



# Set up ONTAP in a MetroCluster configuration with array LUNs

ONTAP MetroCluster

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# Set up ONTAP in a MetroCluster configuration with array LUNs

## Verifying and configuring the HA state of components in Maintenance mode

When configuring a storage system in a MetroCluster configuration, you must make sure that the high-availability (HA) state of the controller module and chassis components is "mcc" or "mcc-2n" so that these components boot properly.

### Before you begin

The system must be in Maintenance mode.

### About this task

This task is not required on systems that are received from the factory.

### Steps

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

```
ha-config show
```

The correct HA state depends on your MetroCluster configuration.

| Number of controllers in the MetroCluster configuration | HA state for all components should be... |
|---|--|
| Eight- or four-node MetroCluster FC configuration       | mcc                                      |
| Two-node MetroCluster FC configuration                  | mcc-2n                                   |
| MetroCluster IP configuration                           | mccip                                    |

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

| Number of controllers in the MetroCluster configuration | Command   |
|---|---|
| Eight- or four-node MetroCluster FC configuration       | <code>ha-config modify controller mcc</code>    |
| Two-node MetroCluster FC configuration                  | <code>ha-config modify controller mcc-2n</code> |
| MetroCluster IP configuration                           | <code>ha-config modify controller mccip</code>  |

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

| Number of controllers in the MetroCluster configuration | Command                                      |
|---|--|
| Eight- or four-node MetroCluster FC configuration       | <code>ha-config modify chassis mcc</code>    |
| Two-node MetroCluster FC configuration                  | <code>ha-config modify chassis mcc-2n</code> |
| MetroCluster IP configuration                           | <code>ha-config modify chassis mccip</code>  |

4. Boot the node to ONTAP:

```
boot_ontap
```

5. Repeat these steps on each node in the MetroCluster configuration.

## Configuring ONTAP on a system that uses only array LUNs

If you want to configure ONTAP for use with array LUNs, you must configure the root aggregate and root volume, reserve space for diagnostics and recovery operations, and set up the cluster.

### Before you begin

- The ONTAP system must be connected to the storage array.
- The storage array administrator must have created LUNs and presented them to ONTAP.
- The storage array administrator must have configured the LUN security.

### About this task

You must configure each node that you want to use with array LUNs. If the node is in an HA pair, then you must complete the configuration process on one node before proceeding with the configuration on the partner node.

### Steps

1. Power on the primary node and interrupt the boot process by pressing Ctrl-C when you see the following message on the console:

```
Press CTRL-C for special boot menu.
```

2. Select option **4 (Clean configuration and initialize all disks)** on the boot menu.

The list of array LUNs made available to ONTAP is displayed. In addition, the array LUN size required for root volume creation is also specified. The size required for root volume creation differs from one ONTAP system to another.

- If no array LUNs were previously assigned, ONTAP detects and displays the available array LUNs, as shown in the following example:

```

mcc8040-ams1::> disk show NET-1.6 -instance
          Disk: NET-1.6
    Container Type: aggregate
      Owner/Home: mcc8040-ams1-01 / mcc8040-ams1-01
        DR Home: -
Stack ID/Shelf/Bay: - / - / -
          LUN: 0
        Array: NETAPP_INF_1
      Vendor: NETAPP
        Model: INF-01-00
    Serial Number: 60080E50004317B4000003B158E35974
          UID:
60080E50:004317B4:000003B1:58E35974:00000000:00000000:00000000:000000
00:00000000:00000000
          BPS: 512
    Physical Size: 87.50GB
      Position: data
Checksum Compatibility: block
      Aggregate: eseries
        Plex: plex0

Paths:

          LUN  Initiator Side      Target
Side                               Link
Controller      Initiator  ID  Switch Port      Switch
Port            Acc Use  Target Port      TPGN      Speed
I/O KB/s            IOPS
-----
-----
-----
mcc8040-ams1-01    2c                0  mccb6505-ams1:16  mccb6505-
ams1:18          AO  INU  20330080e54317b4  1  4 Gb/S
0                0
mcc8040-ams1-01    2a                0  mccb6505-ams1:17  mccb6505-
ams1:19          ANO RDY  20320080e54317b4  0  4 Gb/S
0                0

Errors:
-
```

- If array LUNs were previously assigned, for example, through the maintenance mode, they are either marked local or partner in the list of the available array LUNs, depending on whether the array LUNs were selected from the node on which you are installing ONTAP or its HA partner:

In this example, array LUNs with index numbers 3 and 6 are marked "local" because they had been previously assigned from this particular node:

\*\*\*\*\*

\*  
\* No disks are owned by this node, but array LUNs are assigned.  
\*  
\* You can use the following information to verify connectivity from  
\*  
\* HBAs to switch ports. If the connectivity of HBAs to switch ports  
\*  
\* does not match your expectations, configure your SAN and rescan.  
\*  
\* You can rescan by entering 'r' at the prompt for selecting  
\*  
\* array LUNs below.

\*\*\*\*\*

| WWPN             | HBA | HBA WWPN         | Switch port       | Switch port |
|------------------|-----|------------------|-------------------|-------------|
| -----            | --- | -----            | -----             | -----       |
| 20190027f88948dd | 0e  | 500a098001baf8e0 | vgbr6510s203:25   |             |
| 2011547feeead680 | 0f  | 500a098101baf8e0 | vgci9710s202:1-17 |             |
| 201b0027f88948dd | 0g  | 500a098201baf8e0 | vgbr6510s203:27   |             |
| 2012547feeead680 | 0h  | 500a098301baf8e0 | vgci9710s202:1-18 |             |

No native disks were detected, but array LUNs were detected.  
You will need to select an array LUN to be used to create the root aggregate and root volume.

The array LUNs visible to the system are listed below. Select one array LUN to be used to create the root aggregate and root volume. \*\*The root volume requires 350.0 GB of space.\*\*

Warning: The contents of the array LUN you select will be erased by ONTAP prior to their use.

| Index    | Array LUN Name | Model | Vendor | Size  | Owner |
|----------|----------------|-------|--------|-------|-------|
| Checksum | Serial Number  |       |        |       |       |
| -----    | -----          | ----- | -----  | ----- | ----- |
| -----    | -----          | ----- | -----  | ----- | ----- |

|       |                          |       |     |          |       |
|-------|--------------------------|-------|-----|----------|-------|
| 0     | vgci9710s202:2-24.0L19   | RAID5 | DGC | 217.3 GB |       |
| Block | 6006016083402B0048E576D7 |       |     |          |       |
| 1     | vgbr6510s203:30.126L20   | RAID5 | DGC | 217.3 GB |       |
| Block | 6006016083402B0049E576D7 |       |     |          |       |
| 2     | vgci9710s202:2-24.0L21   | RAID5 | DGC | 217.3 GB |       |
| Block | 6006016083402B004AE576D7 |       |     |          |       |
| 3     | vgbr6510s203:30.126L22   | RAID5 | DGC | 405.4 GB | local |
| Block | 6006016083402B004BE576D7 |       |     |          |       |
| 4     | vgci9710s202:2-24.0L23   | RAID5 | DGC | 217.3 GB |       |
| Block | 6006016083402B004CE576D7 |       |     |          |       |
| 5     | vgbr6510s203:30.126L24   | RAID5 | DGC | 217.3 GB |       |
| Block | 6006016083402B004DE576D7 |       |     |          |       |
| 6     | vgbr6510s203:30.126L25   | RAID5 | DGC | 423.5 GB | local |
| Block | 6006016083402B003CF93694 |       |     |          |       |
| 7     | vgci9710s202:2-24.0L26   | RAID5 | DGC | 423.5 GB |       |
| Block | 6006016083402B003DF93694 |       |     |          |       |

3. Select the index number corresponding to the array LUN you want to assign as the root volume.

The array LUN must be of sufficient size to create the root volume.

The array LUN selected for root volume creation is marked "local (root)".

In the following example, the array LUN with index number 3 is marked for root volume creation:

The root volume will be created on switch 0:5.183L33.

\*\*ONTAP requires that 11.0 GB of space be reserved for use in diagnostic and recovery operations.\*\* Select one array LUN to be used as spare for diagnostic and recovery operations.

| Index    | Array LUN Name           | Model     | Vendor | Size     | Owner        |
|----------|--------------------------|-----------|--------|----------|--------------|
| Checksum | Serial Number            |           |        |          |              |
| 0        | switch0:5.183L1          | SYMMETRIX | EMC    | 266.1 GB |              |
| Block    | 600604803436313734316631 |           |        |          |              |
| 1        | switch0:5.183L3          | SYMMETRIX | EMC    | 266.1 GB |              |
| Block    | 600604803436316333353837 |           |        |          |              |
| 2        | switch0:5.183L31         | SYMMETRIX | EMC    | 266.1 GB |              |
| Block    | 600604803436313237643666 |           |        |          |              |
| 3        | switch0:5.183L33         | SYMMETRIX | EMC    | 658.3 GB | local (root) |
| Block    | 600604803436316263613066 |           |        |          |              |
| 4        | switch0:7.183L0          | SYMMETRIX | EMC    | 173.6 GB |              |
| Block    | 600604803436313261356235 |           |        |          |              |
| 5        | switch0:7.183L2          | SYMMETRIX | EMC    | 173.6 GB |              |
| Block    | 600604803436313438396431 |           |        |          |              |
| 6        | switch0:7.183L4          | SYMMETRIX | EMC    | 658.3 GB |              |
| Block    | 600604803436313161663031 |           |        |          |              |
| 7        | switch0:7.183L30         | SYMMETRIX | EMC    | 173.6 GB |              |
| Block    | 600604803436316538353834 |           |        |          |              |
| 8        | switch0:7.183L32         | SYMMETRIX | EMC    | 266.1 GB |              |
| Block    | 600604803436313237353738 |           |        |          |              |
| 9        | switch0:7.183L34         | SYMMETRIX | EMC    | 658.3 GB |              |
| Block    | 600604803436313737333662 |           |        |          |              |

4. Select the index number corresponding to the array LUN you want to assign for use in diagnostic and recovery options.

The array LUN must be of sufficient size for use in diagnostic and recovery options. If required, you can also select multiple array LUNs with a combined size greater than or equal to the specified size. To select multiple entries, you must enter the comma-separated values of all of the index numbers corresponding to the array LUNs you want to select for diagnostic and recovery options.

The following example shows a list of array LUNs selected for root volume creation and for diagnostic and recovery options:



```

Here is a list of the selected array LUNs
Index Array LUN Name      Model      Vendor      Size      Owner
Checksum Serial Number
-----
2  switch0:5.183L31      SYMMETRIX  EMC        266.1 GB  local
Block      600604803436313237643666
3  switch0:5.183L33      SYMMETRIX  EMC        658.3 GB  local    (root)
Block      600604803436316263613066
4  switch0:7.183L0       SYMMETRIX  EMC        173.6 GB  local
Block      600604803436313261356235
5  switch0:7.183L2       SYMMETRIX  EMC        173.6 GB  local
Block      600604803436313438396431
Do you want to continue (yes|no)?

```



Selecting “no” clears the LUN selection.

- Enter **y** when prompted by the system to continue with the installation process.

The root aggregate and the root volume are created and the rest of the installation process continues.

- Enter the required details to create the node management interface.

The following example shows the node management interface screen with a message confirming the creation of the node management interface:

```
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.
```

```
Enter the node management interface port [e0M]:
```

```
Enter the node management interface IP address: 192.0.2.66
```

```
Enter the node management interface netmask: 255.255.255.192
```

```
Enter the node management interface default gateway: 192.0.2.7
```

```
A node management interface on port e0M with IP address 192.0.2.66 has  
been created.
```

```
This node has its management address assigned and is ready for cluster  
setup.
```

### After you finish

After configuring ONTAP on all of the nodes that you want to use with array LUNs, you should complete the [Cluster setup process](#)

### Related information

[FlexArray virtualization installation requirements and reference](#)

## Setting up the cluster

Setting up the cluster involves setting up each node, creating the cluster on the first node, and joining any remaining nodes to the cluster.

### Related information

[Software setup](#)

## Installing the license for using array LUNs in a MetroCluster configuration

You must install the V\_StorageAttach license on each MetroCluster node that you want to use with array LUNs. You cannot use array LUNs in an aggregate until the license is installed.

### Before you begin

- The cluster must be installed.

- You must have the license key for the V\_StorageAttach license.

### About this task

You must use a separate license key for each node on which you want to install the V\_StorageAttach license.

### Steps

1. Install the V\_StorageAttach license.

```
system license add
```

Repeat this step for each cluster node on which you want to install the license.

2. Verify that the V\_StorageAttach license is installed on all required nodes in a cluster.

```
system license show
```

The following sample output shows that the V\_StorageAttach license is installed on the nodes of cluster\_A:

```
cluster_A::> system license show
Serial Number: nnnnnnnn
Owner: controller_A_1
Package          Type      Description          Expiration
-----
V_StorageAttach  license  Virtual Attached Storage

Serial Number: 11111111
Owner: controller_A_2
Package          Type      Description          Expiration
-----
V_StorageAttach  license  Virtual Attached Storage
```

## Configuring FC-VI ports on a X1132A-R6 quad-port card on FAS8020 systems

If you are using the X1132A-R6 quad-port card on a FAS8020 system, you can enter Maintenance mode to configure the 1a and 1b ports for FC-VI and initiator usage. This is not required on MetroCluster systems received from the factory, in which the ports are set appropriately for your configuration.

### About this task

This task must be performed in Maintenance mode.



Converting an FC port to an FC-VI port with the `ucadmin` command is only supported on the FAS8020 and AFF 8020 systems. Converting FC ports to FCVI ports is not supported on any other platform.

## Steps

### 1. Disable the ports:

```
storage disable adapter 1a
```

```
storage disable adapter 1b
```

```
*> storage disable adapter 1a
Jun 03 02:17:57 [controller_B_1:fc.adapter.offlining:info]: Offlining
Fibre Channel adapter 1a.
Host adapter 1a disable succeeded
Jun 03 02:17:57 [controller_B_1:fc.adapter.offline:info]: Fibre Channel
adapter 1a is now offline.
*> storage disable adapter 1b
Jun 03 02:18:43 [controller_B_1:fc.adapter.offlining:info]: Offlining
Fibre Channel adapter 1b.
Host adapter 1b disable succeeded
Jun 03 02:18:43 [controller_B_1:fc.adapter.offline:info]: Fibre Channel
adapter 1b is now offline.
*>
```

### 2. Verify that the ports are disabled:

```
ucadmin show
```

```
*> ucadmin show
```

| Adapter | Current Mode | Current Type | Pending Mode | Pending Type | Admin Status |
|---------|--------------|--------------|--------------|--------------|--------------|
| ...     |              |              |              |              |              |
| 1a      | fc           | initiator    | -            | -            | offline      |
| 1b      | fc           | initiator    | -            | -            | offline      |
| 1c      | fc           | initiator    | -            | -            | online       |
| 1d      | fc           | initiator    | -            | -            | online       |

### 3. Set the a and b ports to FC-VI mode:

```
ucadmin modify -adapter 1a -type fcvi
```

The command sets the mode on both ports in the port pair, 1a and 1b (even though only 1a is specified in the command).

```
*> ucadmin modify -t fcvi 1a
Jun 03 02:19:13 [controller_B_1:ucm.type.changed:info]: FC-4 type has
changed to fcvi on adapter 1a. Reboot the controller for the changes to
take effect.
Jun 03 02:19:13 [controller_B_1:ucm.type.changed:info]: FC-4 type has
changed to fcvi on adapter 1b. Reboot the controller for the changes to
take effect.
```

4. Confirm that the change is pending:

```
ucadmin show
```

```
*> ucadmin show
      Current  Current  Pending  Pending  Admin
Adapter Mode    Type     Mode     Type     Status
-----
...
1a    fc      initiator -        fcvi     offline
1b    fc      initiator -        fcvi     offline
1c    fc      initiator -        -        online
1d    fc      initiator -        -        online
```

5. Shut down the controller, and then reboot into Maintenance mode.

6. Confirm the configuration change:

```
ucadmin show local
```

```
Node          Adapter  Mode    Type     Mode     Type     Status
-----
...
controller_B_1
      1a      fc      fcvi     -        -        online
controller_B_1
      1b      fc      fcvi     -        -        online
controller_B_1
      1c      fc      initiator -        -        online
controller_B_1
      1d      fc      initiator -        -        online
6 entries were displayed.
```

# Assigning ownership of array LUNs

Array LUNs must be owned by a node before they can be added to an aggregate to be used as storage.

## Before you begin

- Back-end configuration testing (testing of the connectivity and configuration of devices behind the ONTAP systems) must be completed.
- Array LUNs that you want to assign must be presented to the ONTAP systems.

## About this task

You can assign ownership of array LUNs that have the following characteristics:

- They are unowned.
- They have no storage array configuration errors, such as the following:
  - The array LUN is smaller than or larger than the size that ONTAP supports.
  - The LDEV is mapped on only one port.
  - The LDEV has inconsistent LUN IDs assigned to it.
  - The LUN is available on only one path.

ONTAP issues an error message if you try to assign ownership of an array LUN with back-end configuration errors that would interfere with the ONTAP system and the storage array operating together. You must fix such errors before you can proceed with array LUN assignment.

ONTAP alerts you if you try to assign an array LUN with a redundancy error: for example, all paths to this array LUN are connected to the same controller or only one path to the array LUN. You can fix a redundancy error before or after assigning ownership of the LUN.

## Steps

1. View the array LUNs that have not yet been assigned to a node:

```
storage disk show -container-type unassigned
```

2. Assign an array LUN to this node:

```
storage disk assign -disk array_LUN_name -owner nodename
```

If you want to fix a redundancy error after disk assignment instead of before, you must use the `-force` parameter with the `storage disk assign` command.

## Related information

[FlexArray virtualization installation requirements and reference](#)

# Peering the clusters

The clusters in the MetroCluster configuration must be in a peer relationship so that they can communicate with each other and perform the data mirroring essential to MetroCluster disaster recovery.

## Steps

1. Configure intercluster LIFs using the procedure in:

[Configuring intercluster LIFs](#)

2. Create a cluster peer relationship using the procedure in:

[Peering the clusters](#)

## Mirroring the root aggregates

You must mirror the root aggregates in your MetroCluster configuration to ensure data protection.

### Before you begin

You must have ensured that the SyncMirror requirements for the MetroCluster configuration with array LUNs are satisfied. Refer to [Requirements for a MetroCluster configuration with array LUNs](#).

### About this task

You must repeat this task for each controller in the MetroCluster configuration.

### Step

1. Mirror the unmirrored root aggregate:

```
storage aggregate mirror
```

The following command mirrors the root aggregate for controller\_A\_1:

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

The root aggregate is mirrored with array LUNs from pool1.

## Creating data aggregates on, implementing, and verifying the MetroCluster configuration

You must create data aggregates on each node, implement, and verify the MetroCluster configuration.

### Steps

1. Create data aggregates on each node:
  - a. Create a mirrored data aggregate on each node:

[Mirror the root aggregates.](#)

- b. If needed, create unmirrored data aggregates:

[Create a mirrored data aggregate on each node.](#)

2. [Implement the MetroCluster configuration.](#)
3. [Configure the MetroCluster FC switches for health monitoring.](#)
4. Check and verify the configuration:
  - a. [Check the MetroCluster configuration.](#)
  - b. [Check for MetroCluster configuration errors with Config Advisor.](#)
  - c. [Verify switchover, healing, and switchback.](#)
5. Install and configure the MetroCluster Tiebreaker software:
  - a. [Install the Tiebreaker Software.](#)
  - b. [Configure the Tiebreaker Software.](#)
6. Set the destination for configuration backup files:

[Protect configuration backup files.](#)



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