Expanding a four-node MetroCluster FC configuration to an eight-node configuration
ONTAP MetroCluster

November 19, 2021

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Expanding a four-node MetroCluster FC configuration to an eight-node configuration

Expanding a four-node MetroCluster FC configuration to an eight-node MetroCluster FC configuration involves adding two controllers to each cluster to form a second HA pair at each MetroCluster site, and then running the MetroCluster FC configuration operation.

About this task

- The nodes must be running ONTAP 9 in a MetroCluster FC configuration.
  
  This procedure is not supported on earlier versions of ONTAP or in MetroCluster IP configurations.

- The existing MetroCluster FC configuration must be healthy.

- The equipment you are adding must be supported and meet all the requirements described in Fabric-attached MetroCluster installation and configuration

- You must have available FC switch ports to accommodate the new controllers and any new bridges.

- You need the admin password and access to an FTP or SCP server.

- This procedure applies only to MetroCluster FC configurations.

- This procedure is nondisruptive and takes approximately one day to complete (excluding rack and stack) when disks are zeroed.

Before performing this procedure, the MetroCluster FC configuration consists of four nodes, with one HA pair at each site:

At the conclusion of this procedure, the MetroCluster FC configuration consists of two HA pairs at each site:
Both sites must be expanded equally. A MetroCluster FC configuration cannot consist of an uneven number of nodes.

## Determining the new cabling layout

You must determine the cabling for the new controller modules and any new disk shelves to the existing FC switches.

### About this task

This task must be performed at each MetroCluster site.

### Steps

1. Use the Fabric-attached MetroCluster Installation and Configuration Guide and create a cabling layout for your switch type, using the port usage for an eight-node MetroCluster configuration.

   The FC switch port usage must match the usage described in the guide so that the Reference Configuration Files (RCFs) can be used.

   **Fabric-attached MetroCluster installation and configuration**

   If your environment cannot be cabled in such a way that RCF files can be used, you must manually configure the system according to instructions found in the *Fabric-attached MetroCluster Installation and Configuration Guide*. Do not use this procedure if the cabling cannot use RCF files.
Racking the new equipment

You must rack the equipment for the new nodes.

Steps
1. Use the MetroCluster Installation and Configuration guide and rack the new storage systems, disk shelves, and FC-to-SAS bridges.

Verifying the health of the MetroCluster configuration

You should check the health of the MetroCluster configuration to verify proper operation.

Steps
1. Check that the MetroCluster is configured and in normal mode on each cluster:

   `metrocluster show`

   ```
   cluster_A::> metrocluster show
   Cluster     Entry Name     State
   -------------------  -------------------  -----------
   Local: cluster_A  Configuration state configured
           Mode normal
           AUSO Failure Domain auso-on-cluster-disaster
   Remote: cluster_B Configuration state configured
           Mode normal
           AUSO Failure Domain auso-on-cluster-disaster
   ```

2. Check that mirroring is enabled on each node:

   `metrocluster node show`

   ```
   cluster_A::> metrocluster node show
   DR              Configuration  DR
   Group Cluster   State          Mirroring Mode
   ----- ------- --------------  ---------
   ---- ----- -----------------  2 entries were displayed.
   1     cluster_A
         node_A_1 configured enabled normal
         cluster_B
         node_B_1 configured enabled normal
   ```

3. Check that the MetroCluster components are healthy:
cluster_A::> metrocluster check run

Last Checked On: 10/1/2014 16:03:37

<table>
<thead>
<tr>
<th>Component</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>nodes</td>
<td>ok</td>
</tr>
<tr>
<td>lifs</td>
<td>ok</td>
</tr>
<tr>
<td>config-replication</td>
<td>ok</td>
</tr>
<tr>
<td>aggregates</td>
<td>ok</td>
</tr>
</tbody>
</table>

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.

4. Check that there are no health alerts:

   system health alert show

5. Simulate a switchover operation:
   a. From any node's prompt, change to the advanced privilege level:
      
      set -privilege advanced

      You need to respond with y when prompted to continue into advanced mode and see the advanced mode prompt (*>).

   b. Perform the switchover operation with the -simulate parameter:
      
      metrocluster switchover -simulate

   c. Return to the admin privilege level:
      
      set -privilege admin

Checking for MetroCluster configuration errors with Config Advisor

You can go to the NetApp Support Site and download the Config Advisor tool to check for common configuration errors.

About this task

Config Advisor is a configuration validation and health check tool. You can deploy it at both secure sites and non-secure sites for data collection and system analysis.
Support for Config Advisor is limited, and available only online.

Steps
1. Go to the Config Advisor download page and download the tool.

   **NetApp Downloads: Config Advisor**

2. Run Config Advisor, review the tool’s output and follow the recommendations in the output to address any issues discovered.

Sending a custom AutoSupport message prior to adding nodes to the MetroCluster configuration

You should issue an AutoSupport message to notify NetApp technical support that maintenance is underway. Informing technical support that maintenance is underway prevents them from opening a case on the assumption that a disruption has occurred.

**About this task**
This task must be performed on each MetroCluster site.

**Steps**
1. Log in to the cluster at Site_A.
2. Invoke an AutoSupport message indicating the start of the maintenance:

   ```bash
   system node autosupport invoke -node * -type all -message MAINT=maintenance-window-in-hours
   ```

   The `maintenance-window-in-hours` parameter specifies the length of the maintenance window and can be a maximum of 72 hours. If the maintenance is completed before the time has elapsed, you can issue the following command to indicating that the maintenance period has ended:

   ```bash
   system node autosupport invoke -node * -type all -message MAINT=end
   ```

3. Repeat this step on the partner site.

Recabling and zoning a switch fabric for the new nodes

When adding nodes to the MetroCluster configuration, you must change the cabling and then run RCF files to redefine the zoning on the fabric.

**About this task**
This task must be performed on each switch fabric. It is done one fabric at a time.

Disconnecting the existing DR group from the fabric

You must disconnect the existing controller modules from the FC switches in the fabric.

**About this task**
This task must be performed at each MetroCluster site.
Steps
1. Disable the HBA ports that connect the existing controller modules to the switch fabric undergoing maintenance:

   storage port disable -node node-name -port port-number

2. On the local FC switches, remove the cables from the ports for the existing controller module’s HBA, FC-VI, and ATTO bridges.

   You should label the cables for easy identification when you re-cable them. Only the ISL ports should remain cabled.

Applying the RCF files and recabling the switches

You must apply the RCF files to reconfigure your zoning to accommodate the new nodes.

Steps
1. Locate the RCF files for your configuration.

   You must use the RCF files for an eight-node configuration and that match your switch model.

2. Apply the RCF files, following the directions on the download page, adjusting the ISL settings as needed.

3. Ensure that the switch configuration is saved.

4. Reboot the FC switches.

5. Cable both the pre-existing and the new FC-to-SAS bridges to the FC switches, using the cabling layout you created previously.

   The FC switch port usage must match the MetroCluster eight-node usage described in the Fabric-attached MetroCluster Installation and Configuration Guide so that the Reference Configuration Files (RCFs) can be used.

   Fabric-attached MetroCluster installation and configuration

   - If your environment cannot be cabled in such a way that RCF files can be used then contact technical support. Do NOT use this procedure if the cabling cannot use RCF files.

6. Verify that the ports are online by using the correct command for your switch.

<table>
<thead>
<tr>
<th>Switch vendor</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brocade</td>
<td>switchshow</td>
</tr>
<tr>
<td>Cisco</td>
<td>show interface brief</td>
</tr>
</tbody>
</table>

7. Cable the FC-VI ports from the existing and new controllers, using the cabling layout you created previously.

   Fabric-attached MetroCluster installation and configuration

   The FC switch port usage must match the MetroCluster eight-node usage described in the Fabric-attached
If your environment cannot be cabled in such a way that RCF files can be used then contact technical support. Do NOT use this procedure if the cabling cannot use RCF files.

8. From the existing nodes, verify that the FC-VI ports are online:

```
metrocluster interconnect adapter show
```

```
metrocluster interconnect mirror show
```

9. Cable the HBA ports from the current and the new controllers.

10. On the existing controller modules, e-enable the ports connected to the switch fabric undergoing maintenance:

```
storage port enable -node node-name -port port-ID
```

11. Start the new controllers and boot them into Maintenance mode:

```
boot_ontap maint
```

12. Verify that only storage that will be used by the new DR group is visible to the new controller modules.

   None of the storage that is used by the other DR group should be visible.

13. Return to the beginning of this process to re-cable the second switch fabric.

## Configuring ONTAP on the new controllers

You must set up ONTAP on each new controller in the MetroCluster configuration, and then re-create the MetroCluster relationship between the two sites.

### Clearing the configuration on a controller module

Before using a new controller module in the MetroCluster configuration, you must clear the existing configuration.

**Steps**

1. If necessary, halt the node to display the LOADER prompt:

   ```
halt
   ```

2. At the LOADER prompt, set the environmental variables to default values:

   ```
set-defaults
   ```

3. Save the environment:

   ```
saveenv
   ```
4. At the LOADER prompt, launch the boot menu:

   boot_ontap menu

5. At the boot menu prompt, clear the configuration:

   wipeconfig

   Respond yes to the confirmation prompt.

   The node reboots and the boot menu is displayed again.

6. At the boot menu, select option 5 to boot the system into Maintenance mode.

   Respond yes to the confirmation prompt.

### Assigning disk ownership in AFF systems

If you are using AFF systems in a configuration with mirrored aggregates and the nodes do not have the disks (SSDs) correctly assigned, you should assign half the disks on each shelf to one local node and the other half of the disks to its HA partner node. You should create a configuration in which each node has the same number of disks in its local and remote disk pools.

**About this task**

The storage controllers must be in Maintenance mode.

This does not apply to configurations which have unmirrored aggregates, an active/passive configuration, or that have an unequal number of disks in local and remote pools.

This task is not required if disks were correctly assigned when received from the factory.

- **Pool 0** always contains the disks that are found at the same site as the storage system that owns them, while **Pool 1** always contains the disks that are remote to the storage system that owns them.

**Steps**

1. If you have not done so, boot each system into Maintenance mode.

2. Assign the disks to the nodes located at the first site (site A):

   You should assign an equal number of disks to each pool.

   a. On the first node, systematically assign half the disks on each shelf to pool 0 and the other half to the HA partner’s pool 0:

      ```bash
      disk assign -disk disk-name -p pool -n number-of-disks
      ```

      If storage controller Controller_A_1 has four shelves, each with 8 SSDs, you issue the following commands:
b. Repeat the process for the second node at the local site, systematically assigning half the disks on each shelf to pool 1 and the other half to the HA partner’s pool 1:

\[
\text{disk assign -shelf FC\_switch\_A\_1:1-4.shelf1 -p 0 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_A\_1:1-4.shelf2 -p 0 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_B\_1:1-4.shelf1 -p 1 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_B\_1:1-4.shelf2 -p 1 -n 4}
\]

3. Assign the disks to the nodes located at the second site (site B):

You should assign an equal number of disks to each pool.

a. On the first node at the remote site, systematically assign half the disks on each shelf to pool 0 and the other half to the HA partner’s pool 0:

\[
\text{disk assign -disk disk-name -p pool}
\]

If storage controller Controller_A_1 has four shelves, each with 8 SSDs, you issue the following commands:

\[
\text{disk assign -shelf FC\_switch\_A\_1:1-4.shelf3 -p 0 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_B\_1:1-4.shelf4 -p 1 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_A\_1:1-4.shelf3 -p 0 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_B\_1:1-4.shelf4 -p 1 -n 4}
\]

b. Repeat the process for the second node at the remote site, systematically assigning half the disks on each shelf to pool 1 and the other half to the HA partner’s pool 1:

\[
\text{disk assign -disk disk-name -p pool}
\]

If storage controller Controller_B_2 has four shelves, each with 8 SSDs, you issue the following commands:

\[
\text{disk assign -shelf FC\_switch\_B\_1:1-5.shelf1 -p 0 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_B\_1:1-5.shelf2 -p 0 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_A\_1:1-5.shelf1 -p 1 -n 4}
\]
\[
\text{disk assign -shelf FC\_switch\_A\_1:1-5.shelf2 -p 1 -n 4}
\]
Assigning disk ownership in non-AFF systems

If the MetroCluster nodes do not have the disks correctly assigned, or if you are using DS460C disk shelves in your configuration, you must assign disks to each of the nodes in the MetroCluster configuration on a shelf-by-shelf basis. You will create a configuration in which each node has the same number of disks in its local and remote disk pools.

About this task
The storage controllers must be in Maintenance mode.

If your configuration does not include DS460C disk shelves, this task is not required if disks were correctly assigned when received from the factory.

Pool 0 always contains the disks that are found at the same site as the storage system that owns them.

Pool 1 always contains the disks that are remote to the storage system that owns them.

If your configuration includes DS460C disk shelves, you should manually assign the disks using the following guidelines for each 12-disk drawer:

<table>
<thead>
<tr>
<th>Assign these disks in the drawer…</th>
<th>To this node and pool…</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 2</td>
<td>Local node’s pool 0</td>
</tr>
<tr>
<td>3 - 5</td>
<td>HA partner node’s pool 0</td>
</tr>
<tr>
<td>6 - 8</td>
<td>DR partner of the local node’s pool 1</td>
</tr>
</tbody>
</table>
This disk assignment pattern ensures that an aggregate is minimally affected in case a drawer goes offline.

**Steps**

1. If you have not done so, boot each system into Maintenance mode.
2. Assign the disk shelves to the nodes located at the first site (site A):

   Disk shelves at the same site as the node are assigned to pool 0 and disk shelves located at the partner site are assigned to pool 1.

   You should assign an equal number of shelves to each pool.

   a. On the first node, systematically assign the local disk shelves to pool 0 and the remote disk shelves to pool 1:

      ```
      disk assign -shelf local-switch-name:shelf-name.port -p pool
      ```

      If storage controller Controller_A_1 has four shelves, you issue the following commands:

      ```
      *> disk assign -shelf FC_switch_A_1:1-4.shelf1 -p 0
      *> disk assign -shelf FC_switch_A_1:1-4.shelf2 -p 0
      *> disk assign -shelf FC_switch_B_1:1-4.shelf1 -p 1
      *> disk assign -shelf FC_switch_B_1:1-4.shelf2 -p 1
      ```

   b. Repeat the process for the second node at the local site, systematically assigning the local disk shelves to pool 0 and the remote disk shelves to pool 1:

      ```
      disk assign -shelf local-switch-name:shelf-name.port -p pool
      ```

      If storage controller Controller_A_2 has four shelves, you issue the following commands:

      ```
      *> disk assign -shelf FC_switch_A_1:1-4.shelf3 -p 0
      *> disk assign -shelf FC_switch_A_1:1-4.shelf4 -p 1
      *> disk assign -shelf FC_switch_B_1:1-4.shelf3 -p 0
      *> disk assign -shelf FC_switch_B_1:1-4.shelf4 -p 1
      ```

3. Assign the disk shelves to the nodes located at the second site (site B):

   Disk shelves at the same site as the node are assigned to pool 0 and disk shelves located at the partner site are assigned to pool 1.

   You should assign an equal number of shelves to each pool.

   a. On the first node at the remote site, systematically assign its local disk shelves to pool 0 and its remote disk shelves to pool 1:
disk assign -shelf local-switch-name shelf-name -p pool

If storage controller Controller_B_1 has four shelves, you issue the following commands:

```
*> disk assign -shelf FC_switch_B_1:1-5.shelf1 -p 0
*> disk assign -shelf FC_switch_B_1:1-5.shelf2 -p 0
*> disk assign -shelf FC_switch_A_1:1-5.shelf1 -p 1
*> disk assign -shelf FC_switch_A_1:1-5.shelf2 -p 1
```

b. Repeat the process for the second node at the remote site, systematically assigning its local disk shelves to pool 0 and its remote disk shelves to pool 1:

```
disk assign -shelf shelf-name -p pool
```

If storage controller Controller_B_2 has four shelves, you issue the following commands:

```
*> disk assign -shelf FC_switch_B_1:1-5.shelf3 -p 0
*> disk assign -shelf FC_switch_B_1:1-5.shelf4 -p 0
*> disk assign -shelf FC_switch_A_1:1-5.shelf3 -p 1
*> disk assign -shelf FC_switch_A_1:1-5.shelf4 -p 1
```

4. Confirm the shelf assignments:

```
storage show shelf
```

5. Exit Maintenance mode:

```
halt
```

6. Display the boot menu:

```
boot_ontap menu
```

7. On each node, select option 4 to initialize all disks.

**Verifying the ha-config state of components**

In a MetroCluster configuration, the ha-config state of the controller module and chassis components must be set to **mcc** so they boot up properly.

**About this task**

- The system must be in Maintenance mode.
- This task must be performed on each new controller module.

**Steps**

1. In Maintenance mode, display the HA state of the controller module and chassis:
ha-config show

The HA state for all components should be "mcc".

2. If the displayed system state of the controller is not correct, set the HA state for the controller module:

   ha-config modify controller mcc

3. If the displayed system state of the chassis is not correct, set the HA state for the chassis:

   ha-config modify chassis mcc

4. Repeat these steps on the other replacement node.

### Booting the new controllers and joining them to the cluster

To join the new controllers to the cluster, you must boot each new controller module and use the ONTAP cluster setup wizard to identify the cluster will join.

**Before you begin**

You must have cabled the MetroCluster configuration.

You must not have configured the Service Processor prior to performing this task.

**About this task**

This task must be performed on each of the new controllers at both clusters in the MetroCluster configuration.

**Steps**

1. If you have not already done so, power up each node and let them boot completely.

   If the system is in Maintenance mode, issue the `halt` command to exit Maintenance mode, and then issue the following command from the LOADER prompt:

   `boot_ontap`

   The controller module enters the node setup wizard.

   The output should be similar to the following:
Welcome to node setup

You can enter the following commands at any time:

"help" or "?" - if you want to have a question clarified,
"back" - if you want to change previously answered questions, and
"exit" or "quit" - if you want to quit the setup wizard.

Any changes you made before quitting will be saved.

To accept a default or omit a question, do not enter a value.

2. Enable the AutoSupport tool by following the directions provided by the system.

3. Respond to the prompts to configure the node management interface.

The prompts are similar to the following:

Enter the node management interface port: [e0M]:
Enter the node management interface IP address: 10.228.160.229
Enter the node management interface netmask: 225.225.252.0
Enter the node management interface default gateway: 10.228.160.1

4. Confirm that nodes are configured in high-availability mode:

    storage failover show -fields mode

If not, you must issue the following command on each node, and then reboot the node:

    storage failover modify -mode ha -node localhost

This command configures high availability mode but does not enable storage failover. Storage failover is automatically enabled when you issue the metrocluster configure command later in the configuration process.

5. Confirm that you have four ports configured as cluster interconnects:

    network port show

The following example shows output for two controllers in cluster_A. If it is a two-node MetroCluster configuration, the output shows only one node.
cluster_A::> network port show

<table>
<thead>
<tr>
<th>Node</th>
<th>Port</th>
<th>IPspace</th>
<th>Broadcast Domain</th>
<th>Link</th>
<th>MTU</th>
<th>Admin/Oper</th>
</tr>
</thead>
</table>
| node_A_1
  **e0a** | Cluster | Cluster | up | 1500 | auto/1000 |
  e0b    | Cluster | Cluster | up | 1500 | auto/1000 |
  auto/1000**
    e0c    | Default | Default | up | 1500 | auto/1000 |
    e0d    | Default | Default | up | 1500 | auto/1000 |
    e0e    | Default | Default | up | 1500 | auto/1000 |
    e0f    | Default | Default | up | 1500 | auto/1000 |
    e0g    | Default | Default | up | 1500 | auto/1000 |
| node_A_2
  **e0a** | Cluster | Cluster | up | 1500 | auto/1000 |
  auto/1000**
    e0b    | Cluster | Cluster | up | 1500 | auto/1000 |
| 14 entries were displayed.

6. Because you are using the CLI to set up the cluster, exit the Node Setup wizard:

   exit

7. Log in to the admin account by using the admin user name.

8. Start the Cluster Setup wizard, and then join the existing cluster:

   cluster setup
You can enter the following commands at any time:
"help" or "?" - if you want to have a question clarified,
"back" - if you want to change previously answered questions, and
"exit" or "quit" - if you want to quit the cluster setup wizard.
Any changes you made before quitting will be saved.

You can return to cluster setup at any time by typing "cluster setup".
To accept a default or omit a question, do not enter a value.

Do you want to create a new cluster or join an existing cluster?
{create, join}: `join`

9. After you complete the **Cluster Setup** wizard and it exits, verify that the cluster is active and the node is healthy:

    cluster show

The following example shows a cluster in which the first node (cluster1-01) is healthy and eligible to participate:

```
cluster_A:/> cluster show
Node               Health  Eligibility
------------------ ------- ------------
node_A_1           true    true
node_A_2           true    true
node_A_3           true    true
```

If it becomes necessary to change any of the settings you entered for the admin SVM or node SVM, you can access the **Cluster Setup** wizard by using the `cluster setup` command.

### Configuring the clusters into a MetroCluster configuration

You must peer the clusters, mirror the root aggregates, create a mirrored data aggregate, and then issue the command to implement the MetroCluster operations.

#### Configuring intercluster LIFs

You must create intercluster LIFs on ports used for communication between the MetroCluster partner clusters. You can use dedicated ports or ports that also have data traffic.
Configuring intercluster LIFs on dedicated ports

You can configure intercluster LIFs on dedicated ports. Doing so typically increases the available bandwidth for replication traffic.

Steps
1. List the ports in the cluster:

   network port show

   For complete command syntax, see the man page.

   The following example shows the network ports in cluster01:

<table>
<thead>
<tr>
<th>Node</th>
<th>Port</th>
<th>IPspace</th>
<th>Broadcast</th>
<th>Domain</th>
<th>Link</th>
<th>MTU</th>
<th>Admin/Oper</th>
</tr>
</thead>
<tbody>
<tr>
<td>cluster01-01</td>
<td>e0a</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0b</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0c</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0d</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0e</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0f</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td>cluster01-02</td>
<td>e0a</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0b</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0c</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0d</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0e</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e0f</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
<td></td>
</tr>
</tbody>
</table>

2. Determine which ports are available to dedicate to intercluster communication:

   network interface show -fields home-port,curr-port

   For complete command syntax, see the man page.

   The following example shows that ports "e0e" and "e0f" have not been assigned LIFs:
3. Create a failover group for the dedicated ports:

```bash
cluster01::> network interface failover-groups create -vserver system_SVM -failover-group intercluster01 -targets physical_or_logical_ports
```

The following example assigns ports "e0e" and "e0f" to the failover group "intercluster01" on the system SVM "cluster01":

```bash
cluster01::> network interface failover-groups create -vserver cluster01 -failover-group intercluster01 -targets cluster01-01:e0e,cluster01-01:e0f,cluster01-02:e0e,cluster01-02:e0f
```

4. Verify that the failover group was created:

```bash
network interface failover-groups show
```

For complete command syntax, see the man page.
cluster01::> network interface failover-groups show

<table>
<thead>
<tr>
<th>Vserver</th>
<th>Group</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster</td>
<td>Cluster</td>
<td>cluster01-01:e0a, cluster01-01:e0b,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cluster01-02:e0a, cluster01-02:e0b</td>
</tr>
<tr>
<td>cluster01</td>
<td>Default</td>
<td>cluster01-01:e0c, cluster01-01:e0d,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cluster01-02:e0c, cluster01-02:e0d,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cluster01-01:e0e, cluster01-01:e0f</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cluster01-02:e0e, cluster01-02:e0f</td>
</tr>
<tr>
<td>intercluster01</td>
<td></td>
<td>cluster01-01:e0e, cluster01-01:e0f</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cluster01-02:e0e, cluster01-02:e0f</td>
</tr>
</tbody>
</table>

5. Create intercluster LIFs on the system SVM and assign them to the failover group.

<table>
<thead>
<tr>
<th>ONTAP version</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.6 and later</td>
<td>network interface create -vserver system_SVM -lif LIF_name -service-policy default-intercluster -home-node node -home-port port -address port_IP -netmask netmask -failover-group failover_group</td>
</tr>
<tr>
<td>9.5 and earlier</td>
<td>network interface create -vserver system_SVM -lif LIF_name -role intercluster -home-node node -home-port port -address port_IP -netmask netmask -failover-group failover_group</td>
</tr>
</tbody>
</table>

For complete command syntax, see the man page.

The following example creates intercluster LIFs "cluster01_icl01" and "cluster01_icl02" in the failover group "intercluster01":
cluster01::> network interface create -vserver cluster01 -lif 
    cluster01_icl01 -service-
policy default-intercluster -home-node cluster01-01 -home-port e0e 
- -address 192.168.1.201 
- -netmask 255.255.255.0 -failover-group intercluster01

cluster01::> network interface create -vserver cluster01 -lif 
    cluster01_icl02 -service-
policy default-intercluster -home-node cluster01-02 -home-port e0e 
- -address 192.168.1.202 
- -netmask 255.255.255.0 -failover-group intercluster01

6. Verify that the intercluster LIFs were created:

In ONTAP 9.6 and later:

network interface show -service-policy default-intercluster

In ONTAP 9.5 and earlier:

network interface show -role intercluster

For complete command syntax, see the man page.

cluster01::> network interface show -service-policy default-intercluster

<table>
<thead>
<tr>
<th>Logical</th>
<th>Status</th>
<th>Network</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vserver</td>
<td>Interface</td>
<td>Admin/Oper Address/Mask</td>
<td>Node</td>
</tr>
<tr>
<td>Home</td>
<td>cluster01_icl01</td>
<td>up/up 192.168.1.201/24</td>
<td>cluster01-01 e0e</td>
</tr>
<tr>
<td></td>
<td></td>
<td>true</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cluster01_icl02</td>
<td>up/up 192.168.1.202/24</td>
<td>cluster01-02 e0f</td>
</tr>
<tr>
<td></td>
<td></td>
<td>true</td>
<td></td>
</tr>
</tbody>
</table>

7. Verify that the intercluster LIFs are redundant:

In ONTAP 9.6 and later:

network interface show -service-policy default-intercluster -failover
In ONTAP 9.5 and earlier:

```
network interface show -role intercluster -failover
```

For complete command syntax, see the man page.

The following example shows that the intercluster LIFs "cluster01_icl01" and "cluster01_icl02" on the SVM "e0e" port will fail over to the "e0f" port.

```
cluster01::> network interface show -service-policy default-intercluster -failover

Logical  Home                  Failover        Failover
Vserver  Interface       Node:Port             Policy          Group
-------- --------------- --------------------- --------------- --------
cluster01
   cluster01_icl01 cluster01-01:e0e   local-only
intercluster01
   Failover Targets:  cluster01-01:e0e,
                       cluster01-01:e0f
   cluster01_icl02 cluster01-02:e0e   local-only
intercluster01
   Failover Targets:  cluster01-02:e0e,
                       cluster01-02:e0f
```

Configuring intercluster LIFs on shared data ports

You can configure intercluster LIFs on ports shared with the data network. Doing so reduces the number of ports you need for intercluster networking.

**Steps**

1. List the ports in the cluster:

   ```
   network port show
   ```

   For complete command syntax, see the man page.

   The following example shows the network ports in cluster01:
cluster01::> network port show

<table>
<thead>
<tr>
<th>Node</th>
<th>Port</th>
<th>IPspace</th>
<th>Broadcast Domain</th>
<th>Link</th>
<th>MTU</th>
<th>Admin/Oper</th>
</tr>
</thead>
<tbody>
<tr>
<td>cluster01-01</td>
<td>e0a</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0b</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0c</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0d</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td>cluster01-02</td>
<td>e0a</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0b</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0c</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0d</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
</tbody>
</table>

2. Create intercluster LIFs on the system SVM:

**In ONTAP 9.6 and later:**

```
network interface create -vserver system_SVM -lif LIF_name -service-policy default-intercluster -home-node node -home-port port -address port_IP -netmask netmask
```

**In ONTAP 9.5 and earlier:**

```
network interface create -vserver system_SVM -lif LIF_name -role intercluster -home-node node -home-port port -address port_IP -netmask netmask
```

For complete command syntax, see the man page.

The following example creates intercluster LIFs `cluster01_icl01` and `cluster01_icl02`:

```
cluster01::> network interface create -vserver cluster01 -lif cluster01_icl01 -service-policy default-intercluster -home-node cluster01-01 -home-port e0c -address 192.168.1.201 -netmask 255.255.255.0

cluster01::> network interface create -vserver cluster01 -lif cluster01_icl02 -service-policy default-intercluster -home-node cluster01-02 -home-port e0c -address 192.168.1.202 -netmask 255.255.255.0
```
3. Verify that the intercluster LIFs were created:

**In ONTAP 9.6 and later:**

```
network interface show -service-policy default-intercluster
```

**In ONTAP 9.5 and earlier:**

```
network interface show -role intercluster
```

For complete command syntax, see the man page.

```
cluster01::> network interface show -service-policy default-intercluster
```

<table>
<thead>
<tr>
<th>Logical</th>
<th>Status</th>
<th>Network</th>
<th>Current Is</th>
<th>Node</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vserver</td>
<td>Interface</td>
<td>Admin/Oper Address/Mask</td>
<td>Node</td>
<td>Port</td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>--------</td>
<td>------------------</td>
<td>-----------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>--------</td>
<td>--------------------</td>
<td>-----------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>cluster01</td>
<td></td>
<td></td>
<td>true</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cluster01_icl01</td>
<td></td>
<td>up/up</td>
<td>192.168.1.201/24</td>
<td>cluster01-01</td>
<td>e0c</td>
</tr>
<tr>
<td>true</td>
<td></td>
<td></td>
<td>true</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cluster01_icl02</td>
<td></td>
<td>up/up</td>
<td>192.168.1.202/24</td>
<td>cluster01-02</td>
<td>e0c</td>
</tr>
</tbody>
</table>

4. Verify that the intercluster LIFs are redundant:

**In ONTAP 9.6 and later:**

```
network interface show -service-policy default-intercluster -failover
```

**In ONTAP 9.5 and earlier:**

```
network interface show -role intercluster -failover
```

For complete command syntax, see the man page.

The following example shows that the intercluster LIFs "cluster01_icl01" and "cluster01_icl02" on the "e0c" port will fail over to the "e0d" port.
cluster01::> network interface show -service-policy default-intercluster -failover

| Logical | Home                  | Failover     | Failover
|---------|-----------------------|--------------|----------
<table>
<thead>
<tr>
<th>Vserver</th>
<th>Interface</th>
<th>Node:Port</th>
<th>Policy</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>cluster01</td>
<td>cluster01_icl01 cluster01-01:e0c</td>
<td>local-only</td>
<td>192.168.1.201/24</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Failover Targets: cluster01-01:e0c,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cluster01-01:e0d</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cluster01_icl02 cluster01-02:e0c</td>
<td>local-only</td>
<td>192.168.1.201/24</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Failover Targets: cluster01-02:e0c,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cluster01-02:e0d</td>
<td></td>
</tr>
</tbody>
</table>

**Mirroring the root aggregates**

You must mirror the root aggregates to provide data protection.

By default, the root aggregate is created as RAID-DP type aggregate. You can change the root aggregate from RAID-DP to RAID4 type aggregate. The following command modifies the root aggregate for RAID4 type aggregate:

```
storage aggregate modify -aggregate aggr_name -raidtype raid4
```

On non-ADP systems, the RAID type of the aggregate can be modified from the default RAID-DP to RAID4 before or after the aggregate is mirrored.

**Steps**

1. Mirror the root aggregate:

   `storage aggregate mirror aggr_name`

   The following command mirrors the root aggregate for controller_A_1:

   ```
   controller_A_1::> storage aggregate mirror aggr0_controller_A_1
   ```

   This mirrors the aggregate, so it consists of a local plex and a remote plex located at the remote MetroCluster site.

2. Repeat the previous step for each node in the MetroCluster configuration.

**Implementing the MetroCluster configuration**

You must run the `metrocluster configure -refresh true` command to start data
You issue the `metrocluster configure -refresh true` command once, on one of the newly added nodes, to refresh the MetroCluster configuration. You do not need to issue the command on each of the sites or nodes.

The `metrocluster configure -refresh true` command automatically pairs the two nodes with the lowest system IDs in each of the two clusters as disaster recovery (DR) partners. In a four-node MetroCluster configuration, there are two DR partner pairs. The second DR pair is created from the two nodes with higher system IDs.

**Steps**

1. Refresh the MetroCluster configuration:
   a. Enter advanced privilege mode:
      ```
      set -privilege advanced
      ```
   b. Refresh the MetroCluster configuration on one of the new nodes:
      ```
      metrocluster configure -refresh true
      ```
      The following example shows the MetroCluster configuration refreshed on both DR groups:
      ```
      controller_A_2::*> metrocluster configure -refresh true
      [Job 726] Job succeeded: Configure is successful.
      ```
      ```
      controller_A_4::*> metrocluster configure -refresh true
      [Job 740] Job succeeded: Configure is successful.
      ```
   c. Return to admin privilege mode:
      ```
      set -privilege admin
      ```
2. Verify the networking status on site A:
   ```
   network port show
   ```
   The following example shows the network port usage on a four-node MetroCluster configuration:
cluster_A::> network port show

<table>
<thead>
<tr>
<th>Node</th>
<th>Port</th>
<th>IPspace</th>
<th>Broadcast Domain</th>
<th>Link</th>
<th>MTU</th>
<th>Admin/Oper</th>
</tr>
</thead>
<tbody>
<tr>
<td>controller_A_1</td>
<td>e0a</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>9000</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0b</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>9000</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0c</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0d</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0e</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0f</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0g</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td>controller_A_2</td>
<td>e0a</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>9000</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0b</td>
<td>Cluster</td>
<td>Cluster</td>
<td>up</td>
<td>9000</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0c</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0d</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0e</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0f</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
<tr>
<td></td>
<td>e0g</td>
<td>Default</td>
<td>Default</td>
<td>up</td>
<td>1500</td>
<td>auto/1000</td>
</tr>
</tbody>
</table>

14 entries were displayed.

3. Verify the MetroCluster configuration from both sites in the MetroCluster configuration:
   a. Verify the configuration from site A:

   metrocluster show

   cluster_A::> metrocluster show

   Configuration: IP fabric

   Cluster | Entry Name             | State            |
   --------|------------------------|------------------|
   Local: cluster_A | Configuration state configured Mode normal |
   Remote: cluster_B | Configuration state configured Mode normal |

   b. Verify the configuration from site B:

   metrocluster show
cluster_B::> metrocluster show

Configuration: IP fabric

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

Creating a mirrored data aggregate on each node

You must create a mirrored data aggregate on each node in the DR group.

About this task

- You should know what drives will be used in the new aggregate.
- If you have multiple drive types in your system (heterogeneous storage), you should understand how you can ensure that the correct drive type is selected.
- Drives are owned by a specific node; when you create an aggregate, all drives in that aggregate must be owned by the same node, which becomes the home node for that aggregate.

In systems using ADP, aggregates are created using partitions in which each drive is partitioned in to P1, P2 and P3 partitions.

- Aggregate names should conform to the naming scheme you determined when you planned your MetroCluster configuration.

Disk and aggregate management

Steps

1. Display a list of available spares:

   storage disk show -spare -owner node_name

2. Create the aggregate:

   storage aggregate create -mirror true

If you are logged in to the cluster on the cluster management interface, you can create an aggregate on any node in the cluster. To ensure that the aggregate is created on a specific node, use the -node parameter or specify drives that are owned by that node.

You can specify the following options:

- Aggregate’s home node (that is, the node that owns the aggregate in normal operation)
- List of specific drives that are to be added to the aggregate
- Number of drives to include
In the minimum supported configuration, in which a limited number of drives are available, you must use the force-small-aggregate option to allow the creation of a three disk RAID-DP aggregate.

- Checksum style to use for the aggregate
- Type of drives to use
- Size of drives to use
- Drive speed to use
- RAID type for RAID groups on the aggregate
- Maximum number of drives that can be included in a RAID group
- Whether drives with different RPM are allowed

For more information about these options, see the `storage aggregate create` man page.

The following command creates a mirrored aggregate with 10 disks:

```
cluster_A::> storage aggregate create aggr1_node_A_1 -diskcount 10 -node node_A_1 -mirror true
[Job 15] Job is queued: Create aggr1_node_A_1.
[Job 15] The job is starting.
[Job 15] Job succeeded: DONE
```

3. Verify the RAID group and drives of your new aggregate:

```
storage aggregate show-status -aggregate aggregate-name
```

### Configuring FC-to-SAS bridges for health monitoring

#### About this task
- Third-party SNMP monitoring tools are not supported for FibreBridge bridges.
- Starting with ONTAP 9.8, FC-to-SAS bridges are monitored via in-band connections by default, and additional configuration is not required.

Starting with ONTAP 9.8, the `storage bridge` command is replaced with `system bridge`. The following steps show the `storage bridge` command, but if you are running ONTAP 9.8 or later, the `system bridge` command is preferred.

#### Step

1. From the ONTAP cluster prompt, add the bridge to health monitoring:
   a. Add the bridge, using the command for your version of ONTAP:

<table>
<thead>
<tr>
<th>ONTAP version</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5 and later</td>
<td><code>storage bridge add -address 0.0.0.0</code></td>
</tr>
<tr>
<td></td>
<td><code>-managed-by in-band -name bridge-name</code></td>
</tr>
</tbody>
</table>
b. Verify that the bridge has been added and is properly configured:

```
storage bridge show
```

It might take as long as 15 minutes to reflect all data because of the polling interval. The ONTAP health monitor can contact and monitor the bridge if the value in the "Status" column is "ok", and other information, such as the worldwide name (WWN), is displayed.

The following example shows that the FC-to-SAS bridges are configured:

```
controller_A_1::> storage bridge show

<table>
<thead>
<tr>
<th>Bridge</th>
<th>Symbolic Name</th>
<th>Is Monitored</th>
<th>Monitor Status</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor Model</td>
<td>Bridge WWN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATTO_10.10.20.10</td>
<td>atto01</td>
<td>true</td>
<td>ok</td>
<td>Atto</td>
</tr>
<tr>
<td>ATTO_10.10.20.11</td>
<td>atto02</td>
<td>true</td>
<td>ok</td>
<td>Atto</td>
</tr>
<tr>
<td>ATTO_10.10.20.12</td>
<td>atto03</td>
<td>true</td>
<td>ok</td>
<td>Atto</td>
</tr>
<tr>
<td>ATTO_10.10.20.13</td>
<td>atto04</td>
<td>true</td>
<td>ok</td>
<td>Atto</td>
</tr>
</tbody>
</table>

4 entries were displayed
```

### Moving a metadata volume in MetroCluster configurations

You can move a metadata volume from one aggregate to another aggregate in a MetroCluster configuration. You might want to move a metadata volume when the source aggregate is decommissioned or unmirrored, or for other reasons that make the aggregate ineligible.

**About this task**

- You must have cluster administrator privileges to perform this task.
- The target aggregate must be mirrored and should not be in the degraded state.
- The available space in the target aggregate must be larger than the metadata volume that you are moving.

**Steps**
1. Set the privilege level to advanced:

   set -privilege advanced

2. Identify the metadata volume that should be moved:

   volume show MDV_CRS*

   Cluster_A::*> volume show MDV_CRS*
   Vserver Volume Aggregate State Type Size
   Available Used%  ------- ------------ ------------ ---------- ---- ----------
   ----------------- ----------------- ---- --------  --------
   Cluster_A
   MDV_CRS_14c00d4ac9f311e7922800a0984395f1_A
   Node_A_1_aggr1
   online       RW      10GB
   9.50GB       5%
   Cluster_A
   MDV_CRS_14c00d4ac9f311e7922800a0984395f1_B
   Node_A_2_aggr1
   online       RW      10GB
   9.50GB       5%
   Cluster_A
   MDV_CRS_15035e66c9f311e7902700a098439625_A
   Node_B_1_aggr1
   -            RW      -
   -
   Cluster_A
   MDV_CRS_15035e66c9f311e7902700a098439625_B
   Node_B_2_aggr1
   -            RW      -
   -
   4 entries were displayed.

   Cluster_A::>

3. Identify an eligible target aggregate:

   metrocluster check config-replication show-aggregate-eligibility

   The following command identifies the aggregates in cluster_A that are eligible to host metadata volumes:
Cluster_A::*> metrocluster check config-replication show-aggregate-eligibility

Aggregate Hosted Config Replication Vols Host Addl Vols Comments
------------------------ ------------------------------------------ --------------

Node_A_1_aggr0 - false Root Aggregate
Node_A_2_aggr0 - false Root Aggregate
Node_A_1_aggr1 MDV_CRS_1bc7134a5ddf11e3b63f123478563412_A true -
Node_A_2_aggr1 MDV_CRS_1bc7134a5ddf11e3b63f123478563412_B true -
Node_A_1_aggr2 - true
Node_A_2_aggr2 - true
Node_A_1_Aggr3 - false Unable to determine available space of aggregate
Node_A_1_aggr5 - false Unable to determine mirror configuration
Node_A_2_aggr6 - false Mirror configuration does not match requirement
Node_B_1_aggr4 - false NonLocal Aggregate

In the previous example, Node_A_1_aggr2 and Node_A_2_aggr2 are eligible.

4. Start the volume move operation:

```
volume move start -vserver svm_name -volume metadata_volume_name -destination -aggregate destination_aggregate_name*
```

The following command moves metadata volume "MDV_CRS_14c00d4ac9f311e7922800a0984395f1" from "aggregate Node_A_1_aggr1" to "aggregate Node_A_1_aggr2":

```
Cluster_A::*> volume move start -vserver svm_cluster_A -volume MDV_CRS_14c00d4ac9f311e7922800a0984395f1 -destination-aggregate aggr_cluster_A_02_01
```

Warning: You are about to modify the system volume "MDV_CRS_9da04864ca6011e7b82e0050568be9fe_A". This may cause severe performance or stability problems. Do not proceed unless directed to do so by support. Do you want to proceed? {y|n}: y

[Job 109] Job is queued: Move "MDV_CRS_9da04864ca6011e7b82e0050568be9fe_A" in Vserver "svm_cluster_A" to aggregate "aggr_cluster_A_02_01". Use the "volume move show -vserver svm_cluster_A -volume MDV_CRS_9da04864ca6011e7b82e0050568be9fe_A" command to view the status of this operation.

5. Verify the state of the volume move operation:
volume move show -volume vol_constituent_name

6. Return to the admin privilege level:

set -privilege admin

Checking the MetroCluster configuration

You can check that the components and relationships in the MetroCluster configuration are working correctly. You should do a check after initial configuration and after making any changes to the MetroCluster configuration. You should also do a check before a negotiated (planned) switchover or a switchback operation.

About this task

If the `metrocluster check run` command is issued twice within a short time on either or both clusters, a conflict can occur and the command might not collect all data. Subsequent `metrocluster check show` commands do not show the expected output.

Steps

1. Check the configuration:

   metrocluster check run

   The command runs as a background job and might not be completed immediately.

   cluster_A::> metrocluster check run
   The operation has been started and is running in the background. Wait for it to complete and run "metrocluster check show" to view the results. To check the status of the running metrocluster check operation, use the command, "metrocluster operation history show -job-id 2245"

   cluster_A::> metrocluster check show
   Last Checked On: 9/13/2018 20:41:37

<table>
<thead>
<tr>
<th>Component</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>nodes</td>
<td>ok</td>
</tr>
<tr>
<td>lifs</td>
<td>ok</td>
</tr>
<tr>
<td>config-replication</td>
<td>ok</td>
</tr>
<tr>
<td>aggregates</td>
<td>ok</td>
</tr>
<tr>
<td>clusters</td>
<td>ok</td>
</tr>
<tr>
<td>connections</td>
<td>ok</td>
</tr>
</tbody>
</table>

   6 entries were displayed.
2. Display more detailed results from the most recent `metrocluster check run` command:

```
metrocluster check aggregate show
metrocluster check cluster show
metrocluster check config-replication show
metrocluster check lif show
metrocluster check node show
```

The `metrocluster check show` commands show the results of the most recent `metrocluster check run` command. You should always run the `metrocluster check run` command prior to using the `metrocluster check show` commands so that the information displayed is current.

The following example shows the `metrocluster check aggregate show` command output for a healthy four-node MetroCluster configuration:

```
cluster_A::> metrocluster check aggregate show

Last Checked On: 8/5/2014 00:42:58

<table>
<thead>
<tr>
<th>Node</th>
<th>Aggregate</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>controller_A_1</td>
<td>controller_A_1_aggr0</td>
<td>mirroring-status</td>
</tr>
<tr>
<td>ok</td>
<td>ok</td>
<td>disk-pool-allocation</td>
</tr>
<tr>
<td>ok</td>
<td>ok</td>
<td>ownership-state</td>
</tr>
<tr>
<td>ok</td>
<td>controller_A_1_aggr1</td>
<td>mirroring-status</td>
</tr>
<tr>
<td>ok</td>
<td>ok</td>
<td>disk-pool-allocation</td>
</tr>
<tr>
<td>ok</td>
<td>ok</td>
<td>ownership-state</td>
</tr>
<tr>
<td>ok</td>
<td>controller_A_1_aggr2</td>
<td>mirroring-status</td>
</tr>
<tr>
<td>ok</td>
<td>ok</td>
<td>disk-pool-allocation</td>
</tr>
<tr>
<td>ok</td>
<td>ok</td>
<td>ownership-state</td>
</tr>
</tbody>
</table>
```
<table>
<thead>
<tr>
<th>Controller</th>
<th>Aggregator</th>
<th>Mirroring Status</th>
<th>Disk Pool Allocation</th>
<th>Ownership State</th>
</tr>
</thead>
<tbody>
<tr>
<td>controller_A_2</td>
<td>controller_A_2_aggr0</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>controller_A_2_aggr1</td>
<td></td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>controller_A_2_aggr2</td>
<td></td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
</tbody>
</table>

18 entries were displayed.

The following example shows the `metrocluster check cluster show` command output for a healthy four-node MetroCluster configuration. It indicates that the clusters are ready to perform a negotiated switchover if necessary.
### Checking for MetroCluster configuration errors with Config Advisor

You can go to the NetApp Support Site and download the Config Advisor tool to check for common configuration errors.

**About this task**

Config Advisor is a configuration validation and health check tool. You can deploy it at both secure sites and non-secure sites for data collection and system analysis.

- Support for Config Advisor is limited, and available only online.

**Steps**

1. Go to the Config Advisor download page and download the tool.

   **NetApp Downloads: Config Advisor**

2. Run Config Advisor, review the tool's output and follow the recommendations in the output to address any issues discovered.

### Sending a custom AutoSupport message after adding nodes to the MetroCluster configuration

You should issue an AutoSupport message to notify NetApp technical support that maintenance is complete.

**About this task**

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Check</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>mccint-fas9000-0102</td>
<td>negotiated-switchover-ready</td>
<td>not-applicable</td>
</tr>
<tr>
<td></td>
<td>switchback-ready</td>
<td>not-applicable</td>
</tr>
<tr>
<td></td>
<td>job-schedules</td>
<td>ok</td>
</tr>
<tr>
<td></td>
<td>licenses</td>
<td>ok</td>
</tr>
<tr>
<td></td>
<td>periodic-check-enabled</td>
<td>ok</td>
</tr>
<tr>
<td>mccint-fas9000-0304</td>
<td>negotiated-switchover-ready</td>
<td>not-applicable</td>
</tr>
<tr>
<td></td>
<td>switchback-ready</td>
<td>not-applicable</td>
</tr>
<tr>
<td></td>
<td>job-schedules</td>
<td>ok</td>
</tr>
<tr>
<td></td>
<td>licenses</td>
<td>ok</td>
</tr>
<tr>
<td></td>
<td>periodic-check-enabled</td>
<td>ok</td>
</tr>
</tbody>
</table>

10 entries were displayed.
This task must be performed on each MetroCluster site.

Steps
1. Log in to the cluster at Site_A.
2. Invoke an AutoSupport message indicating the end of the maintenance:
   
   ```
   system node autosupport invoke -node * -type all -message MAINT=end
   ```

3. Repeat this step on the partner site.

Verifying switchover, healing, and switchback

You should verify the switchover, healing, and switchback operations of the MetroCluster configuration.

Steps
1. Use the procedures for negotiated switchover, healing, and switchback that are mentioned in the MetroCluster Management and Disaster Recovery Guide.
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