Migrating to a two-node switched cluster with CN1610 cluster switches

If you have an existing two-node switchless cluster environment that uses cluster network switches, you can migrate to a two-node switched cluster environment using CN1610 cluster network switches. The procedure you use depends on whether you have two dedicated cluster-network ports on each controller (as required on most systems) or a single cluster port on each controller (a supported option on N3150, N3220, and N3240 storage systems).

About this task

There are two migration options available:

- Migrating from a switchless cluster to a switched CN1610 cluster environment
- Migrating from a switchless cluster (systems with a single cluster-network connection)

Migrating from a switchless cluster to a switched CN1610 cluster environment

If you have an existing two-node switchless cluster environment, you can migrate to a two-node switched-cluster environment using CN1610 cluster network switches.

Before you begin

Two-node switchless configuration:

- The two-node switchless configuration must be properly set up and functioning.
- The nodes must be running Data ONTAP 8.2 or later.
- All cluster ports must be in the up state.
- All cluster LIFs must have be in the up state and on their home ports.

CN1610 cluster switch configuration:

- The CN1610 cluster switch infrastructure be redundant and fully functional on both switches. Refer to the IBM N series support website to ensure you have the latest RCF and FASTPATH versions on your switches.
- Management network connectivity on both switches.
- Console access to the cluster switches.
- Necessary cabling for the node-to-switch and switch-to-switch connections has been completed. Twinax or fiber is supported for the CN1610 switch. For more information on cabling, see Installation and Setup Instructions of your storage system and Clustered Data ONTAP Switch Setup and Configuration Guide.
- Inter-Switch Link (ISL) cables are connected to ports 13 through 16 on both CN1610 switches.
- Initial customization of both CN1610 switches has been completed.

About this task

This procedure migrates nodes in a two-node switchless environment into a two-node switched environment. The examples in this procedure use the following switch and node nomenclature:

- cs1 and cs2 are the CN1610 switches.
- clus1 and clus2 are the cluster logical interfaces (LIFs).
The names of the Vservers are node1 and node2.
The cluster::*> prompt indicates the name of the cluster.
The cluster ports used in this procedure as an example are e1a and e2a. Refer to the Installation and Setup Instructions of your storage system for the supported cluster ports.

**Procedure**

1. Disable all node-facing ports on both new cluster switches cs1 and cs2. Do not disable the ISL ports.

   Disable node facing ports 1 to 12 on switch cs1:
   ```
   {cs1}# configure
   {cs1}(Config)# interface 0/1-0/12
   {cs1}(Interface 0/1-0/12)# shutdown
   {cs1}(Interface 0/1-0/12)# exit
   {cs1}(Config)# exit
   ```

   Disable node facing ports 1 to 12 on switch cs2:
   ```
   {cs2}# configure
   {cs2}(Config)# interface 0/1-0/12
   {cs2}(Interface 0/1-0/12)# shutdown
   {cs2}(Interface 0/1-0/12)# exit
   {cs2}(Config)# exit
   ```

2. Use the `show port channel` command to verify that the ISL and the physical ports on the ISL between the two CN1610 cluster switches cs1 and cs2 are up.

   Results for the cs1 switch:
   ```
   {cs1}# show port-channel 3/1
   Local Interface............................. 3/1
   Channel Name............................... ISL-LAG
   Link State.................................. Up
   Admin Mode.................................. Enabled
   Type......................................... Static
   Load Balance Option......................... 7
   (Enhanced hashing mode)
   Mbr Device/ Port Port Port
   Ports Timeout Speed Active
   -------- ----------- ------- -----
   0/13 actor/long 10G Full True
   partner/long
   0/14 actor/long 10G Full True
   partner/long
   0/15 actor/long 10G Full True
   partner/long
   0/16 actor/long 10G Full True
   partner/long
   ```

   Results for the cs2 switch:
3. Use the **show isdp neighbors** command to display the list of neighboring devices.

Results for the cs1 switch:

```
(cs1)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge,
S - Switch, H - Host, I - IGMP, r - Repeater
Device ID Intf Holdtime Capability Platform Port ID
---------------------- ------------ --------- ------------ --------- ------------
  cs2  0/13   11   S      CN1610  0/13
  cs2  0/14   11   S      CN1610  0/14
  cs2  0/15   11   S      CN1610  0/15
  cs2  0/16   11   S      CN1610  0/16
```

Results for the cs2 switch:

```
(cs2)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge,
S - Switch, H - Host, I - IGMP, r - Repeater
Device ID Intf Holdtime Capability Platform Port ID
---------------------- ------------ --------- ------------ --------- ------------
  cs1  0/13   11   S      CN1610  0/13
  cs1  0/14   11   S      CN1610  0/14
  cs1  0/15   11   S      CN1610  0/15
  cs1  0/16   11   S      CN1610  0/16
```

4. Use the **run * cdph show-neighbors** command to ensure that each cluster port is connected to the corresponding port on its partner cluster node.

This example verifies that cluster ports e1a and e2a are connected to the same port on its cluster partner node:
5. Use the `network interface show -role cluster` command to ensure that all cluster LIFs are up and operational and display `true` in the Is Home column:

```
cluster::*> network interface show -role cluster

Logical Status  Network  Current  Current  Is
Vserver Interface Admin/Oper Address/Mask Node Port Home
----------- ---------- ---------- ------------- ------------- ------- ----
node1
clus1      up/up  10.10.1.1/16 nodenode1 e1a true
clus2      up/up  10.10.2.1/16 nodenode1 e2a true
node2
clus1      up/up  10.10.11.1/16 nodenode2 e1a true
clus2      up/up  10.10.11.2/16 nodenode2 e2a true
```

4 entries were displayed.

6. Use the `network interface modify` command and set the auto revert parameter to `false` on clus1 and clus2 on both nodes:

```
cluster::*> network interface modify -vserver node1 -lif clus1 -auto-revert false
cluster::*> network interface modify -vserver node1 -lif clus2 -auto-revert false
cluster::*> network interface modify -vserver node2 -lif clus1 -auto-revert false
cluster::*> network interface modify -vserver node2 -lif clus2 -auto-revert false
```

7. Use the `network interface migrate` command on the console of each node to migrate clus1 to port e2a. Use the `network interface show` command to verify that the migration took place:

```
cluster::*> network interface migrate -vserver node1 -lif clus1 -source-node node1 -dest-node node1 -dest-port e2a
cluster::*> network interface migrate -vserver node2 -lif clus1 -source-node node2 -dest-node node2 -dest-port e2a
cluster::*> network interface show -role cluster

Logical Status  Network  Current  Current  Is
Vserver Interface Admin/Oper Address/Mask Node Port Home
----------- ---------- ---------- ------------- ------------- ------- ----
node1
clus1      up/up  10.10.1.1/16 nodenode1 e2a false
clus2      up/up  10.10.2.1/16 nodenode1 e2a true
node2
clus1      up/up  10.10.11.1/16 nodenode2 e2a false
clus2      up/up  10.10.11.2/16 nodenode2 e2a true
```

4 entries were displayed.

8. Shut down cluster port e1a on both nodes with the `network port modify` command. Verify the port status with the `network port show` command:
9. Disconnect the cable from e1a on node1. Connect e1a on node1 to port 1 on cs1, using the appropriate cabling supported by the CN1610 switches. For more information on cabling, see Installation and Setup Instructions of your storage system and Clustered Data ONTAP Switch Setup and Configuration Guide.

10. Disconnect the cable from cluster port e1a on node2. Connect e1a to port 2 on cs1, using the appropriate cabling supported by CN1610 switches.

11. Enable all the node-facing ports on cs1.

```
(cs1)# configure
(cs1)(Config)# interface 0/1-0/12
(cs1)(Interface 0/1-0/12)# no shutdown
(cs1)(Interface 0/1-0/12)# exit
(cs1)(Config)# exit
```

12. Enable the first cluster port, e1a, on each node.

```
cluster::*> network port modify -node node1 -port e1a -up-admin true
cluster::*> network port modify -node node2 -port e1a -up-admin true
```

13. Verify that all of the cluster ports are up.

```
cluster::*> network port show -role cluster
```

14. Revert clus1 (which was previously migrated) on both nodes back to e1a with the network interface revert command:

```
cluster::*> network interface revert -vserver node1 -lif clus1
cluster::*> network interface revert -vserver node2 -lif clus1
```

15. Use the network interface show command to ensure that all cluster LIFs are up and operational and display true in the Is Home column:
16. Use the `cluster show` command to show the status of the node members:

```
cluster::*> cluster show
Node    Health  Eligibility Epsilon
-------- ---------- --------- --------
node1   true       true     false
node2   true       true     false
```

17. On the console of each node, use the `network interface migrate` command to migrate clus2 to port e1a. Use the `network interface show` command to verify that the migration took place:

```
cluster::*> network interface migrate -vserver node1 -lif clus2 -source-node node1 -dest-node node1 -dest-port e1a
cluster::*> network interface migrate -vserver node2 -lif clus2 -source-node node2 -dest-node node2 -dest-port e1a
cluster::*> network interface show -role cluster
```

18. Use the `network port modify` to shut down cluster port e2a on both nodes. Use the `network port show` command to confirm the port status:

```
cluster::*> network port modify -node node1 -port e2a -up-admin false
cluster::*> network port modify -node node2 -port e2a -up-admin false
cluster::*> network port show -role cluster
```

19. Disconnect the cable from e2a on node1. Connect e2a on node1 to port 1 on cs2 using the appropriate cabling supported by CN1610 switches.

20. On node2, disconnect the cable from cluster port e2a. Connect e2a to port 2 on cs2, using the appropriate cabling supported by CN1610 switches.

21. Enable all node-facing ports on cs2:

```
(cs2)# configure
(cs2)(Config)# interface 0/1-0/12
(cs2)(Interface 0/1-0/12)# no shutdown
(cs2)(Interface 0/1-0/12)# exit
(cs2)(Config)# exit
```
22. Enable the second cluster port e2a on the nodes:

```
cluster::*> network port modify -node node1 -port e2a -up-admin true
cluster::*> network port modify -node node2 -port e2a -up-admin true
```

23. Verify that all of the cluster ports are up:

```
cluster::*> network port show -role cluster
```

<table>
<thead>
<tr>
<th>Node</th>
<th>Port</th>
<th>Role</th>
<th>Link</th>
<th>MTU</th>
<th>Admin/Oper</th>
<th>Admin/Oper</th>
<th>Admin/Oper</th>
<th>Speed (Mbps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node1</td>
<td>e1a</td>
<td>clus1</td>
<td>up</td>
<td>9000</td>
<td>true/false</td>
<td>full/full</td>
<td>auto/10000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e2a</td>
<td>clus2</td>
<td>up</td>
<td>9000</td>
<td>true/false</td>
<td>full/full</td>
<td>auto/10000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>node2</td>
<td>e1a</td>
<td>clus1</td>
<td>up</td>
<td>9000</td>
<td>true/false</td>
<td>full/full</td>
<td>auto/10000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e2a</td>
<td>clus2</td>
<td>up</td>
<td>9000</td>
<td>true/false</td>
<td>full/full</td>
<td>auto/10000</td>
<td></td>
</tr>
</tbody>
</table>

4 entries were displayed.

24. On all nodes, revert clus1 (which was previously migrated) back to e1a with the `network interface revert` command:

```
cluster::*> network interface revert -vserver node1 -lif clus2
cluster::*> network interface revert -vserver node2 -lif clus2
```

25. Use the `network interface show` command to verify that all of the interfaces display true in the Is Home column:

```
cluster::*> network interface show -role cluster
```

<table>
<thead>
<tr>
<th>Vserver</th>
<th>Interface</th>
<th>Admin/Oper</th>
<th>Address/Mask</th>
<th>Node</th>
<th>Port</th>
<th>Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>node1</td>
<td>clus1</td>
<td>up/up</td>
<td>10.10.10.1/16</td>
<td>node1</td>
<td>e1a</td>
<td>true</td>
</tr>
<tr>
<td></td>
<td>clus2</td>
<td>up/up</td>
<td>10.10.10.2/16</td>
<td>node1</td>
<td>e2a</td>
<td>true</td>
</tr>
<tr>
<td>node2</td>
<td>clus1</td>
<td>up/up</td>
<td>10.10.11.1/16</td>
<td>node2</td>
<td>e1a</td>
<td>true</td>
</tr>
<tr>
<td></td>
<td>clus2</td>
<td>up/up</td>
<td>10.10.11.2/16</td>
<td>node2</td>
<td>e2a</td>
<td>true</td>
</tr>
</tbody>
</table>

26. Use the `show isdp neighbors` command to verify that both nodes have two connections to each switch.

This example shows the appropriate results for both switches:

```
(cs1)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge,
                  S - Switch, H - Host, I - IGMP, r - Repeater
Device ID     Intf  Holdtime Capability  Platform  Port ID
-------------- ----------- ---------- -------------- ------- ------------
node1          0/1    132   H                N6270   e1a
node2          0/2    163   H                N6270   e1a
cs2            0/13   11    S                CN1610  0/13
cs2            0/14   11    S                CN1610  0/14
cs2            0/15   11    S                CN1610  0/15
cs2            0/16   11    S                CN1610  0/16
(cs2)# show isdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge,
                  S - Switch, H - Host, I - IGMP, r - Repeater
Device ID     Intf  Holdtime Capability  Platform  Port ID
-------------- ----------- ---------- -------------- ------- ------------
node1          0/1    132   H                N6270   e2a
node2          0/2    163   H                N6270   e2a
cs2            0/13   11    S                CN1610  0/13
cs2            0/14   11    S                CN1610  0/14
cs2            0/15   11    S                CN1610  0/15
cs1            0/16   11    S                CN1610  0/16
```
27. Use the `run * cdpd show-neighbors` command to ensure that each cluster port is connected correctly to each cluster switch.

   This example verifies that cluster ports e1a and e2a are connected to the corresponding ports on their cluster switches correctly:

```
cluster::*> run * cdpd show-neighbors
2 entries were acted on.

Node: node1
  Local  Remote  Remote  Remote  Hold  Remote
  Port   Device Interface Platform Time  Capability
  ------  ------- --------------- ---------------------- ----- ----------
e1a     cs1    0/1            CN1610 13  S
 e2a     cs2    0/1            CN1610 15  S

Node: node2
  Local  Remote  Remote  Remote  Hold  Remote
  Port   Device Interface Platform Time  Capability
  ------  ------- --------------- ---------------------- ----- ----------
e1a     cs1    0/2            CN1610 12  S
 e2a     cs2    0/2            CN1610 15  S
```

28. Disable the two-node switchless configuration settings on both nodes:

```
cluster::*> network options switchless-cluster modify -enabled false
```

29. Verify that the settings have been disabled:

```
cluster::*> network options switchless-cluster show
Enable Switchless Cluster: false
```

30. Use the `network interface modify` command and set the auto revert parameter to true on clus1 and clus2 on both nodes:

```
cluster::*> network interface modify -vserver node1 -lif clus1 -auto-revert true
cluster::*> network interface modify -vserver node1 -lif clus2 -auto-revert true
cluster::*> network interface modify -vserver node2 -lif clus1 -auto-revert true
cluster::*> network interface modify -vserver node2 -lif clus2 -auto-revert true
```

31. Use the `cluster show` command to show the status of the node members:

```
cluster::*> cluster show
Node      Health  Eligibility  Epsilon
---------  --------  ----------  -------
node1     true     true       false
node2     true     true       false
```

For more information, see *Clustered Data ONTAP Switch Setup and Configuration Guide*.

---

**Migrating to a two-node switched cluster (systems with a single cluster-network connection)**

If you have N3150, N3220, and N3240 systems in an existing two-node switchless cluster in which each controller has a single, back-to-back 10-GbE connection for cluster connectivity, you can use the switchless-cluster networking option and replace the direct back-to-back connectivity with switch connections. This is a non-disruptive procedure.

**Before you begin**

- Two cluster connections are required to migrate from a switchless configuration to a switched configuration.
• The cluster must be healthy and consist of two nodes connected with back-to-back connectivity. The nodes must be running Data ONTAP 8.2 or later.
• The switchless cluster feature cannot be used with more than two nodes.
• All cluster ports must be in the up state.

About this task

This procedure removes the direct cluster connectivity in a switchless environment and replaces each connection to the switch with a connection to the partner node.

Procedure

1. Check the cluster status of the nodes by entering the following command at the system console of either node:
   `cluster show`
   The command produces output similar to the following:

<table>
<thead>
<tr>
<th>Node</th>
<th>Health</th>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>node1</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>node2</td>
<td>true</td>
<td>true</td>
</tr>
</tbody>
</table>

   2 entries were displayed.

2. Check the status of the by entering the following command at the system console of either node:
   `storage failover show`
   The output should be similar to the following:

<table>
<thead>
<tr>
<th>Node</th>
<th>Partner</th>
<th>Possible State Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>node1</td>
<td>node2</td>
<td>true Connected to node2</td>
</tr>
<tr>
<td>node2</td>
<td>node1</td>
<td>true Connected to node1</td>
</tr>
</tbody>
</table>

   2 entries were displayed.

3. Enter the following command at either node's prompt to change to the advanced privilege level:
   `set -privilege advanced`
   You can respond y when prompted to continue into advanced mode. The advanced mode prompt appears (">`).

4. Verify that the current state of the switchless cluster is true and then disable switchless-cluster mode:
   `network options switchless-cluster modify -enabled false`

5. Enter the following command to return to the admin privilege level:
   `set -privilege admin`

6. Take over the target node by entering the following command:
   `storage failover takeover -ofnode target_node_name`
   It does not matter which node is the target node. When it is taken over, the target node automatically reboots and displays the Waiting for giveback... message. The active node is now serving data for the partner (target) node that has been taken over.

7. If a node is impaired, wait at least two minutes after the takeover of the impaired node to ensure that the takeover completed successfully.

8. With the target node showing the Waiting for giveback... message, shut it down. The method you use to shut down the node depends on whether remote management via a Service Processor (SP) is used.

<table>
<thead>
<tr>
<th>Is the SP configured?</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Log in to the impaired node's SP and enter the following command: system power off</td>
</tr>
</tbody>
</table>
9. On each controller, disconnect the cable that connects the 10G cluster port to the switchless cluster.

10. Connect the 10-GbE cluster port to the switch on both controllers. Verify that the 10-GbE cluster ports connected on the switch are configured to be part of the same VLAN. If you plan on connecting the cluster ports on each controller to different switches, verify that the ports on which the cluster ports are connected on each switch are configured for the same VLAN and that trunking is properly configured on both switches.

11. Enter the following command to give back storage to the target node:
   ```
   storage failover giveback -ofnode node2
   ```

12. Enter the `storage failover show-giveback` command to monitor the progress of the giveback operation.

13. After the giveback operation is complete, enter the `storage failover show` command to confirm that the is healthy and takeover is possible. The output should be similar to the following:

<table>
<thead>
<tr>
<th>Node</th>
<th>Partner</th>
<th>Possible State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>node1</td>
<td>node2</td>
<td>true</td>
<td>Connected to node2</td>
</tr>
<tr>
<td>node2</td>
<td>node1</td>
<td>true</td>
<td>Connected to node1</td>
</tr>
</tbody>
</table>

14. Verify that the cluster port LIFs are operating correctly:
   ```
   network interface show -role cluster
   ```

<table>
<thead>
<tr>
<th>Vserver</th>
<th>Logical</th>
<th>Status</th>
<th>Network Address/Mask</th>
<th>Current Node</th>
<th>Current Port</th>
<th>Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>node1</td>
<td>clus1</td>
<td>up/up</td>
<td>192.168.177.121/24</td>
<td>node1</td>
<td>ela</td>
<td>true</td>
</tr>
<tr>
<td>node2</td>
<td>clus1</td>
<td>up/up</td>
<td>192.168.177.123/24</td>
<td>node2</td>
<td>ela</td>
<td>true</td>
</tr>
</tbody>
</table>

15. Check the cluster status of the nodes by entering the following command at the system console of either node:
   ```
   cluster show
   ```

   The command produces output similar to the following:

<table>
<thead>
<tr>
<th>Node</th>
<th>Health</th>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>node1</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>node2</td>
<td>true</td>
<td>true</td>
</tr>
</tbody>
</table>

16. Verify cluster connectivity with the `cluster ping-cluster local` command:
   a. Enter the following command at either node’s prompt to change to the advanced privilege level:
      ```
      set -privilege advanced
      ```
      You can respond `y` when prompted to continue into advanced mode. The advanced mode prompt appears (`*>`).
   b. Enter the following command to ping the cluster ports:
      ```
      cluster ping-cluster local
      ```
      The command output should show connectivity between all cluster ports.
   c. Enter the following command to return to the admin privilege level:
      ```
      set -privilege admin
      ```