Prepare the nodes for upgrade

AFF and FAS Controller Upgrade

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Before you can replace the original nodes, you must ensure that they are in an HA pair, have no missing or failed disks, can access each other's storage, and do not own data LIFs assigned to the other nodes in the cluster. You also need to collect information about the original nodes and, if the cluster is in a SAN environment, ensure that all the nodes in the cluster are in quorum.

Steps

1. Ensure that each of the original nodes has enough resources to adequately support the workload of both nodes during takeover mode.

   Refer to References to link to *ONTAP 9 High-Availability Configuration Guide* and follow the *Best practices for HA pairs* section. Neither of the original nodes should be running at more than 50 percent utilization; if a node is running at less than 50 percent utilization, it can handle the loads for both nodes during the controller upgrade.

2. Complete the following substeps to create a performance baseline for the original nodes:

   a. Make sure that the diagnostic user account is unlocked.

      Important: The diagnostic user account is intended only for low-level diagnostic purposes and should be used only with guidance from technical support.

      Important: For information about unlocking the user accounts, refer to References to link to the *System Administration Reference*.

   b. Refer to References to link to the *NetApp Support Site* and download the Performance and Statistics Collector (Perfstat Converged).

      The Perfstat Converged tool lets you establish a performance baseline for comparison after the upgrade.

   c. Create a performance baseline, following the instructions on the NetApp Support Site.

3. Refer to References to link to the *NetApp Support Site* and open a support case on the NetApp Support Site.

   You can use the case to report any issues that might arise during the upgrade.

4. Verify that NVMEM or NVRAM batteries of node3 and node4 are charged, and charge them if they are not.

   You need to physically check node3 and node4 to see if the NVMEM or NVRAM batteries are charged. For information about the LEDs for the model of node3 and node4, refer to References to link to the *Hardware Universe*.

   

   Attention Do not try to clear the NVRAM contents. If there is a need to clear the contents of NVRAM, contact NetApp technical support.

5. Check the version of ONTAP on node3 and node4.

   The new nodes must have the same version of ONTAP 9.x installed on them that is installed on the original nodes. If the new nodes have a different version of ONTAP installed, you need to netboot the new controllers after you install them. For instructions on how to upgrade ONTAP, refer to References to link to

the *ONTAP 9 Upgrade and Revert/Downgrade Guide*.

Information about the version of ONTAP on node3 and node4 should be included in the shipping boxes. The ONTAP version is displayed when the node boots up or you can boot the node to maintenance mode and run the command:

```
version
```

6. Check whether you have two or four cluster LIFs on node1 and node 2:

   ```
   network interface show -role cluster
   ```

   The system displays any cluster LIFs, as shown in the following example:

   ```
   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      172.17.177.2/24  node1    e0c     true
           clus2      up/up      172.17.177.6/24  node1    e0e     true
   node2
           clus1      up/up      172.17.177.3/24  node2    e0c     true
           clus2      up/up      172.17.177.7/24  node2    e0e     true
   ```

7. If you have two or four cluster LIFs on node1 or node2, make sure that you can ping both cluster LIFs across all the available paths by completing the following substeps:

   a. Enter the advanced privilege level:

      ```
      set -privilege advanced
      ```

      The system displays the following message:

      ```
      Warning: These advanced commands are potentially dangerous; use them
      only when directed to do so by NetApp personnel.
      Do you wish to continue? (y or n):
      ```

   b. Enter `y`.

   c. Ping the nodes and test the connectivity:

      ```
      cluster ping-cluster -node node_name
      ```

      The system displays a message similar to the following example:

```
cluster::*> cluster ping-cluster -node node1
Host is node1
Getting addresses from network interface table...
Local = 10.254.231.102 10.254.91.42
Remote = 10.254.42.25 10.254.16.228
Ping status:
...
Basic connectivity succeeds on 4 path(s) Basic connectivity fails on
0 path(s)
................
Detected 1500 byte MTU on 4 path(s):
Local 10.254.231.102 to Remote 10.254.16.228
Local 10.254.231.102 to Remote 10.254.42.25
Local 10.254.91.42 to Remote 10.254.16.228
Local 10.254.91.42 to Remote 10.254.42.25
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)
```

If the node uses two cluster ports, you should see that it is able to communicate on four paths, as shown in the example.

d. Return to the administrative level privilege:

```
set -privilege admin
```

8. Ensure that node1 and node2 are in an HA pair and verify that the nodes are connected to each other, and that takeover is possible:

```
storage failover show
```

The following example shows the output when the nodes are connected to each other and takeover is possible:

```
cluster::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- -------- -------------------------------
node1          node2          true     Connected to node2
node2          node1          true     Connected to node1
```

Neither node should be in partial giveback. The following example shows that node1 is in partial giveback:

```
cluster::> storage failover show
                              Takeover
Node           Partner        Possible State Description
-------------- -------------- -------- -------------------------------
node1          node2          true     Connected to node2, Partial
giveback
node2          node1          true     Connected to node1
```

If either node is in partial giveback, use the `storage failover giveback` command to perform the giveback, and then use the `storage failover show-giveback` command to make sure that no aggregates still need to be given back. For detailed information about the commands, refer to References to link to the *ONTAP 9 High-Availability Configuration Guide*.

9. Ensure that neither node1 nor node2 owns the aggregates for which it is the current owner (but not the home owner):

   `storage aggregate show -node <node_name> -is-home false -fields owner-name,homename,state`

   If neither node1 nor node2 owns aggregates for which it is the current owner (but not the home owner), the system will return a message similar to the following example:

   ```
   cluster::> storage aggregate show -node node2 -is-home false -fields
   owner-name,homename,state
   There are no entries matching your query.
   ```

   The following example shows the output of the command for a node named node2 that is the home owner, but not the current owner, of four aggregates:

   ```
   cluster::> storage aggregate show -node node2 -is-home false
                  -fields owner-name,home-name,state

   aggregate     home-name    owner-name   state
   ------------- ------------ ------------ ------
   aggr1         node1        node2        online
   aggr2         node1        node2        online
   aggr3         node1        node2        online
   aggr4         node1        node2        online

   4 entries were displayed.
   ```

10. Take one of the following actions:

If the command in Step 9…	Then…
Had blank output	Skip Step 11 and go to Step 12.

If the command in Step 9…	Then…
Had output	Go to Step 11.

11. If either node1 or node2 owns aggregates for which it is the current owner but not the home owner, complete the following substeps:

    a. Return the aggregates currently owned by the partner node to the home owner node:

    ```
    storage failover giveback -ofnode <home_node_name>
    ```

    b. Verify that neither node1 nor node2 still owns aggregates for which it is the current owner (but not the home owner):

    ```
    storage aggregate show -nodes <node_name> -is-home false -fields owner-name,home-name,state
    ```

    The following example shows the output of the command when a node is both the current owner and home owner of aggregates:

    ```
    cluster::> storage aggregate show -nodes node1
              -is-home true -fields owner-name,home-name,state

    aggregate     home-name    owner-name   state
    ------------- ------------ ------------ ------
    aggr1         node1        node1        online
    aggr2         node1        node1        online
    aggr3         node1        node1        online
    aggr4         node1        node1        online

    4 entries were displayed.
    ```

12. Ensure that node1 and node2 can access each other's storage and verify that no disks are missing:

```
storage failover show -fields local-missing-disks,partner-missing-disks
```

The following example shows the output when no disks are missing:

```
cluster::> storage failover show -fields local-missing-disks,partner-
missing-disks

node     local-missing-disks partner-missing-disks
-------- ------------------- ---------------------
node1    None                None
node2    None                None
```

If any disks are missing, refer to References to link to the *ONTAP 9 Disks and Aggregates Power Guide*, the *ONTAP 9 Logical Storage Management Guide*, and the *ONTAP 9 High-Availability Configuration Guide*

to configure storage for the HA pair.

13. Ensure that node1 and node2 are healthy and eligible to participate in the cluster:

    `cluster show`

    The following example shows the output when both nodes are eligible and healthy:

```
cluster::> cluster show

Node                  Health  Eligibility
--------------------- ------- ------------
node1                 true    true
node2                 true    true
```

14. Set the privilege level to advanced:

    `set -privilege advanced`

15. Ensure that node1 and node2 are running the same ONTAP release:

    `system node image show -node <node1,node2> -iscurrent true`

    The following example shows the output of the command:

```
cluster::*> system node image show -node node1,node2 -iscurrent true

                  Is      Is                Install
Node     Image    Default Current Version   Date
-------- ------- ------- ------- --------- -------------------
node1
         image1   true    true    9.1         2/7/2017 20:22:06
node2
         image1   true    true    9.1         2/7/2017 20:20:48

2 entries were displayed.
```

16. Verify that neither node1 nor node2 owns any data LIFs that belong to other nodes in the cluster and check the `Current Node` and `Is Home` columns in the output:

    `network interface show -role data -is-home false -curr-node <node_name>`

    The following example shows the output when node1 has no LIFs that are home-owned by other nodes in the cluster:

```
cluster::> network interface show -role data -is-home false -curr-node
node1
 There are no entries matching your query.
```

The following example shows the output when node1 owns data LIFs home-owned by the other node:

```
cluster::> network interface show -role data -is-home false -curr-node
node1

            Logical    Status     Network            Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node           Port
Home
----------- ---------- ---------- ------------------ -------------
------- ----
vs0
            data1      up/up      172.18.103.137/24  node1          e0d
false
            data2      up/up      172.18.103.143/24  node1          e0f
false

2 entries were displayed.
```

17. If the output in Step 15 shows that either node1 or node2 owns any data LIFs home-owned by other nodes in the cluster, migrate the data LIFs away from node1 or node2:

    `network interface revert -vserver * -lif *`

    For detailed information about the `network interface revert` command, refer to References to link to the *ONTAP 9 Commands: Manual Page Reference*.

18. Check whether node1 or node2 owns any failed disks:

    `storage disk show -nodelist <node1,node2> -broken`

    If any of the disks have failed, remove them, following instructions in the *ONTAP 9 Disks and Aggregates Power Guide*. (Refer to References to link to the *ONTAP 9 Disks and Aggregates Power Guide*.)

19. Collect information about node1 and node2 by completing the following substeps and recording the output of each command:

    You will use this information later in the procedure.

    a. Record the model, system ID, and serial number of both nodes:

       `system node show -node <node1,node2> -instance`

You will use the information to reassign disks and decommission the original nodes.

b. Enter the following command on both node1 and node2 and record information about the shelves, number of disks in each shelf, flash storage details, memory, NVRAM, and network cards from the output:

```
run -node <node_name> sysconfig
```

You can use the information to identify parts or accessories that you might want to transfer to node3 or node4. If you do not know if the nodes are V-Series systems or have FlexArray Virtualization software, you can learn that also from the output.

c. Enter the following command on both node1 and node2 and record the aggregates that are online on both nodes:

```
storage aggregate show -node <node_name> -state online
```

You can use this information and the information in the following substep to verify that the aggregates and volumes remain online throughout the procedure, except for the brief period when they are offline during relocation.

d. Enter the following command on both node1 and node2 and record the volumes that are offline on both nodes:

```
volume show -node <node_name> -state offline
```

After the upgrade, you will run the command again and compare the output with the output in this step to see if any other volumes have gone offline.

20. Enter the following commands to see if any interface groups or VLANs are configured on node1 or node2:

```
network port ifgrp show

network port vlan show
```

Make note of whether interface groups or VLANs are configured on node1 or node2; you need that information in the next step and later in the procedure.

21. Complete the following substeps on both node1 and node2 to ensure that physical ports can be mapped correctly later in the procedure:

a. Enter the following command to see if there are failover groups on the node other than `clusterwide`:

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

Failover groups are sets of network ports present on the system. Because upgrading the controller hardware can change the location of physical ports, failover groups can be inadvertently changed during the upgrade.

The system displays failover groups on the node, as shown in the following example:

```
cluster::> network interface failover-groups show

Vserver              Group              Targets
-------------------- ------------------ ----------
Cluster              Cluster            node1:e0a, node1:e0b
                                        node2:e0a, node2:e0b

fg_6210_e0c          Default            node1:e0c, node1:e0d
                                        node1:e0e, node2:e0c
                                        node2:e0d, node2:e0e

2 entries were displayed.
```

b. If there are failover groups present other than `clusterwide`, record the failover group names and the ports that belong to the failover groups.

c. Enter the following command to see if there are any VLANs configured on the node:

`network port vlan show -node <node_name>`

VLANs are configured over physical ports. If the physical ports change, then the VLANs will need to be re-created later in the procedure.

The system displays VLANs configured on the node, as shown in the following example:

```
cluster::> network port vlan show

Network Network
Node    VLAN Name Port    VLAN ID MAC Address
------  --------- ------- ------- ------------------
node1   e1b-70    e1b     70      00:15:17:76:7b:69
```

d. If there are VLANs configured on the node, take note of each network port and VLAN ID pairing.

22. Take one of the following actions:

If interface groups or VLANS are…	**Then…**
On node1 or node2	Complete Step 23 and Step 24.
Not on node1 or node2	Go to Step 24.

23. If you do not know if node1 and node2 are in a SAN or non-SAN environment, enter the following command and examine its output:

`network interface show -vserver <vserver_name> -data-protocol iscsi|fcp`

If neither iSCSI nor FC is configured for the SVM, the command will display a message similar to the

following example:

```
cluster::> network interface show -vserver Vserver8970 -data-protocol
iscsi|fcp
There are no entries matching your query.
```

You can confirm that the node is in a NAS environment by using the `network interface show` command with the `-data-protocol nfs|cifs` parameters.

If either iSCSI or FC is configured for the SVM, the command will display a message similar to the following example:

```
cluster::> network interface show -vserver vs1 -data-protocol iscsi|fcp

         Logical    Status     Network            Current  Current Is
Vserver  Interface  Admin/Oper Address/Mask       Node     Port    Home
-------- ---------- ---------- ------------------ -------- ------- ----
vs1      vs1_lif1   up/down    172.17.176.20/24   node1    0d      true
```

24. Verify that all the nodes in the cluster are in quorum by completing the following substeps:
    a. Enter the advanced privilege level:

       `set -privilege advanced`

       The system displays the following message:

       ```
       Warning: These advanced commands are potentially dangerous; use them
       only when directed to do so by NetApp personnel.
       Do you wish to continue? (y or n):
       ```

    b. Enter `y`.
    c. Verify the cluster service state in the kernel, once for each node:

       `cluster kernel-service show`

       The system displays a message similar to the following example:

```
cluster::*> cluster kernel-service show

Master        Cluster       Quorum        Availability  Operational
Node          Node          Status        Status        Status
------------- ------------- ------------- ------------- -------------
node1         node1         in-quorum     true          operational
              node2         in-quorum     true          operational

2 entries were displayed.
```

Nodes in a cluster are in quorum when a simple majority of nodes are healthy and can communicate with each other. For more information, refer to References to link to the *System Administration Reference*.

d. Return to the administrative privilege level:

```
set -privilege admin
```

25. Take one of the following actions:

If the cluster…	Then…
Has SAN configured	Go to Step 26.
Does not have SAN configured	Go to Step 29.

26. Verify that there are SAN LIFs on node1 and node2 for each SVM that has either SAN iSCSI or FC service enabled by entering the following command and examining its output:

```
network interface show -data-protocol iscsi|fcp -home-node <node_name>
```

The command displays SAN LIF information for node1 and node2. The following examples show the status in the Status Admin/Oper column as up/up, indicating that SAN iSCSI and FC service are enabled:

```
cluster::> network interface show -data-protocol iscsi|fcp
            Logical    Status     Network                  Current
Current Is
Vserver     Interface  Admin/Oper Address/Mask             Node
Port    Home
----------- ---------- ---------- ------------------       ---------
------- ----
a_vs_iscsi  data1      up/up      10.228.32.190/21         node1     e0a
true
            data2      up/up      10.228.32.192/21         node2     e0a
true

b_vs_fcp    data1      up/up      20:09:00:a0:98:19:9f:b0  node1     0c
true
            data2      up/up      20:0a:00:a0:98:19:9f:b0  node2     0c
true

c_vs_iscsi_fcp data1   up/up      20:0d:00:a0:98:19:9f:b0  node2     0c
true
            data2      up/up      20:0e:00:a0:98:19:9f:b0  node2     0c
true
            data3      up/up      10.228.34.190/21         node2     e0b
true
            data4      up/up      10.228.34.192/21         node2     e0b
true
```

Alternatively, you can view more detailed LIF information by entering the following command:

```
network interface show -instance -data-protocol iscsi|fcp
```

27. Capture the default configuration of any FC ports on the original nodes by entering the following command and recording the output for your systems:

    ```
    ucadmin show
    ```

    The command displays information about all FC ports in the cluster, as shown in the following example:

```
cluster::> ucadmin show

                Current Current   Pending Pending   Admin
Node    Adapter Mode    Type      Mode    Type      Status
------- ------- ------- --------- ------- --------- -----------
node1   0a      fc      initiator -       -         online
node1   0b      fc      initiator -       -         online
node1   0c      fc      initiator -       -         online
node1   0d      fc      initiator -       -         online
node2   0a      fc      initiator -       -         online
node2   0b      fc      initiator -       -         online
node2   0c      fc      initiator -       -         online
node2   0d      fc      initiator -       -         online
8 entries were displayed.
```

You can use the information after the upgrade to set the configuration of FC ports on the new nodes.

28. If you are upgrading a V-Series system or a system with FlexArray Virtualization software, capture information about the topology of the original nodes by entering the following command and recording the output:

    `storage array config show -switch`

    The system displays topology information, as show in the following example:

```
cluster::> storage array config show -switch

      LUN LUN                                    Target Side Initiator
Side Initi-
Node  Grp Cnt Array Name    Array Target Port  Switch Port Switch Port
ator
----- --- --- ------------- ------------------ -----------
-------------- ------
node1 0   50  I_1818FAStT_1
                            205700a0b84772da   vgbr6510a:5
vgbr6510s164:3  0d
                            206700a0b84772da   vgbr6510a:6
vgbr6510s164:4  2b
                            207600a0b84772da   vgbr6510b:6
vgbr6510s163:1  0c
node2 0   50  I_1818FAStT_1
                            205700a0b84772da   vgbr6510a:5
vgbr6510s164:1  0d
                            206700a0b84772da   vgbr6510a:6
vgbr6510s164:2  2b
                            207600a0b84772da   vgbr6510b:6
vgbr6510s163:3  0c
                            208600a0b84772da   vgbr6510b:5
vgbr6510s163:4  2a
7 entries were displayed.
```

29. Complete the following substeps:

    a. Enter the following command on one of the original nodes and record the output:

       `service-processor show -node * -instance`

       The system displays detailed information about the SP on both nodes.

    b. Ensure that the SP status is `online`.

    c. Ensure that the SP network is configured.

    d. Record the IP address and other information about the SP.

    You might want to reuse the network parameters of the remote management devices, in this case the SPs, from the original system for the SPs on the new nodes.
    For detailed information about the SP, refer to References to link to the *System Administration Reference* and the *ONTAP 9 Commands: Manual Page Reference*.

30. If you want the new nodes to have the same licensed functionality as the original nodes, enter the following command to see the cluster licenses on the original system:

    `system license show -owner *`

The following example shows the site licenses for cluster1:

```
system license show -owner *
Serial Number: 1-80-000013
Owner: cluster1

Package           Type    Description           Expiration
----------------- ------- --------------------- -----------
Base              site    Cluster Base License  -
NFS               site    NFS License           -
CIFS              site    CIFS License          -
SnapMirror        site    SnapMirror License    -
FlexClone         site    FlexClone License     -
SnapVault         site    SnapVault License     -
6 entries were displayed.
```

31. Obtain new license keys for the new nodes at the *NetApp Support Site*. Refer to References to link to *NetApp Support Site*.

    If the site does not have the license keys you need, contact your NetApp sales representative.

32. Check whether the original system has AutoSupport enabled by entering the following command on each node and examining its output:

    ```
    system node autosupport show -node <node1,node2>
    ```

    The command output shows whether AutoSupport is enabled, as shown in the following example:

    ```
    cluster::> system node autosupport show -node node1,node2

    Node              State     From          To                Mail Hosts
    ----------------- --------- ------------- ----------------  ----------
    node1             enable    Postmaster    admin@netapp.com  mailhost

    node2             enable    Postmaster    -                 mailhost
    2 entries were displayed.
    ```

33. Take one of the following actions:

If the original system…	Then…
Has AutoSupport enabled…	a. Go to Step 34. b. Go to the section Get an IP address of an external key management server for Storage Encryption.

If the original system…	Then…
Does not have AutoSupport enabled…	a. Enable AutoSupport by following the instructions in the *System Administration Reference*. (Refer to References to link to the *System Administration Reference*.) **Note:** AutoSupport is enabled by default when you configure your storage system for the first time. Although you can disable AutoSupport at any time, you should leave it enabled. Enabling AutoSupport can significantly help identify problems and solutions should a problem occur on your storage system. b. Go to the Get an IP address of an external key management server for Storage Encryption section.

34. Verify that AutoSupport is configured with the correct mailhost details and recipient e-mail IDs by entering the following command on both of the original nodes and examining the output:

```
system node autosupport show -node node_name -instance
```

For detailed information about AutoSupport, refer to References to link to the *System Administration Reference* and the *ONTAP 9 Commands: Manual Page Reference*.

35. Send an AutoSupport message to NetApp for node1 by entering the following command:

```
system node autosupport invoke -node node1 -type all -message "Upgrading node1
from platform_old to platform_new"
```

Do not send an AutoSupport message to NetApp for node2 at this point; you do so later in the procedure.

36. Verify that the AutoSupport message was sent by entering the following command and examining its output:

```
system node autosupport show -node <node1> -instance
```

The fields `Last Subject Sent:` and `Last Time Sent:` contain the message title of the last message sent and the time the message was sent.