Rotate the boot media down until it is flush with the motherboard.

8. Secure the boot media in place by using the screw.
   **Note:** Do not over-tighten the screw. Doing so might crack the boot media circuit board.

9. Reinstall the riser into the controller module.

10. Close the air duct:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air duct</td>
</tr>
<tr>
<td>2</td>
<td>Riser 2 (middle PCIe module)</td>
</tr>
<tr>
<td>3</td>
<td>Boot media screw</td>
</tr>
<tr>
<td>4</td>
<td>Boot media</td>
</tr>
</tbody>
</table>
a. Rotate the air duct downward.
b. Slide the air duct toward the risers until it clicks into place.

**Transferring files to the boot media using backup recovery from the second boot media**

You can install the system image to the replacement boot media using the image on second boot media installed in the controller module. This is the primary method for transferring the boot media files to the replacement boot media in systems with two boot media in the controller module.

**About this task**

The image on the secondary boot media must contain an image.tgz file and must not be reporting failures. If image.tgz file is missing or the boot media reports failures, you cannot use this procedure. You must transfer the boot image to the replacement boot media using the USB flash drive replacement procedure.

**Steps**

1. If you are not already grounded, properly ground yourself.

2. If you have not already done so, close the air duct:
   a. Swing the air duct all the way down to the controller module.
   b. Slide the air duct toward the risers until the locking tabs click into place.
   c. Inspect the air duct to make sure that it is properly seated and locked into place.
3. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.

4. Reinstall the cable management device and recable the system, as needed.
   When recabling, remember to reinstall the media converters (SFPs) if they were removed.

5. Recable the power supply, and then connect it to the power source.
   Make sure that you reattach the power cable locking collar on the power cord.

6. Gently push the controller module all the way into the system until the controller module locking hooks begin to rise, firmly push on the locking hooks to finish seating the controller module, and then swing the locking hooks into the locked position over the pins on the controller module.
   The node begins to boot as soon as it is completely installed into the chassis.

7. Interrupt the boot process by pressing Ctrl-C to stop at the LOADER prompt.

8. From the LOADER prompt, boot the recovery image from the secondary boot media:
   `boot_recovery`
   The image is downloaded from the secondary boot media.

9. When prompted, either enter the name of the image or accept the default image displayed inside the brackets on your screen.

10. After the image is installed, start the restoration process:
    a. Record the IP address of the impaired node that is displayed on the screen.
    b. Press `y` when prompted to restore the backup configuration.
    c. Press `y` when prompted to confirm that the backup procedure was successful.

11. From the partner node in advanced privilege level, start the configuration synchronization using the IP address recorded in the previous step:
    `system node restore-backup -node local -target-address impaired_node_IP_address`

12. After the configuration synchronization is complete without errors, press `y` when prompted to confirm that the backup procedure was successful.

13. Press `y` when prompted whether to use the restored copy, and then press `y` when prompted to reboot the node.

14. Exit advanced privilege level on the healthy node.

**Transferring the boot image to the boot media using a USB flash drive**

This procedure should only be used if the secondary boot media restore failed or if the `image.tgz` file is not found on the secondary boot media.

**Before you begin**

You must have a USB flash drive, formatted to FAT32, with the following items:

- A copy of the same image version of ONTAP as what the impaired controller was running.
  You can download the appropriate image from the Downloads section on the NetApp Support Site.
Steps

1. If you are not already grounded, properly ground yourself.

2. If you have not already done so, close the air duct:
   a. Swing the air duct all the way down to the controller module.
   b. Slide the air duct toward the risers until the locking tabs click into place.
   c. Inspect the air duct to make sure that it is properly seated and locked into place.

3. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.

4. Reinstall the cable management device and recable the system, as needed.
   When recabling, remember to reinstall the media converters (SFPs) if they were removed.

5. Recable the power supply, and then connect it to the power source.
   Make sure that you reattach the power cable locking collar on the power cord.

6. Insert the USB flash drive into the USB slot on the controller module.
   Make sure that you install the USB flash drive in the slot labeled for USB devices, and not in the USB console port.

7. Gently push the controller module all the way into the system until the controller module locking hooks begin to rise, firmly push on the locking hooks to finish seating the controller module, and then swing the locking hooks into the locked position over the pins on the controller module.
The node begins to boot as soon as it is completely installed into the chassis.

8. Interrupt the boot process by pressing Ctrl-C to stop at the LOADER prompt.

9. For systems running ONTAP 9.3 and earlier, verify that the environment variables are set as expected:
   
   **Note:** If you are running ONTAP 9.4 or later, the environment variables are persistent and should be set correctly. However, it is a best practice to verify the settings once your system has been restored.

   a. From the LOADER prompt, verify that the environment variables are set as expected:

   ```
   printenv
   ```

   • For AFF systems, make sure that `bootarg.init.flash_optimized` is set to `true`. If necessary, reset it by using the `setenv` command.

   • For systems using Storage Encryption (NSE), make sure that `bootarg.storageencryption.support` is set to `true`. If necessary, reset it by using the `setenv` command.

   If you are using KMIP servers, make sure that the `kmip.int.*` variables are properly set, usually during boot. *ONTAP 9 Disks and Aggregates Power Guide*

   • For systems using UTA2 adapters, make sure that the card settings by using the `ucadmin` command, and then make any necessary changes by using the `ucadmin modify` command.

   b. If necessary, reset any environment variables:

   ```
   setenv environment_variable_name changed_value
   ```

   c. Save any changes you made:

   ```
   saveenv
   ```

10. From the LOADER prompt, boot the recovery image from the USB flash drive:

    ```
    boot_recovery
    ```

    The image is downloaded from the USB flash drive.

11. When prompted, either enter the name of the image or accept the default image displayed inside the brackets on your screen.

12. After the image is installed, start the restoration process:

    a. Record the IP address of the impaired node that is displayed on the screen.

    b. Press `y` when prompted to restore the backup configuration.

    c. Press `y` when prompted to confirm that the backup procedure was successful.

13. Press `y` when prompted whether to use the restored copy, and then press `y` when prompted to reboot the node.

14. From the partner node in advanced privilege level, start the configuration synchronization using the IP address recorded in the previous step:

    ```
    system node restore-backup -node local -target-address impaired_node_IP_address
    ```

15. After the configuration synchronization is complete without errors, press `y` when prompted to confirm that the backup procedure was successful.

16. Press `y` when prompted whether to use the restored copy, and then press `y` when prompted to reboot the node.

17. Although ONTAP 9.4 retains the environment variable settings, it is a best practice to verify that they are set as expected.

    a. Take the node to the LOADER prompt.

    b. Check the environment variable settings with the `printenv` command.
c. If an environment variable is not set as expected, modify it with the `setenv environment_variable_name changed_value` command.

d. Save your changes using the `saveenv` command.

e. Reboot the node.

18. With the rebooted impaired node displaying the Waiting for Giveback... message, perform a giveback from the healthy node:

<table>
<thead>
<tr>
<th>If your system is in...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>An HA pair</td>
<td>After the impaired node is displaying the Waiting for Giveback... message, perform a giveback from the healthy node:</td>
</tr>
<tr>
<td></td>
<td>a. From the healthy node:</td>
</tr>
<tr>
<td></td>
<td><code>storage failover giveback -ofnode partner_node_name</code></td>
</tr>
<tr>
<td></td>
<td>The impaired node takes back its storage, finishes booting, and then reboots and is again taken over by the healthy node.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> If the giveback is vetoed, you can consider overriding the vetoes.</td>
</tr>
<tr>
<td></td>
<td><strong>ONTAP 9 High-Availability Configuration Guide</strong></td>
</tr>
<tr>
<td>A two-node MetroCluster configuration</td>
<td>Proceed to the next step.</td>
</tr>
<tr>
<td></td>
<td>The MetroCluster healing and switchback procedures are done in the next task in the replacement process.</td>
</tr>
</tbody>
</table>

19. Exit advanced privilege level on the healthy node.

## Completing the replacement process

After you replace the part, you can return the failed part to NetApp, as described in the RMA instructions shipped with the kit.

Contact technical support at [NetApp Support](https://www.netapp.com/support), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific) if you need the RMA number or additional help with the replacement procedure.

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