Replacing DIMMs

You must replace a DIMM in the controller module when your system registers an increasing number of correctable error correction codes (ECC); failure to do so causes a system panic.

Before you begin

All other components in the system must be functioning properly; if not, you must contact technical support.

You must replace the failed component with a replacement FRU component you received from your provider.

Steps

1. Shutting down the impaired controller on page 1
2. Opening the controller module on page 4
3. Replacing the DIMMs on page 5
4. Reinstalling the controller on page 8
5. Running system-level diagnostics on page 8
6. Healing and switching back aggregates in a two-node MetroCluster configuration on page 10
7. Completing the replacement process on page 12

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 the 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.

Steps

1. If you have a cluster with more than two nodes, check the health and Epsilon from advanced mode:
   
   ```
   cluster show -epsilon *
   ```

   If the cluster is not in quorum or a node that is not the impaired node shows false for eligibility and health, correct the issue before proceeding to the next step.

   If Epsilon resides in the impaired node:

   a. Remove Epsilon from the impaired node:

   ```
   cluster modify -node impaired_node -epsilon false
   ```

   b. Assign Epsilon to a healthy node in the cluster:

   ```
   cluster modify -node healthy_node -epsilon true
   ```

2. If the impaired node is part of an HA pair, disable automatic giveback from the console of the healthy node:

   ```
   storage failover modify -node local -auto-giveback false
   ```
3. 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 <strong>y</strong> when prompted.</td>
</tr>
<tr>
<td>System prompt or password prompt</td>
<td>Take over or halt the impaired node:</td>
</tr>
<tr>
<td></td>
<td>• For an HA pair, take over the impaired node from the healthy node:</td>
</tr>
<tr>
<td></td>
<td><strong>storage failover takeover -ofnode impaired_node_name</strong></td>
</tr>
<tr>
<td></td>
<td>When the impaired node shows <em>Waiting for giveback...</em>, press Ctrl-C, and then respond <strong>y</strong>.</td>
</tr>
<tr>
<td></td>
<td>• For a stand-alone system:</td>
</tr>
<tr>
<td></td>
<td><strong>system node halt impaired_node_name</strong></td>
</tr>
</tbody>
</table>

4. If the system is in a dual-chassis HA pair or stand-alone configuration, turn off the power supplies, and then unplug the impaired node's power cords from the power source.

5. If the system is in a stand-alone configuration, turn off the power supplies, and then unplug the impaired node's power cords from the power source.

**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><strong>metrocluster switchover</strong></td>
</tr>
<tr>
<td>Has not automatically switched over and planned switchover with the <strong>metrocluster switchover</strong> command fails</td>
<td>a. Halt the impaired node:</td>
</tr>
<tr>
<td></td>
<td><strong>system node halt</strong></td>
</tr>
<tr>
<td></td>
<td>b. Perform a forced switchover operation:</td>
</tr>
<tr>
<td></td>
<td><strong>metrocluster switchover -forced on disaster true</strong></td>
</tr>
</tbody>
</table>

3. Resynchronize the data aggregates by running the **metrocluster heal -phase aggregates** command from the surviving cluster.
4. Verify that the operation has been completed by running the `metrocluster operation show` command.

   **Example**
   ```bash
   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 running the `storage aggregate show` command.

   **Example**
   ```bash
   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 running the `metrocluster heal -phase root-aggregates` command.

   **Example**
   ```bash
   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.

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

   **Example**
   ```bash
   mcc1A::> metrocluster operation show
   Operation: heal-root-aggregates
   State: successful
   End Time: 7/29/2016 20:54:42
   Errors: -
   ```
Opening the controller module

To access components inside the controller, you must first remove the controller module from the system and then remove the cover on 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. Remove and set aside the cable management devices from the left and right sides of the controller module.

4. Loosen the thumbscrew on the cam handle on the controller module.

5. Pull the cam handle downward and begin to 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.
Replacing the DIMMs

To replace the DIMMs, locate them inside the controller and follow the specific sequence of steps.

**Steps**

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

2. Check the NVMEM LED on the controller module.
   
   You must perform a clean system shutdown before replacing system components to avoid losing unwritten data in the nonvolatile memory (NVMEM). The LED is located on the back of the controller module. Look for the following icon:

   ![NVMEM LED Icon](image)

3. If the NVMEM LED is not flashing, there is no content in the NVMEM; you can skip the following steps and proceed to the next task in this procedure.

4. Unplug the battery:
   
   **Attention:** The NVMEM LED blinks while destaging contents to the flash memory when you halt the system. After the destage is complete, the LED turns off.
   
   • If power is lost without a clean shutdown, the NVMEM LED flashes until the destage is complete, and then the LED turns off.
   
   • If the LED is on and power is on, unwritten data is stored on NVMEM.
     
     This typically occurs during an uncontrolled shutdown after Data ONTAP has successfully booted.

   a. Open the CPU air duct and locate the NVMEM battery.
b. Locate the battery plug and squeeze the clip on the face of the battery plug to release the plug from the socket, and then unplug the battery cable from the socket.

c. Wait a few seconds, and then plug the battery back into the socket.

5. Return to 2 of this procedure to recheck the NVMEM LED.

6. Locate the DIMMs on your controller.

   **Note:** Each system memory DIMM has an LED located on the board next to each DIMM slot. The LED for the faulty blinks every two seconds.

7. Note the orientation of the DIMM in the socket so that you can insert the replacement DIMM in the proper orientation.

8. Slowly push apart on the two DIMM ejector tabs, on either side of the DIMM to eject the DIMM from its slot, and then slide it out of the slot.

   **Attention:** Carefully hold the DIMM by the edges to avoid pressure on the components on the DIMM circuit board.

   The number and placement of system DIMMs depends on the model of your system.
9. Remove the replacement DIMM from the antistatic shipping bag, hold the DIMM by the corners, and align it to the slot. The notch among the pins on the DIMM should line up with the tab in the socket.

10. Make sure that the DIMM latches on the connector are in the open position, and then insert the DIMM squarely into the slot. The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.

   **Attention:** Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot.

11. Push carefully, but firmly, on the top edge of the DIMM until the latches snap into place over the notches at the ends of the DIMM.

12. Locate the NVMEM battery plug socket and squeeze the clip on the face of the battery cable plug to insert it into the socket. Make sure that the plug locks down onto the controller module.

13. Close the controller module cover.
Reinstalling the controller

After you replace a component within the controller module, you must reinstall the controller module in the system chassis and boot it to a state where you can run diagnostic tests on the replaced component.

Steps

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

2. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.
   
   **Note:** Do not completely insert the controller module in the chassis until instructed to do so.

3. Recable the system, as needed.

   If you removed the media converters (SFPs), remember to reinstall them if you are using fiber optic cables.

4. Complete the reinstallation of the controller module:

   The controller module begins to boot as soon as it is fully seated in the chassis. Be prepared to interrupt the boot process.

   a. With the cam handle in the open position, firmly push the controller module in until it meets the midplane and is fully seated, and then close the cam handle to the locked position.

      **Attention:** Do not use excessive force when sliding the controller module into the chassis; you might damage the connectors.

   b. Tighten the thumbscrew on the cam handle on back of the controller module.

   c. If you have not already done so, reinstall the cable management device.

   d. Bind the cables to the cable management device with the hook and loop strap.

   e. As each node starts the booting, press **Ctrl-C** to interrupt the boot process when you see the message **Press Ctrl-C for Boot Menu**.

   f. Select the option to boot to Maintenance mode from the displayed menu.

Running system-level diagnostics

After installing a new DIMM, you should run diagnostics.

**Before you begin**

Your system must be at the LOADER prompt to start System Level Diagnostics.

**About this task**

All commands in the diagnostic procedures are issued from the node where the component is being replaced.

**Steps**

1. If the node to be serviced is not at the LOADER prompt, perform the following steps:
   
   a. Select the Maintenance mode option from the displayed menu.

   b. After the node boots to Maintenance mode, halt the node:
halt

After you issue the command, you should wait until the system stops at the LOADER prompt.

**Important:** During the boot process, you can safely respond `y` to prompts:

- A prompt warning that when entering Maintenance mode in an HA configuration, you must ensure that the healthy node remains down.

2. At the LOADER prompt, access the special drivers specifically designed for system-level diagnostics to function properly:
   ```
   boot_diags
   ```

   During the boot process, you can safely respond `y` to the prompts until the Maintenance mode prompt (`*>>`) appears.

3. Run diagnostics on the system memory:
   ```
   sldiag device run -dev mem
   ```

4. Verify that no hardware problems resulted from the replacement of the DIMMs:
   ```
   sldiag device status -dev mem -long -state failed
   ```

   System-level diagnostics returns you to the prompt if there are no test failures, or lists the full status of failures resulting from testing the component.

5. Proceed based on the result of the preceding step:

<table>
<thead>
<tr>
<th>If the system-level diagnostics tests...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were completed without any failures</td>
<td>a. Clear the status logs:</td>
</tr>
<tr>
<td></td>
<td><code>sldiag device clearstatus</code></td>
</tr>
<tr>
<td></td>
<td>b. Verify that the log was cleared:</td>
</tr>
<tr>
<td></td>
<td><code>sldiag device status</code></td>
</tr>
<tr>
<td></td>
<td>The following default response is displayed:</td>
</tr>
<tr>
<td></td>
<td>SLDIAG: No log messages are present.</td>
</tr>
<tr>
<td></td>
<td>c. Exit Maintenance mode:</td>
</tr>
<tr>
<td></td>
<td><code>halt</code></td>
</tr>
<tr>
<td></td>
<td>The node displays the LOADER prompt.</td>
</tr>
<tr>
<td></td>
<td>d. Boot the node from the LOADER prompt:</td>
</tr>
<tr>
<td></td>
<td><code>boot_ontap</code></td>
</tr>
<tr>
<td></td>
<td>e. Return the node to normal operation:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If your node is in...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>An HA pair</td>
<td>Perform a give back:</td>
</tr>
<tr>
<td></td>
<td><code>storage failover giveback -ofnode replacement_node_name</code></td>
</tr>
<tr>
<td>A stand-alone configuration</td>
<td>Proceed to the next step.</td>
</tr>
<tr>
<td></td>
<td>No action is required.</td>
</tr>
</tbody>
</table>

You have completed system-level diagnostics.
### If the system-level diagnostics tests...

<table>
<thead>
<tr>
<th>Resulted in some test failures</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine the cause of the problem:</td>
<td></td>
</tr>
<tr>
<td>a. Exit Maintenance mode:</td>
<td></td>
</tr>
<tr>
<td><code>halt</code></td>
<td>After you issue the command, wait until the system stops at the LOADER prompt.</td>
</tr>
<tr>
<td>b. Turn off or leave on the power supplies, depending on how many controller modules are in the chassis:</td>
<td></td>
</tr>
<tr>
<td>• If you have two controller modules in the chassis, leave the power supplies turned on to provide power to the other controller module.</td>
<td></td>
</tr>
<tr>
<td>• If you have one controller module in the chassis, turn off the power supplies and unplug them from the power sources.</td>
<td></td>
</tr>
<tr>
<td>c. Verify that you have observed all the considerations identified for running system-level diagnostics, that cables are securely connected, and that hardware components are properly installed in the storage system.</td>
<td></td>
</tr>
<tr>
<td>d. Boot the controller module you are servicing, interrupting the boot by pressing <code>Ctrl-C</code> when prompted to get to the Boot menu:</td>
<td></td>
</tr>
<tr>
<td>• If you have two controller modules in the chassis, fully seat the controller module you are servicing in the chassis. The controller module boots up when fully seated.</td>
<td></td>
</tr>
<tr>
<td>• If you have one controller module in the chassis, connect the power supplies, and then turn them on.</td>
<td></td>
</tr>
<tr>
<td>e. Select Boot to maintenance mode from the menu.</td>
<td></td>
</tr>
<tr>
<td>f. Exit Maintenance mode by entering the following command:</td>
<td></td>
</tr>
<tr>
<td><code>halt</code></td>
<td>After you issue the command, wait until the system stops at the LOADER prompt.</td>
</tr>
<tr>
<td>g. Rerun the system-level diagnostic test.</td>
<td></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.
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

```
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

```
controller_A_1::> storage aggregate show
Aggregate     Size Available Used% State   #Vols  Nodes            RAID Status
--------- -------- --------- ----- ------- ------ ---------------- ------------
...        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

```
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
DR Group Cluster Node           State          Mirroring Mode
----- ------- -------------- -------------- --------- --------------------
1     cluster_A controller_A_1 configured     enabled   heal roots completed
      controller_A_2 configured     enabled   heal roots completed
          cluster_B controller_B_1 configured     enabled   waiting for switchback recovery
      controller_B_2 configured     enabled   waiting for switchback recovery
4 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
Cluster              Configuration State    Mode
--------------------    -------------------     --------
Local: cluster_B configured switchover
Remote: cluster_A configured waiting-for-switchback
```

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

```
cluster_B:~> metrocluster show
Cluster              Configuration State    Mode
--------------------    -------------------     --------
Local: cluster_B configured normal
Remote: cluster_A configured normal
```

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.

    *ONTAP 9 Data Protection Guide Using SnapMirror and SnapVault Technology*

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, 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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