



Configure the clusters into a MetroCluster configuration

ONTAP MetroCluster

NetApp

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Configure the clusters into a MetroCluster configuration

Configure intercluster LIFs

Learn how to configure intercluster LIFs on dedicated and shared ports.

Configure intercluster LIFs on dedicated ports

You can configure intercluster LIFs on dedicated ports to increase 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:

```

cluster01::> network port show
                                         Speed
                                         (Mbps)
Node    Port      IPspace      Broadcast Domain Link      MTU
Admin/Oper
-----
-----
cluster01-01
    e0a      Cluster      Cluster      up      1500
auto/1000
    e0b      Cluster      Cluster      up      1500
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
cluster01-02
    e0a      Cluster      Cluster      up      1500
auto/1000
    e0b      Cluster      Cluster      up      1500
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

```

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:

```
cluster01::> network interface show -fields home-port,curr-port
vserver lif           home-port curr-port
-----
Cluster cluster01-01_clus1  e0a      e0a
Cluster cluster01-01_clus2  e0b      e0b
Cluster cluster01-02_clus1  e0a      e0a
Cluster cluster01-02_clus2  e0b      e0b
cluster01
    cluster_mgmt      e0c      e0c
cluster01
    cluster01-01_mgmt1 e0c      e0c
cluster01
    cluster01-02_mgmt1 e0c      e0c
```

3. Create a failover group for the dedicated ports:

```
network interface failover-groups create -vserver <system_SVM> -failover
-group <failover_group> -targets <physical_or_logical_ports>
```

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

```
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:

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

For complete command syntax, see the man page.

```

cluster01::> network interface failover-groups show
                           Failover
Vserver          Group          Targets
-----
-----
Cluster
      Cluster
          cluster01-01:e0a, cluster01-
01:e0b,
          cluster01-02:e0a, cluster01-02:e0b
cluster01
      Default
          cluster01-01:e0c, cluster01-
01:e0d,
          cluster01-02:e0c, cluster01-
02:e0d,
          cluster01-01:e0e, cluster01-01:e0f
          cluster01-02:e0e, cluster01-02:e0f
      intercluster01
          cluster01-01:e0e, cluster01-01:e0f
          cluster01-02:e0e, cluster01-02:e0f

```

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

ONTAP version	Command
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> -failover-group <failover_group>
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> -failover-group <failover_group>

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
          Logical      Status      Network      Current
Current Is
Vserver      Interface  Admin/Oper Address/Mask      Node
Port      Home
-----  -----
-----  -----
cluster01
          cluster01_icl01
          up/up      192.168.1.201/24  cluster01-01
e0e      true
          cluster01_icl02
          up/up      192.168.1.202/24  cluster01-02
e0f      true

```

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
```

Configure intercluster LIFs on shared data ports

You can configure intercluster LIFs on ports shared with the data network to reduce 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
                                         Speed
                                         (Mbps)
Node    Port      IPspace      Broadcast Domain Link      MTU
Admin/Oper
-----
-----
cluster01-01
    e0a      Cluster      Cluster      up      1500
auto/1000
    e0b      Cluster      Cluster      up      1500
auto/1000
    e0c      Default      Default      up      1500
auto/1000
    e0d      Default      Default      up      1500
auto/1000
cluster01-02
    e0a      Cluster      Cluster      up      1500
auto/1000
    e0b      Cluster      Cluster      up      1500
auto/1000
    e0c      Default      Default      up      1500
auto/1000
    e0d      Default      Default      up      1500
auto/1000
```

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
          Logical      Status      Network      Current
Current Is
Vserver      Interface  Admin/Oper Address/Mask      Node
Port      Home
-----  -----
-----  -----
cluster01
          cluster01_icl01
          up/up      192.168.1.201/24  cluster01-01
e0c      true
          cluster01_icl02
          up/up      192.168.1.202/24  cluster01-02
e0c      true

```

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
  Vserver  Interface      Node:Port      Policy      Group
-----  -----
-----  -----
cluster01
      cluster01_icl01  cluster01-01:e0c  local-only
  192.168.1.201/24
                      Failover Targets: cluster01-01:e0c,
                                         cluster01-01:e0d
      cluster01_icl02  cluster01-02:e0c  local-only
  192.168.1.201/24
                      Failover Targets: cluster01-02:e0c,
                                         cluster01-02:e0d
```

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 protection on the nodes that you have added to a MetroCluster configuration.

About this task

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
```

Node	Port	IPspace	Broadcast	Domain	Link	MTU	Speed (Mbps)	Admin/Oper
<hr/>								
controller_A_1								
	e0a	Cluster	Cluster		up	9000	auto/1000	
	e0b	Cluster	Cluster		up	9000	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	
controller_A_2								
	e0a	Cluster	Cluster		up	9000	auto/1000	
	e0b	Cluster	Cluster		up	9000	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	
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
<hr/>			
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

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

Create a mirrored data aggregate on each MetroCluster FC 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 make sure 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](#)

- Aggregate names must be unique across the MetroCluster sites. This means that you cannot have two different aggregates with the same name on site A and site B.

 It's recommended you maintain at least 20% free space for mirrored aggregates for optimal storage performance and availability. Although the recommendation is 10% for non-mirrored aggregates, the additional 10% of space can be used by the filesystem to absorb incremental changes. Incremental changes increase space utilization for mirrored aggregates due to ONTAP's copy-on-write Snapshot-based architecture. Failure to adhere to these best practices might have a negative impact on performance.

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 verify 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

Learn how to configure the FC-to-SAS bridges for health monitoring.

About this task

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



Beginning 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:

ONTAP version	Command
9.5 and later	<code>storage bridge add -address 0.0.0.0 -managed-by in-band -name <i>bridge-name</i></code>
9.4 and earlier	<code>storage bridge add -address <i>bridge-ip-address</i> -name <i>bridge-name</i></code>

- 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

Bridge          Symbolic Name Is Monitored  Monitor Status
Vendor Model      Bridge WWN
-----  -----  -----  -----
-----  -----  -----  -----
ATTO_10.10.20.10 atto01      true        ok          Atto
FibreBridge 7500N      20000010867038c0
ATTO_10.10.20.11 atto02      true        ok          Atto
FibreBridge 7500N      20000010867033c0
ATTO_10.10.20.12 atto03      true        ok          Atto
FibreBridge 7500N      20000010867030c0
ATTO_10.10.20.13 atto04      true        ok          Atto
FibreBridge 7500N      2000001086703b80

4 entries were displayed

controller_A_1::>

```

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
```

Component	Result
nodes	ok
lifs	ok
config-replication	ok
aggregates	ok
clusters	ok
connections	ok
volumes	ok

7 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:

```
controller_A_2           controller_A_2_aggr0
                           mirroring-status
ok
                           disk-pool-allocation
ok
                           ownership-state
ok
controller_A_2_aggr1
                           mirroring-status
ok
                           disk-pool-allocation
ok
                           ownership-state
ok
controller_A_2_aggr2
                           mirroring-status
ok
                           disk-pool-allocation
ok
                           ownership-state

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.

Last Checked On: 9/13/2017 20:47:04

Cluster	Check	Result
<hr/>		
mccint-fas9000-0102	negotiated-switchover-ready	not-applicable
	switchback-ready	not-applicable
	job-schedules	ok
	licenses	ok
	periodic-check-enabled	ok
mccint-fas9000-0304	negotiated-switchover-ready	not-applicable
	switchback-ready	not-applicable
	job-schedules	ok
	licenses	ok
	periodic-check-enabled	ok

10 entries were displayed.

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