Migrate from a switchless cluster with DAT storage by adding two new shared switches

ONTAP Systems

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Table of Contents

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You must be aware of certain configuration information, port connections, and cabling requirements when you migrate a two-node switchless cluster, non-disruptively, to a cluster with Cisco Nexus 9336C-FX2 cluster switches. The procedure you use depends on whether you have two dedicated cluster-network ports on each controller or a single cluster port on each controller. The process documented works for all nodes using optical or Twinax ports but is not supported on this switch if nodes are using onboard 10Gb BASE-T RJ45 ports for the cluster-network ports.

Most systems require two dedicated cluster-network ports on each controller. See Cisco Ethernet Switches for more information.

If you have an existing two-node switchless cluster environment, you can migrate to a two-node switched cluster environment using Cisco Nexus 9336C-FX2 switches to enable you to scale beyond two nodes in the cluster.

Before you begin

- Two-node switchless configuration:
  - The two-node switchless configuration must be properly set up and functioning.
  - The nodes must be running ONTAP 9.8 and later.
  - All cluster ports must be in the **up** state.
  - All cluster logical interfaces (LIFs) must be in the **up** state and on their **home** ports.
- Cisco Nexus 9336C-FX2 switch configuration:
  - Both switches must have management network connectivity.
  - There must be console access to the cluster switches.
  - Nexus 9336C-FX2 node-to-node switch and switch-to-switch connections must use Twinax or fiber cables.
  - The NetApp Hardware Universe contains more information about cabling.
  - Inter-Switch Link (ISL) cables must be connected to ports 1/35 and 1/36 on both 9336C-FX2 switches.
- Initial customization of the 9336C-FX2 switches must be completed. So that the:
  - 9336C-FX2 switches are running the latest version of software
  - Reference Configuration Files (RCFs) have been applied to the switches
  - Any site customization, such as SMTP, SNMP, and SSH must be configured on the new switches.

About this task

The examples in this procedure use the following cluster switch and node nomenclature:

- The names of the 9336C-FX2 switches are *cs1* and *cs2*.
- The names of the cluster SVMs are *node1* and *node2*.
- The names of the LIFs are *node1_clus1* and *node1_clus2* on node 1, and *node2_clus1* and *node2_clus2* on node 2 respectively.

- The cluster1::*> prompt indicates the name of the cluster.
- The cluster ports used in this procedure are *e3a* and *e3b*, as per the AFF A400 controller. The Hardware Universe contains the latest information about the actual cluster ports for your platforms.

Steps

1. If AutoSupport is enabled on this cluster, suppress automatic case creation by invoking an AutoSupport message: `system node autosupport invoke -node * -type all -message MAINT=xh`.

   where x is the duration of the maintenance window in hours.

   

   The AutoSupport message notifies technical support of this maintenance task so that automatic case creation is suppressed during the maintenance window.

2. Change the privilege level to advanced, entering y when prompted to continue:
   `set -privilege advanced`

   The advanced prompt (*>) appears.

3. Disable all node-facing ports (not ISL ports) on both the new cluster switches cs1 and cs2. You must not disable the ISL ports.

   The following example shows that node-facing ports 1 through 34 are disabled on switch cs1:

```
cs1# config
Enter configuration commands, one per line. End with CNTL/Z.
cs1(config)# interface e/1-34
cs1(config-if-range)# shutdown
```

4. Verify that the ISL and the physical ports on the ISL between the two 9336C-FX2 switches cs1 and cs2 are up on ports 1/35 and 1/36:
   `show port-channel summary`

   The following example shows that the ISL ports are up on switch cs1:

```
cs1# show port-channel summary
Flags:  D - Down        P - Up in port-channel (members)
        I - Individual  H - Hot-standby (LACP only)
        s - Suspended   r - Module-removed
        b - BFD Session Wait
        S - Switched    R - Routed
        U - Up (port-channel)
        p - Up in delay-lacp mode (member)
        M - Not in use. Min-links not met
--------------------------------------------------------------------------
------
Group Port-       Type     Protocol  Member Ports
      Channel
--------------------------------------------------------------------------
------
1     Po1(SU)     Eth      LACP      Eth1/35(P)   Eth1/36(P)
```

The following example shows that the ISL ports are up on switch cs2:

```
       cs2# show port-channel summary
        Flags:  D - Down        P - Up in port-channel (members)
        I - Individual  H - Hot-standby (LACP only)
        s - Suspended   r - Module-removed
        b - BFD Session Wait
        S - Switched    R - Routed
        U - Up (port-channel)
        p - Up in delay-lacp mode (member)
        M - Not in use. Min-links not met
--------------------------------------------------------------------------
------
Group Port-       Type     Protocol  Member Ports
      Channel
--------------------------------------------------------------------------
------
1     Po1(SU)     Eth      LACP      Eth1/35(P)   Eth1/36(P)
```

5. Display the list of neighboring devices:
   `show cdp neighbors`.

   This command provides information about the devices that are connected to the system. The following example lists the neighboring devices on switch cs1:

```
cs1# show cdp neighbors
Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater,
                  V - VoIP-Phone, D - Remotely-Managed-Device,
                  s - Supports-STP-Dispute
Device-ID          Local Intrfce  Hldtme Capability  Platform      Port ID
cs2                Eth1/35        175    R S I s     N9K-C9336C    Eth1/35
cs2                Eth1/36        175    R S I s     N9K-C9336C    Eth1/36
Total entries displayed: 2
```

The following example lists the neighboring devices on switch cs2:

```
cs2# show cdp neighbors
Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater,
                  V - VoIP-Phone, D - Remotely-Managed-Device,
                  s - Supports-STP-Dispute
Device-ID          Local Intrfce  Hldtme Capability  Platform      Port ID
cs1                Eth1/35        177    R S I s     N9K-C9336C    Eth1/35
cs1           )    Eth1/36        177    R S I s     N9K-C9336C    Eth1/36

Total entries displayed: 2
```

6. Verify that all cluster ports are up:
   `network port show - ipspace Cluster`

   Each port should display up for Link and healthy for Health Status:

```
cluster1::*> network port show -ipspace Cluster

Node: node1
                                                  Speed(Mbps)  Health
Port      IPspace      Broadcast Domain Link MTU  Admin/Oper   Status
--------- ------------ ---------------- ---- ---- ------------ ---------
e3a       Cluster      Cluster          up   9000  auto/100000 healthy
e3b       Cluster      Cluster          up   9000  auto/100000 healthy

Node: node2
                                                  Speed(Mbps)  Health
Port      IPspace      Broadcast Domain Link MTU  Admin/Oper   Status
--------- ------------ ---------------- ---- ---- ------------ ---------
e3a       Cluster      Cluster          up   9000  auto/100000 healthy
e3b       Cluster      Cluster          up   9000  auto/100000 healthy
4 entries were displayed.
```

7. Verify that all cluster LIFs are up and operational:
   `network interface show - vserver Cluster`

   Each cluster LIF should display true for `Is Home` and have a Status Admin/Oper of up/up.

```
cluster1::*> network interface show -vserver Cluster
            Logical     Status     Network            Current
Current Is
Vserver     Interface   Admin/Oper Address/Mask       Node          Port
Home
----------- ---------- ---------- ------------------ ------------- -------
-----
Cluster
            node1_clus1  up/up    169.254.209.69/16  node1         e3a
true
            node1_clus2  up/up    169.254.49.125/16  node1         e3b
true
            node2_clus1  up/up    169.254.47.194/16  node2         e3a
true
            node2_clus2  up/up    169.254.19.183/16  node2         e3b
true
4 entries were displayed.
```

8. Verify that auto-revert is enabled on all cluster LIFs:
   `network interface show - vserver Cluster -fields auto-revert`

```
cluster1::*> network interface show -vserver Cluster -fields auto-revert
       Logical
Vserver   Interface     Auto-revert
--------- ------------- ------------
Cluster
          node1_clus1   true
          node1_clus2   true
          node2_clus1   true
          node2_clus2   true
4 entries were displayed.
```

9. Disconnect the cable from cluster port e3a on node1, and then connect e3a to port 1 on cluster switch cs1, using the appropriate cabling supported by the 9336C-FX2 switches.

   The NetApp Hardware Universe contains more information about cabling.

10. Disconnect the cable from cluster port e3a on node2, and then connect e3a to port 2 on cluster switch cs1, using the appropriate cabling supported by the 9336C-FX2 switches.
11. Enable all node-facing ports on cluster switch cs1.

    The following example shows that ports 1/1 through 1/34 are enabled on switch cs1:

```
cs1# config
Enter configuration commands, one per line. End with CNTL/Z.
cs1(config)# interface e1/1-34
cs1(config-if-range)# no shutdown
```

12. Verify that all cluster LIFs are **up**, operational, and display as true for `Is Home`:
    `network interface show - vserver Cluster`

    The following example shows that all the LIFs are **up** on node1 and node2 and that `Is Home` results are **true**:

```
cluster1::*> network interface show -vserver Cluster
          Logical      Status     Network            Current     Current
Is
Vserver   Interface    Admin/Oper Address/Mask       Node        Port
Home
--------- ------------ ---------- ------------------ ----------- -------
----
Cluster
          node1_clus1  up/up      169.254.209.69/16  node1       e3a
true
          node1_clus2  up/up      169.254.49.125/16  node1       e3b
true
          node2_clus1  up/up      169.254.47.194/16  node2       e3a
true
          node2_clus2  up/up      169.254.19.183/16  node2       e3b
true
4 entries were displayed.
```

13. Display information about the status of the nodes in the cluster:
    `cluster show`

    The following example displays information about the health and eligibility of the nodes in the cluster:

```
cluster1::*> cluster show
Node                 Health  Eligibility   Epsilon
-------------------- ------- ------------  ------------
node1                true    true          false
node2                true    true          false
2 entries were displayed.
```

14. Disconnect the cable from cluster port e3b on node1, and then connect e3b to port 1 on cluster switch cs2, using the appropriate cabling supported by the 9336C-FX2 switches.
15. Disconnect the cable from cluster port e3b on node2, and then connect e3b to port 2 on cluster switch cs2, using the appropriate cabling supported by the 9336C-FX2 switches.
16. Enable all node-facing ports on cluster switch cs2.

    The following example shows that ports 1/1 through 1/34 are enabled on switch cs2:

```
cs2# config
Enter configuration commands, one per line. End with CNTL/Z.
cs2(config)# interface e1/1-34
cs2(config-if-range)# no shutdown
```

17. Verify that all cluster ports are up:
`network port show - ipspace Cluster`

The following example shows that all the cluster ports are up on node1 and node2:

```
cluster1::*> network port show -ipspace Cluster

Node: node1

Ignore
                                                  Speed(Mbps)  Health
Health
Port      IPspace      Broadcast Domain Link MTU  Admin/Oper   Status
Status
--------- ------------ ---------------- ---- ---- ------------ --------
------
e3a       Cluster      Cluster          up   9000  auto/100000 healthy
false
e3b       Cluster      Cluster          up   9000  auto/100000 healthy
false

Node: node2

Ignore
                                                  Speed(Mbps)  Health
Health
Port      IPspace      Broadcast Domain Link MTU  Admin/Oper   Status
Status
--------- ------------ ---------------- ---- ---- ------------ --------
------
e3a       Cluster      Cluster          up   9000  auto/100000 healthy
false
e3b       Cluster      Cluster          up   9000  auto/100000 healthy
false
4 entries were displayed.
```

18. Verify that all interfaces display true for `Is Home`:
`network interface show - vserver Cluster`

This might take several minutes to complete.

The following example shows that all LIFs are **up** on node1 and node2 and that `Is Home` results are true:

```
cluster1::*> network interface show -vserver Cluster
          Logical      Status     Network            Current    Current Is
Vserver   Interface    Admin/Oper Address/Mask       Node       Port
Home
--------- ------------ ---------- ------------------ ---------- -------
----
Cluster
          node1_clus1  up/up      169.254.209.69/16  node1      e3a
true
          node1_clus2  up/up      169.254.49.125/16  node1      e3b
true
          node2_clus1  up/up      169.254.47.194/16  node2      e3a
true
          node2_clus2  up/up      169.254.19.183/16  node2      e3b
true
4 entries were displayed.
```

19. Verify that both nodes each have one connection to each switch:
    `show cdp neighbors`

    The following example shows the appropriate results for both switches:

```
cs1# show cdp neighbors
Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater,
                  V - VoIP-Phone, D - Remotely-Managed-Device,
                  s - Supports-STP-Dispute
Device-ID          Local Intrfce  Hldtme Capability  Platform      Port ID
node1              Eth1/1         133    H           AFFA400       e3a
node2              Eth1/2         133    H           AFFA400       e3a
cs2                Eth1/35        175    R S I s     N9K-C9336C    Eth1/35
cs2                Eth1/36        175    R S I s     N9K-C9336C    Eth1/36
Total entries displayed: 4
cs2# show cdp neighbors
Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater,
                  V - VoIP-Phone, D - Remotely-Managed-Device,
                  s - Supports-STP-Dispute
Device-ID          Local Intrfce  Hldtme Capability  Platform      Port ID
node1              Eth1/1         133    H           AFFA400       e3b
node2              Eth1/2         133    H           AFFA400       e3b
cs1                Eth1/35        175    R S I s     N9K-C9336C    Eth1/35
cs1                Eth1/36        175    R S I s     N9K-C9336C    Eth1/36
Total entries displayed: 4
```

20. Display information about the discovered network devices in your cluster:
`network device-discovery show -protocol cdp`

```
cluster1::*> network device-discovery show -protocol cdp
Node/       Local  Discovered
Protocol    Port   Device (LLDP: ChassisID)  Interface         Platform
----------- ------ ------------------------- ----------------
----------------
node2       /cdp
            e3a    cs1                       0/2               N9K-C9336C
            e3b    cs2                       0/2               N9K-C9336C

node1       /cdp
            e3a    cs1                       0/1               N9K-C9336C
            e3b    cs2                       0/1               N9K-C9336C
4 entries were displayed.
```

21. Verify that the storage configuration of HA pair 1 (and HA pair 2) is correct and error free:
`system switch ethernet show`

```
storage::*> system switch ethernet show
Switch                    Type                  Address          Model
------------------------- --------------------- ---------------
----------
sh1
                          storage-network       172.17.227.5     C9336C

       Serial Number: FOC221206C2
        Is Monitored: true
              Reason: None
    Software Version: Cisco Nexus Operating System (NX-OS) Software,
Version
                      9.3(5)
      Version Source: CDP
sh2
                          storage-network       172.17.227.6     C9336C
       Serial Number: FOC220443LZ
        Is Monitored: true
              Reason: None
    Software Version: Cisco Nexus Operating System (NX-OS) Software,
Version
                      9.3(5)
      Version Source: CDP
2 entries were displayed.
storage::*>
```

22. Verify that the settings are disabled:
`network options switchless-cluster show`

> It might take several minutes for the command to complete. Wait for the '3-minute lifetime to expire' announcement.

The `false` output in the following example shows that the configuration settings are disabled:

```
cluster1::*> network options switchless-cluster show
Enable Switchless Cluster: false
```

23. Verify the status of the node members in the cluster:
`cluster show`

The following example shows information about the health and eligibility of the nodes in the cluster:

```
cluster1::*> cluster show
Node                  Health  Eligibility   Epsilon
--------------------- ------- ------------  --------
node1                 true    true          false
node2                 true    true          false
```

24. Ensure that the cluster network has full connectivity:
    `cluster ping-cluster -node node-name`

```
cluster1::*> cluster ping-cluster -node node2
Host is node2
Getting addresses from network interface table...
Cluster node1_clus1 169.254.209.69 node1 e3a
Cluster node1_clus2 169.254.49.125 node1 e3b
Cluster node2_clus1 169.254.47.194 node2 e3a
Cluster node2_clus2 169.254.19.183 node2 e3b
Local = 169.254.47.194 169.254.19.183
Remote = 169.254.209.69 169.254.49.125
Cluster Vserver Id = 4294967293
Ping status:
....
Basic connectivity succeeds on 4 path(s)
Basic connectivity fails on 0 path(s)
................
Detected 9000 byte MTU on 4 path(s):
Local 169.254.47.194 to Remote 169.254.209.69
Local 169.254.47.194 to Remote 169.254.49.125
Local 169.254.19.183 to Remote 169.254.209.69
Local 169.254.19.183 to Remote 169.254.49.125
Larger than PMTU communication succeeds on 4 path(s)
RPC status:
2 paths up, 0 paths down (tcp check)
2 paths up, 0 paths down (udp check)
```

25. Change the privilege level back to admin:
    `set -privilege admin`

26. Enable the Ethernet switch health monitor log collection feature for collecting switch-related log files, using the commands:

    - `system switch ethernet log setup-password`
    - `system switch ethernet log enable-collection`

```
cluster1::*> system switch ethernet log setup-password
Enter the switch name: <return>
The switch name entered is not recognized.

Choose from the following list:
cs1
cs2
cluster1::*> system switch ethernet log setup-password
Enter the switch name: cs1
RSA key fingerprint is e5:8b:c6:dc:e2:18:18:09:36:63:d9:63:dd:03:d9:cc
Do you want to continue? {y|n}::[n] y
Enter the password: <enter switch password>
Enter the password again: <enter switch password>
cluster1::*> system switch ethernet log setup-password
Enter the switch name: cs2
RSA key fingerprint is 57:49:86:a1:b9:80:6a:61:9a:86:8e:3c:e3:b7:1f:b1
Do you want to continue? {y|n}:: [n] y
Enter the password: <enter switch password>
Enter the password again: <enter switch password>
cluster1::*> system  switch ethernet log enable-collection
Do you want to enable cluster log collection for all nodes in the cluster?
{y|n}: [n] y
Enabling cluster switch log collection.
cluster1::*>
```

Setup the shared switch

The examples in this procedure use the following switch and node nomenclature:

- The names of the two shared switches are *sh1* and *sh2*.
- The nodes are *node1* and *node2*.

The procedure requires the use of both ONTAP commands and Cisco Nexus 9000 Series Switches commands, ONTAP commands are used unless otherwise indicated.

Steps

1. Verify that the storage configuration of HA pair 1 (and HA pair 2) is correct and error free:
   `system switch ethernet show`

```
storage::*> system switch ethernet show
Switch                    Type                  Address          Model
------------------------- --------------------  ---------------- -------
sh1
                          storage-network       172.17.227.5     C9336C

      Serial Number: FOC221206C2
       Is Monitored: true
             Reason: None
   Software Version: Cisco Nexus Operating System (NX-OS) Software,
Version
                     9.3(5)
     Version Source: CDP
sh2
                          storage-network       172.17.227.6     C9336C
       Serial Number: FOC220443LZ
        Is Monitored: true
              Reason: None
    Software Version: Cisco Nexus Operating System (NX-OS) Software,
Version
                      9.3(5)
      Version Source: CDP
2 entries were displayed.
storage::*>
```

2. Verify that the storage node ports are healthy and operational:
   `storage port show -port-type ENET`

```
storage::*> storage port show -port-type ENET
                                    Speed                           VLAN
Node    Port    Type    Mode        (Gb/s)      State     Status      ID
------- ------- ------- ---------- ----------- --------- ---------- -----
node1
        e0c     ENET    storage          100      enabled  online        30
        e0d     ENET    storage          100      enabled  online        30
        e5a     ENET    storage          100      enabled  online        30
        e5b     ENET    storage          100      enabled  online        30

node2
        e0c     ENET   storage           100      enabled  online        30
        e0d     ENET   storage           100      enabled  online        30
        e5a     ENET   storage           100      enabled  online        30
        e5b     ENET   storage           100      enabled  online        30
```

3. Move the HA pair 1, NSM224 path A ports to sh1 port range 11-22.
4. Install a cable from HA pair 1, node1, path A to sh1 port range 11-22. For example, the path A storage port on an AFF A400 is e0c.
5. Install a cable from HA pair 1, node2, path A to sh1 port range 11-22.
6. Verify that the node ports are healthy and operational:
   `storage port show -port-type ENET`

```
storage::*> storage port show -port-type ENET
                                  Speed                           VLAN
Node    Port    Type    Mode      (Gb/s)      State     Status      ID
------- ------- ------- ---------- ---------- --------- --------- -----
node1
        e0c     ENET    storage          100     enabled  online        30
        e0d     ENET    storage            0     enabled  offline       30
        e5a     ENET    storage            0     enabled  offline       30
        e5b     ENET    storage          100     enabled  online        30

node2
        e0c     ENET   storage          100     enabled  online        30
        e0d     ENET   storage            0     enabled  offline       30
        e5a     ENET   storage            0     enabled  offline       30
        e5b     ENET   storage          100     enabled  online        30
```

7. Check that there are no storage switch or cabling issues with the cluster:
   `system health alert show -instance`

```
storage::*> system health alert show -instance
There are no entries matching your query.
```

8. Move the HA pair 1, NSM224 path B ports to sh2 port range 11-22.
9. Install a cable from HA pair 1, node1, path B to sh2 port range 11-22. For example, the path B storage port on an AFF A400 is e5b.
10. Install a cable from HA pair 1, node2, path B to sh2 port range 11-22.
11. Verify that the node ports are healthy and operational:
    `storage port show -port-type ENET`

```
storage::*> storage port show -port-type ENET
                                   Speed                             VLAN
Node    Port    Type    Mode       (Gb/s)      State      Status       ID
------- ------- ------- ---------- ----------- ---------- ---------- -----
node1
        e0c     ENET   storage          100      enabled  online        30
        e0d     ENET   storage            0      enabled  offline       30
        e5a     ENET   storage            0      enabled  offline       30
        e5b     ENET   storage          100      enabled  online        30

node2
        e0c     ENET  storage           100      enabled  online        30
        e0d     ENET  storage             0      enabled  offline       30
        e5a     ENET  storage             0      enabled  offline       30
        e5b     ENET  storage           100      enabled  online        30
```

12. Verify that the storage configuration of HA pair 1 is correct and error free:
`system switch ethernet show`

```
storage::*> system switch ethernet show
Switch                    Type                  Address          Model
------------------------- --------------------- ----------------
----------
sh1
                          storage-network       172.17.227.5     C9336C

      Serial Number: FOC221206C2
       Is Monitored: true
             Reason: None
   Software Version: Cisco Nexus Operating System (NX-OS) Software,
Version
                     9.3(5)
     Version Source: CDP
sh2
                          storage-network       172.17.227.6     C9336C
      Serial Number: FOC220443LZ
       Is Monitored: true
             Reason: None
   Software Version: Cisco Nexus Operating System (NX-OS) Software,
Version
                     9.3(5)
     Version Source: CDP
2 entries were displayed.
storage::*>
```

13. Reconfigure the unused (controller) secondary storage ports on HA pair 1 from storage to networking. If more than one NS224 was direct attached, there will be ports that should be reconfigured.

```
storage port modify -node [node name] -port [port name] -mode network
```

To place storage ports into a broadcast domain:

- `network port broadcast-domain create` (to create a new domain, if needed)
- `network port broadcast-domain add-ports` (to add ports to an existing domain)

14. If you suppressed automatic case creation, re-enable it by invoking an AutoSupport message:
`system node autosupport invoke -node * -type all -message MAINT=END`