Data ONTAP® 8.1
Software Setup Guide
for Cluster-Mode

NetApp, Inc.
495 East Java Drive
Sunnyvale, CA 94089 U.S.
Telephone: +1 (408) 822-6000
Fax: +1 (408) 822-4501
Support telephone: +1 (888) 463-8277
Web: www.netapp.com
Feedback: doccomments@netapp.com

Part number: 210-05617_A0
Updated for Data ONTAP 8.1.1 on 14 June 2012

Contents

Preparing for the software setup process

Before setting up the software, you should understand cluster and Vserver concepts, and ensure that the storage hardware is installed and cabled.

Setting up the software provides you with an operational storage system capable of serving data. Software setup consists of the following elements:

1. Plan your setup by doing the following:
   - Learn about clusters and Vservers from the relevant material on the NetApp Support Site.
     Understanding these concepts helps you to choose the most appropriate values when setting up the cluster and Vservers.
   - Ensure that your storage hardware is installed and configured.
   - Register on the NetApp Support Site.
2. Gather configuration information for your setup by completing the following configuration worksheets:
   - The configuration worksheet for cluster setup.
     This worksheet provides you with the values you need to enter when you set up the cluster using the Cluster Setup wizard.
   - The configuration worksheet for Vserver setup.
     This worksheet provides you with the values you need to enter when you set up the Vservers using the Vserver Setup wizard.
3. Set up the cluster by doing the following:
   - Complete the Cluster Setup wizard.
     This wizard helps you to create the cluster and join the nodes to it.
   - Enable storage failover for each HA pair.
   - If the cluster has only two nodes, configure cluster high availability.
   - Synchronize the time across the cluster.

   After this stage of the software setup process, the cluster is operational, but not ready to serve data to clients.
4. Set up your Vservers with FlexVol volumes or an Infinite Volume:
   - To set up Vservers with FlexVol volumes, use the Vserver Setup wizard in the clustershell.
   - To set up a Vserver with an Infinite Volume, use the Create Vserver wizard in System Manager 2.1.

     Note: The Infinite Volume feature is not enabled, and you need to contact NetApp to enable this feature.

An Infinite Volume requires a dedicated cluster. The cluster can only contain a Vserver with Infinite Volume and its Infinite Volume.

For more information about using the Create Vserver wizard, see the System Manager online help.

For each Vserver that you set up, you can configure network, storage, services, and data access protocol information.

After setting up your Vservers, the cluster can serve data to the clients.

After setting up the software, you should configure your storage system according to your requirements. For more information, see the documentation on the NetApp Support Site.

Where to learn about concepts required for software setup

Before setting up the software, you should understand what the cluster, network, storage, and protocol components are that you configure during software setup.

Concept	Where to find more information
Cluster concepts: • What a *cluster* is • What a *node* is in the cluster • What a *Vserver* is • The types of Vservers that you create during software setup You create an *admin Vserver* to manage the cluster and *cluster Vservers* to serve data to clients. A *node Vserver* is created automatically for each node when you join the node to the cluster.	*Data ONTAP System Administration Guide for Cluster-Mode*

Concept	Where to find more information

Networking concepts:
• The *cluster network*, which connects the nodes to form a cluster.
• The *data network*, which connects the cluster to the clients.
• The following types of *logical interfaces (LIFs)*:
  • The *cluster management LIF*, which enables the cluster administrator to access the cluster.
  • The *node management LIF*, which enables the cluster administrator to access a single node in the cluster.
  • The *data LIFs*, which enable Vservers to serve data to the clients.
	Data ONTAP Network Management Guide for Cluster-Mode

Storage concepts: The way storage is provisioned for Vservers through *volumes* to serve the data to the clients	*Data ONTAP Logical Storage Management Guide for Cluster-Mode*
File access and network services concepts: • *LDAP* • *NIS* • *DNS*	*Data ONTAP File Access and Protocols Management Guide for Cluster-Mode* (for information about LDAP and NIS) *Data ONTAP Network Management Guide for Cluster-Mode* (for information about DNS)
Protocols concepts: • *NFS* • *CIFS* • *FC* • *iSCSI*	*Data ONTAP File Access and Protocols Management Guide for Cluster-Mode* (for information about NFS and CIFS) *Data ONTAP SAN Administration Guide for Cluster-Mode* (for information about FC and iSCSI)

Concept	Where to find more information
High availability concepts: • What an HA pair is • What *storage failover* is • *Cluster* high availability (for two-node clusters)	*Data ONTAP High-Availability Configuration Guide for Cluster-Mode*

Prerequisites for setup

Before you begin the software setup process, you should ensure that you have prepared your storage environment for your new storage system.

- Your system should be racked and cabled according to the *Installation and Setup Instructions* for your platform and the *Data ONTAP High-Availability Configuration Guide for Cluster-Mode*.
- You should have reviewed the appropriate disk shelf guides for your platform, and the *Site Requirements Guide*.
- If you are using third-party storage, then you should have reviewed the *V-Series Installation Requirements and Reference Guide*, and the *V-Series Implementation Guide for Third-Party Storage*.

Related information

The NetApp Support Site at support.netapp.com

Registering on the NetApp Support Site

Registering on the NetApp Support Site involves creating a new user account and registering your installed products. After registering, you can access customized support information for your system, find troubleshooting information and product documentation, download software and firmware, and request technical assistance.

About this task

You should plan for one business day for your new user account request to be processed. For additional information and best practices about the NetApp Support Site, see the *NetApp Support Owner's Manual*.

Steps

1. Go to the NetApp Support Site at *support.netapp.com*.
2. Click **Register Now**, and follow the instructions on the page to register as a new user.

You will be notified by email when your registration request has been processed. This process takes about a day.

3. Click **My Support > Register Products**, and follow the instructions on the page to register your new system.

   Registering your system ensures that NetApp can provide you with support for your installed products.

Related information

NetApp Support Owner's Manual: support.netapp.com/NOW/products/globalservices

Gathering configuration information

Before setting up the software, you use the configuration worksheets to gather the information that the Cluster Setup and Vserver Setup wizards require.

Steps

1. *Completing the cluster setup worksheet* on page 9
2. *Completing the Vserver setup worksheet* on page 14

Completing the cluster setup worksheet

Use this worksheet to record the values that you need during the cluster setup process. If a default value is provided, you can use that value or else enter your own.

Note: As you record values for the IP addresses, keep in mind that each IP address must be a valid host address that meets the following criteria:

- The host address, in combination with the associated netmask, must not match the polling or network address, and must not match the broadcast address
- The host address must not be already assigned to another system on the network
- The host address must be a valid IP address (for example, it cannot be 0.0.0.0 or 256.345.567.257)
- The host address must not be a special use IPv4 address as defined by *RFC 3330*.

Cluster information

Types of information	Default provided?	Your values
Private cluster network ports For more information about the default Ethernet port roles for each platform, see the *Data ONTAP Network Management Guide for Cluster-Mode*.	Yes	
Cluster ports' MTU size The default MTU size is 9000 bytes. The MTU size must be the same on every node in the cluster.	Yes	
Cluster network netmask	Yes	

Types of information	Default provided?	Your values
Cluster interface IP addresses (for each cluster network port on each node) Using the default IP addresses is highly recommended. However, if you choose your own IP addresses, note that the IP addresses for each node must be on the same subnet.	Yes	
Cluster name The name must begin with a letter, and it must be fewer than 80 characters.	No	
Cluster base license key To get this license key, go to the NetApp Support Site at *support.netapp.com* and click **My Support > Software Licenses**.	No	

Feature license keys

To get your feature license keys, go to the NetApp Support Site at *support.netapp.com* and click **My Support > Software Licenses**. For more information about managing feature license keys, see the *Data ONTAP System Administration Guide for Cluster-Mode*.

Types of information	Default provided?	Your values
Feature license keys	No	

Admin Vserver

Types of information	Default provided?	Your values
Cluster administrator password The password for the admin account that the storage system requires before granting cluster administrator access at the console or through a secure protocol. The default rules for passwords are as follows: • A password must be at least eight characters long. • A password must contain at least one letter and one number.	No	
Cluster management interface port The physical port that is connected to the data network and enables the cluster administrator to manage the cluster. Because the cluster management interface can fail over to any node in the cluster, the cluster management interface port should have a port role of data. For more information about the default Ethernet port roles for each platform, see the *Data ONTAP Network Management Guide for Cluster-Mode*.	Yes	
Cluster management interface IP address A unique IP address for the cluster management interface. The cluster administrator uses this address to access the admin Vserver and manage the cluster. Typically, this address should be on the data network. You can obtain this IP address from the administrator responsible for assigning IP addresses in your organization. Example: 192.0.2.66	No	

Types of information	Default provided?	Your values
Cluster management interface netmask The subnet mask that defines the range of valid IP addresses on the cluster management network. Example: 255.255.255.0	No	
Cluster management interface default gateway The IP address for the router on the cluster management network.	No	
DNS domain name The name of your network's DNS domain. The domain name must consist of alphanumeric characters. To enter multiple DNS domain names, separate each name with either a comma or a space.	No	
Name server IP addresses The IP addresses of the DNS name servers. Separate each address with either a comma or a space.	No	

Node information (for each node in the cluster)

Types of information	Default provided?	Your values
Physical location of the controller A description of the physical location of the controller. Use a description that identifies where to find this node in the cluster (for example, "Lab 5, Row 7, Rack B").	No	

Types of information	**Default provided?**	**Your values**
Node management interface port The physical port that is connected to the node management network and enables the cluster administrator to manage the node. Because the node management interface does not fail over, the node management interface port should typically have a port role of node management; however, if necessary, it can reside on a data port. For more information about the default Ethernet port roles for each platform, see the *Data ONTAP Network Management Guide for Cluster-Mode*.	Yes	
Node management interface IP address A unique IP address for the node management interface on the management network. If you defined the node management interface port to be a data port, then this IP address should be a unique IP address on the data network. You can obtain this IP address from the administrator responsible for assigning IP addresses in your organization. Example: 192.0.2.66	No	
Node management interface netmask The subnet mask that defines the range of valid IP addresses on the node management network. If you defined the node management interface port to be a data port, then the netmask should be the subnet mask for the data network. Example: 255.255.255.0	No	
Node management interface default gateway The IP address for the router on the node management network.	No	

NTP server information

Types of information	Default provided?	Your values
NTP server address The IP address(es) of the Network Time Protocol (NTP) server at your site. This server is used to synchronize the time across the cluster.	No	

Completing the Vserver setup worksheet

Before you start the Vserver Setup wizard to create and configure a Vserver, you must gather the required information to complete the wizard successfully.

Note: You can create and configure only Vservers with FlexVol volumes by using the Vserver Setup wizard. You cannot create and configure a Vserver with Infinite Volume by using the Vserver Setup wizard.

The Vserver Setup wizard has the following subwizards, which you can run after you create a Vserver:

- Network setup
- Storage setup
- Services setup
- Data access protocol setup

Each subwizard has its specific requirements, depending on the types of services, protocols, and the protocol traffic.

You can use the following worksheet to record values for the setup process:

Vserver information

Types of information	Your values
Vserver name The name of a Vserver can contain alphanumeric characters and the following special characters: ".", "-", and "_". However, the name of a Vserver must not start with a number or a special character. The maximum number of characters allowed in a Vserver name is 47.	

Types of information	Your values
Data protocols Protocols that you want to configure or allow on that Vserver	
Client services Services that you want to configure on the Vserver	
Aggregate name Aggregate on which you want to create the Vserver's root volume. The default aggregate name is used if you do not specify one.	
Language setting The default language is used if you do not specify one. The language is set for a Vserver. The language of the Vserver determines the character set used to display file names and data for all NAS volumes in the Vserver. **Note:** The language of a Vserver cannot be modified after the Vserver is created.	

Information for creating volumes on the Vserver

Types of information	Values
Volume name The default volume name is used if you do not specify one.	
Aggregate name Aggregate on which you want to create the volume. The default aggregate name is used if you do not specify one.	
Volume size	
Volume junction path The default junction path is used if you do not specify one.	

Information for creating an IP network interface on the Vserver

Types of information	Values
LIF name The default LIF name is used if you do not specify one.	
Protocols Protocols that can use the LIF **Note:** Protocols that can use the LIF cannot be modified after the LIF is created.	
Home node Home node is the node on which you want to create a LIF. The default home node is used if you do not specify one.	
Home port Home port is the port on which you want to create a LIF. The default home port is used if you do not specify one.	
IP address	
Network mask	
Default gateway IP address	

Information for creating an FC network interface on the Vserver

Types of information	Values
LIF name The default LIF name is used if you do not specify one.	
Protocols Protocols that can use the LIF **Note:** Protocols that can use the LIF cannot be modified after the LIF is created.	
Home node Home node is the node on which you want to create a LIF. The default home node is used if you do not specify one.	

Types of information	Values
Home port Home port is the port on which you want to create a LIF. The default home port is used if you do not specify one.	

Information for configuring LDAP

Types of information	Values
LDAP server IP address	
LDAP server port number The default LDAP server port number is used if you do not specify one.	
LDAP server minimum bind authentication level	
Bind domain name and *password*	
Base domain name	

Information for configuring NIS

Types of information	Values
NIS domain name	
IP addresses of the NIS servers	

Information for configuring DNS

Types of information	Values
DNS domain name	
IP addresses of the DNS servers	

Note: You do not need to enter any information to configure NFS on a Vserver. The NFS configuration is created when you specify the protocol value as `nfs`.

Information for configuring CIFS protocol

Types of information	Values
Domain name	

Types of information	Values
CIFS share name The default CIFS share name is used if you do not specify one. **Note:** You must not use space characters or Unicode characters in CIFS share names. You can use alphanumeric characters and the following special characters: "!", "@", "#", "$", "%", "&", "(", ")", "_", " ' ", "{", "}", ".", "~", and "-".	
CIFS share path The default CIFS share path is used if you do not specify one.	
CIFS access control list The default CIFS access control list is used if you do not specify one.	

Information for configuring iSCSI protocol

Types of information	Values
igroup name The default igroup name is used if you do not specify one.	
Names of the initiators	
Operating system type of the initiator	
LUN name The default LUN name is used if you do not specify one.	
Volume for LUN Volume that is to be used for the LUN	
LUN size	

Information for configuring Fibre Channel (FC) protocol (FCoE included)

Types of information	Values
igroup name The default igroup name is used if you do not specify one.	
World wide port number (WWPN) of the initiators	
Operating system type of the initiator	
LUN name The default LUN name is used if you do not specify one.	
Volume for LUN Volume that is to be used for the LUN	
LUN size	

Setting up the cluster

Setting up the cluster involves creating the cluster on the first node, joining the remaining nodes to it, enabling storage failover or high availability, and synchronizing the time.

Steps

1. *Creating the cluster on the first node* on page 20
   You use the Cluster Setup wizard to create the cluster on the first node. The wizard helps you to configure the cluster network that connects the nodes, create the cluster admin Vserver, add feature license keys, and create the node management interface for the first node.
2. *Joining a node to the cluster* on page 22
   After creating a new cluster, for each remaining node, you use the Cluster Setup wizard to join the node to the cluster and create the node's node management interface.
3. *Enabling storage failover* on page 23
   You should enable storage failover for each HA pair in the cluster.
4. *Configuring cluster high availability in a two-node cluster* on page 24
   If the cluster contains only two nodes (a single HA pair), you should configure cluster high availability.
5. *Synchronizing the system time across the cluster* on page 24
   Synchronizing the time ensures that every node in the cluster has the same time, and prevents CIFS and Kerberos failures.

Creating the cluster on the first node

You use the Cluster Setup wizard to create the cluster on the first node. The wizard helps you to configure the cluster network that connects the nodes, create the cluster admin Vserver, add feature license keys, and create the node management interface for the first node.

Before you begin

The cluster setup worksheet should be completed, and the storage system hardware should be installed and cabled.

Steps

1. Power on the first node.

   The node boots, and the Cluster Setup wizard starts on the console.

```
Welcome to the cluster setup wizard.

You can enter the following commands at any time:
```

```
  "help" or "?" - if you want to have a question clarified,
  "back" - if you want to change previously answered questions, and
  "exit" or "quit" - if you want to quit the cluster setup wizard.
     Any changes you made before quitting will be saved.

You can return to cluster setup at any time by typing "cluster setup".
To accept a default or omit a question, do not enter a value.


Do you want to create a new cluster or join an existing cluster?
{create, join}:
```

Note: If a login prompt appears instead of the Cluster Setup wizard, you must start the wizard by logging in using the factory default settings and then entering the `cluster setup` command.

2. Enter the following command to create a new cluster:

   `create`

   The system defaults are displayed.

```
System Defaults:
Private cluster network ports [e0a,e0b].
Cluster port MTU values will be set to 9000.
Cluster interface IP addresses will be automatically generated.

Do you want to use these defaults? {yes, no} [yes]:
```

3. Do one of the following:

   - To accept the system defaults, press Enter.
   - To enter your own values, type **no** and then press Enter.

4. Follow the prompts to complete the Cluster Setup wizard:

   - To accept the default value for a prompt, press Enter.
     The default values are determined automatically based on your platform and network configuration.
   - To enter your own value for the prompt, enter the value and then press Enter.

5. After the Cluster Setup wizard is completed and exits, verify that the cluster is active and the first node is healthy:

   a) Log in to the cluster.

      You can use the `admin` account name, and the password that you entered in the Cluster Setup wizard.

   b) Enter the following command to display the status of the cluster:

      `cluster show`

      Example
      The following example shows a cluster in which all nodes are healthy and eligible to participate in the cluster:

```
cluster1::> cluster show
Node                  Health  Eligibility
--------------------- ------- ------------
node0                 true    true
```

c) If you need to make changes to the values you entered for the admin Vserver or node Vserver, enter the following command to access the Cluster Setup wizard:

```
cluster setup
```

6. Use the `system node reboot` command to reboot the node.

   You must reboot the node for storage failover to work properly.

After you finish

The cluster is now set up on the first node, and you can begin joining the remaining nodes to it.

Joining a node to the cluster

After creating a new cluster, for each remaining node, you use the Cluster Setup wizard to join the node to the cluster and create the node's node management interface.

Before you begin

The cluster must be created on the first node.

About this task

You must complete this task for each node in the cluster.

Steps

1. Power on the node.

   The node boots, and the Cluster Setup wizard starts on the console.

```
Welcome to the cluster setup wizard.

You can enter the following commands at any time:
  "help" or "?" - if you want to have a question clarified,
  "back" - if you want to change previously answered questions, and
  "exit" or "quit" - if you want to quit the cluster setup wizard.
     Any changes you made before quitting will be saved.

You can return to cluster setup at any time by typing "cluster setup".
To accept a default or omit a question, do not enter a value.


Do you want to create a new cluster or join an existing cluster?
{create, join}:
```

2. Enter the following command to join the node to the cluster:

```
join
```

3. Follow the prompts to set up the node and join it to the cluster:
   - To accept the default value for a prompt, press Enter.
   - To enter your own value for the prompt, enter the value and then press Enter.
4. After the Cluster Setup wizard is completed and exits, verify that the node is healthy and eligible to participate in the cluster:
   a) Log in to the cluster.
   b) Enter the following command to display the status of the cluster:

      ```
      cluster show
      ```

      Example
      The following example shows a cluster after the second node (*node1*) has been joined to the cluster:

      ```
      cluster1::> cluster show
      Node                  Health  Eligibility
      --------------------- ------- ------------
      node0                 true    true
      node1                 true    true
      ```

   c) If you need to make changes to the values you entered for the admin Vserver or node Vserver, enter the following command to access the Cluster Setup wizard:

      ```
      cluster setup
      ```

5. Use the `system node reboot` command to reboot the node.

   You must reboot the node for storage failover to work properly.

After you finish

Repeat this task for each remaining node.

Enabling storage failover

You enable storage failover to provide an additional level of security that data continues to be served if a hardware failure occurs.

About this task

You should enable storage failover for each set of HA pairs. Storage failover is described in the *Data ONTAP High-Availability Configuration Guide for Cluster-Mode*.

Step

1. On one node of each HA pair in the cluster, enable storage failover by using the `storage failover modify` command.

Example

```
cluster1::> storage failover modify -node node1 -enabled true
```

Enabling storage failover on one node of an HA pair automatically enables it on the partner node.

Configuring cluster high availability in a two-node cluster

Cluster high availability (HA) differs from the HA provided by storage failover. You must configure cluster HA in a cluster if it contains only two nodes.

About this task

Cluster HA is a special case of the clustering technology used in larger clusters; cluster HA communications occur over the cluster network, not over the HA interconnection between controllers in a storage-failover pair. In a two-node cluster, cluster HA ensures that the failure of one node does not disable the cluster.

If your cluster contains only two nodes, you must enable cluster HA. If the cluster contains more than two nodes, you should not enable cluster HA in the cluster.

Step

1. Enter the following command to enable cluster HA:

   ```
   cluster ha modify -configured true
   ```

Synchronizing the system time across the cluster

Synchronizing the time ensures that every node in the cluster has the same time, and prevents CIFS and Kerberos failures.

Before you begin

A Network Time Protocol (NTP) server should be set up at your site.

About this task

You synchronize the time across the cluster by associating each node in the cluster with the NTP server, and then enabling NTP for the cluster. For more information about managing the system time, see the *Data ONTAP System Administration Guide for Cluster-Mode*.

Steps

1. For each node in the cluster, use the `system services ntp server create` command to associate the node with your NTP server.

Example
The following example associates a node named node0 with an NTP server named ntp1.example.com that is running the highest-numbered version of NTP available:

```
cluster1::> system services ntp server create -node node0 -server
ntp1.example.com -version max
```

2. Use the `system services ntp server show` command to verify that each node is associated with an NTP server.

   Example

```
cluster1::> system services ntp server show
Node   Server                         Version
------ ------------------------------ --------------------------------
node0  ntp1.example.com               max
node1  ntp1.example.com               max
node2  ntp1.example.com               max
node3  ntp1.example.com               max
4 entries were displayed.
```

3. Use the `system services ntp config modify` command to enable NTP.

   Example
   The following example enables NTP for the cluster:

```
cluster1::> system services ntp config modify -enabled true
```

4. Verify that the system time and time zone is set correctly for each node.

   All nodes in the cluster should be set to the same time zone.

   a) Use the `system node date show` command to display the current date, time, and time zone for each node.

      Example

```
cluster1::> system node date show
Node      Date                Timezone
--------- ------------------- -----------------
node0     10/06/2011 09:35:15 America/New_York
node1     10/06/2011 09:35:15 America/New_York
node2     10/06/2011 09:35:15 America/New_York
node3     10/06/2011 09:35:15 America/New_York
4 entries were displayed.
```

   b) Use the `system node date modify` command to change the date or time zone for all of the nodes.

      Example
      This example changes the time zone for the cluster to be GMT:

```
cluster1::> system node date modify -node * -timezone GMT
```

Verifying cluster setup

After completing cluster setup, you should complete verification tasks to ensure that the cluster is operational and configured according to your requirements.

Verifying cluster health

After completing cluster setup, you should verify that each node is healthy and eligible to participate in the cluster.

About this task

For more information about node health and eligibility, see the *Data ONTAP System Administration Guide for Cluster-Mode*.

Step

1. Use the `cluster show` command to view the status of each node.

   Example
   This example shows that each node is healthy and eligible as indicated by status "true" in the Health and Eligibility columns (Status "false" indicates a problem).

```
cluster1::> cluster show
Node                  Health  Eligibility
--------------------- ------- ------------
node0                 true    true
node1                 true    true
node2                 true    true
node3                 true    true
4 entries were displayed.
```

Verifying that the cluster is in an RDB quorum

After setting up the cluster, you must ensure that all nodes are participating in a replicated database (RDB) quorum and that all rings are in the quorum. You must also verify that the per-ring quorum master is the same for all nodes.

About this task

For more information about cluster replication rings and RDB quorums, see the *Data ONTAP System Administration Guide for Cluster-Mode*.

Step

1. At the advanced privilege level, display the RDB processes for the management application (mgmt), volume location database (vldb), and virtual-interface manager (vifmgr):

   cluster ring show -unitname vldb

   cluster ring show -unitname mgmt

   cluster ring show -unitname vifmgr

   Example

```
cluster1::*> cluster ring show -unitname vldb

Node   UnitName Epoch DB Epoch DB Trnxs Master
------ -------- ----- -------- -------- ---------
node0  vldb     154   154      14847    node0
node1  vldb     154   154      14847    node0
node2  vldb     154   154      14847    node0
node3  vldb     154   154      14847    node0
4 entries were displayed.
```

   For each process, verify the following configuration:

   - The relational database epoch and database epochs match for each node.
   - The per-ring quorum master is the same for all nodes.
     Note that each ring might have a different quorum master.

Verifying network connectivity

You should verify that the cluster, cluster management, and node management interfaces are configured correctly.

Steps

1. At the advanced privilege level, use the `cluster ping-cluster` command with the `-node` parameter to ping all combinations of the cluster LIFs.

   Example
   This example pings the cluster LIFs from node1.

```
cluster1::*> 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)
```

Complete this step for each node in the cluster. For each node, you should verify the following:

- All of the paths are up.
- The pings are successful at each MTU size (1500, 4500, and 9000).

  If the pings are only successful for MTU size 1500, then verify that the cluster network switch and cluster ports are configured with the correct MTU sizes. For more information about configuring the MTU size for a port, see the *Data ONTAP Network Management Guide for Cluster-Mode*.

2. Use the `network interface show` command to verify that the cluster management and node management LIFs are configured correctly.

   Example

```
cluster1::> network interface show
            Logical    Status     Network            Current       Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port    Home
----------- ---------- ---------- ------------------ ------------- ------- ----
cluster1
            cluster_mgmt up/up    172.17.178.119/24  ie3070-1      e1a     true
node0
            clus1        up/up    172.17.177.120/24  ie3070-1      e0a     true
            clus2        up/up    172.17.177.121/24  ie3070-1      e0b     true
            mgmt1        up/up    172.17.178.120/24  ie3070-1      e1a     true
node1
            clus1        up/up    172.17.177.122/24  ie3070-2      e0a     true
            clus2        up/up    172.17.177.123/24  ie3070-2      e0b     true
            mgmt1        up/up    172.17.178.122/24  ie3070-2      e1a     true
node2
            clus1        up/up    172.17.177.124/24  ie3070-3      e0a     true
            clus2        up/up    172.17.177.125/24  ie3070-3      e0b     true
            mgmt1        up/up    172.17.178.124/24  ie3070-3      e1a     true
node3
            clus1        up/up    172.17.177.126/24  ie3070-4      e0a     true
            clus2        up/up    172.17.177.127/24  ie3070-4      e0b     true
            mgmt1        up/up    172.17.178.126/24  ie3070-4      e1a     true
```

   For each cluster management and node management LIF, verify the following:

   - The LIF is up.
   - The IP address is configured correctly.

   For more information about changing the configuration of a LIF, see the *Data ONTAP Network Management Guide for Cluster-Mode*.

3. Use the `network port show` command to verify that the cluster, node management, and data ports are assigned correctly.

   Example

```
cluster1::> network port show
                                      Auto-Negot  Duplex     Speed (Mbps)
Node   Port   Role     Link   MTU Admin/Oper  Admin/Oper Admin/Oper
------ ------ -------- ---- ----- ----------- ---------- ------------
```

```
node0
       e0a    cluster  up    9000  true/true  full/full   1000/1000
       e0b    cluster  up    9000  true/true  full/full   1000/1000
       e0c    data     up    1500  true/true  full/full   1000/1000
       e0d    data     up    1500  true/true  full/full   1000/1000
       e1a    mgmt     up    1500  true/true  full/full   1000/1000
node1
       e0a    cluster  up    9000  true/true  half/full     10/1000
       e0b    cluster  up    9000  true/true  half/full     10/1000
       e0c    data     up    1500  true/true  half/full     10/1000
       e0d    data     up    1500  true/true  half/full     10/1000
       e1a    mgmt     up    1500  true/true  full/full   1000/1000
node2
       e0a    cluster  up    9000  true/true  full/full   auto/1000
       e0b    cluster  up    9000  true/true  full/full   auto/1000
       e0c    data     up    1500  true/true  full/full   auto/1000
       e0d    data     up    1500  true/true  full/full   auto/1000
       e1a    mgmt     up    1500  true/true  full/full   auto/1000
node3
       e0a    cluster  up    9000  true/true  full/full   auto/1000
       e0b    cluster  up    9000  true/true  full/full   auto/1000
       e0c    data     up    1500  true/true  full/full   auto/1000
       e0d    data     up    1500  true/true  full/full   auto/1000
       e1a    mgmt     up    1500  true/true  full/full   auto/1000
```

Verify that each port has the correct role assigned for your platform. For more information about default port roles and changing the role assignment for a port, see the *Data ONTAP Network Management Guide for Cluster-Mode*.

Verifying licensing

You should verify that the correct feature licenses are installed on your system.

About this task

For more information about feature licenses, see the *Data ONTAP System Administration Guide for Cluster-Mode*.

Step

1. Use the `system license show` command to verify that the correct feature licenses are installed on your system by verifying license names as listed in the Description column of the command output.

   Example

```
cluster1::> system license show
Feature          Cluster SN   Limit    Description
---------------  -----------  -------  -----------
Base             1-80-123456  4        Base License w/cluster size
limit (nodes)
Mirror           1-80-123456  4        Mirror License
CIFS             1-80-123456  4        CIFS License
```

```
SnapRestore      1-80-123456  4        SnapRestore License
NFS              1-80-123456  4        NFS License
SnapMirror_DP    1-80-123456  4        SnapMirror Data Protection
License
6 entries were displayed.
```

Verifying the high-availability configuration

You should verify that storage failover is configured for each HA pair. If you have a two-node cluster, then you should also verify that cluster high availability is configured.

About this task

For more information about storage failover and cluster high availability, see the *Data ONTAP High-Availability Configuration Guide for Cluster-Mode*.

Steps

1. Use the `storage failover show` command to verify that storage failover is enabled for each HA pair.

   Example

   ```
   cluster1::> storage failover show
                       Takeover
   Node     Partner  Possible State
   -------- -------- -------- ------------------
   node0    node1    true     Connected to node1
   node1    node0    true     Connected to node0
   node2    node3    true     Connected to node3
   node3    node2    true     Connected to node2
   4 entries were displayed.
   ```

2. If the cluster consists of only two nodes (a single HA pair), then use the `cluster ha show` command to verify that cluster high availability is configured.

   Example

   ```
   cluster1::> cluster ha show
   High Availability Configured: true
   ```

Verifying the system time

You should verify that NTP is configured, and that the time is synchronized across the cluster.

About this task

For more information about managing the system time, see the *Data ONTAP System Administration Guide for Cluster-Mode*.

Steps

1. Use the `system services ntp server show` command to verify that each node is associated with an NTP server.

   Example

```
cluster1::> system services ntp show
Node   Server               Version
-------------------------- -----------
node0
       ntp1.example.com     max
       ntp2.example.com     max
node1
       ntp1.example.com     max
       ntp2.example.com     max
node2
       ntp1.example.com     max
       ntp2.example.com     max
node3
       ntp1.example.com     max
       ntp2.example.com     max
```

2. Use the `system date show` command to verify that each node has the same date and time.

   Example

```
cluster1::> system date show
Node      Date                Timezone
--------- ------------------- -------------------------
node0     1/3/2012 20:54:38   GMT
node1     1/3/2012 20:54:38   GMT
node2     1/3/2012 20:54:38   GMT
node3     1/3/2012 20:54:38   GMT
4 entries were displayed.
```

Setting up a Vserver

You can create and configure Vservers with FlexVol volumes fully to start serving data immediately, or with a minimal configuration to delegate administration to the Vserver administrator by using the `vserver setup` command. You cannot create or configure a Vserver with Infinite Volume by using the `vserver setup` command.

Before you begin

You must have understood the requirements and gathered the required information before you start the Vserver Setup wizard or any of the subwizards.

About this task

By using the `vserver setup` command, which launches a CLI wizard, you can perform the following tasks:

- Creating and configuring a Vserver fully
- Creating and configuring a Vserver with minimal network configuration
- Configuring existing Vservers
  - Setting up a network interface
  - Provisioning storage by creating volumes
  - Configuring services
  - Configuring protocols

Steps

1. Depending on your requirements, enter the appropriate command:

If you want to...	Enter the following command...

Set up a Vserver by using the Vserver Setup wizard	**`vserver setup`**
	The `vserver setup` command prompts you to create and configure a Vserver in the following sequence:
	a. Create a Vserver
	b. Create data volumes
	c. Create logical interfaces
	d. Configure services
	e. Configure protocols
	The following example shows how to set up a Vserver by using the Vserver Setup wizard:
	`cluster1::>vserver setup`
	`Welcome to the Vserver Setup Wizard, which will lead you through`
	`the steps to create a virtual storage server that serves data to clients.`
	
	`You can enter the following commands at any time:`
	`"help" or "?" if you want to have a question clarified,`
	`"back" if you want to change your answers to previous questions, and`
	`"exit" if you want to quit the Vserver Setup Wizard. Any changes`
	`you made before typing "exit" will be applied.`
	
	`You can restart the Vserver Setup Wizard by typing "vserver setup". To`
	`accept a default or omit a question, do not enter a value.`
	
	`Vserver Setup wizard creates and configures only data Vservers.`
	`If you want to create a repository Vserver use the vserver create command.`
	
	`Step 1. Create a Vserver.`
	`You can type "back", "exit", or "help" at any question.`
	`.....`
	`Enter the Vserver name: vs2`
	`.....`
	Note: Repository Vserver in the CLI refers to Vserver with Infinite Volume.

If you want to...	Enter the following command...

Set up a network interface for an existing Vserver	**vserver setup -vserver *vserver_name* -network true**
	vserver_name is the name of the Vserver.
	The following example shows how to set up a network interface by using the Vserver Setup wizard:
	`cluster1::> vserver setup -vserver vs2 -network true`
	`Welcome to the Vserver Setup Wizard, which will lead you through`
	`the steps to create a virtual storage server that serves data to clients.`
	
	`You can enter the following commands at any time:`
	`"help" or "?" if you want to have a question clarified,`
	`"back" if you want to change your answers to previous questions, and`
	`"exit" if you want to quit the Vserver Setup Wizard. Any changes`
	`you made before typing "exit" will be applied.`
	
	`You can restart the Vserver Setup Wizard by typing "vserver setup". To`
	`accept a default or omit a question, do not enter a value.`
	
	`Vserver Setup wizard creates and configures only data Vservers.`
	`If you want to create a repository Vserver use the vserver create command.`
	
	`Step 1. Create a Vserver.`
	`You can type "back", "exit", or "help" at any question.`
	
	`Choose the Vserver data protocols to be configured {nfs, cifs, fcp, iscsi}`
	`[fcp]:`
	`Choose the Vserver client services to be configured {ldap, nis, dns}:`
	
	`Vserver vs2's allowed protocol list has been modified to fcp`
	
	`Step 2: Create a logical interface.`
	`You can type "back", "exit", or "help" at any question.`
	
	`Do you want to create a logical interface? {yes, no} [yes]:`
	`.....`

If you want to...	Enter the following command...
Provision storage by creating volumes on an existing Vserver	**vserver setup -vserver *vserver_name* -storage true** *vserver_name* is the name of the Vserver. The following example shows how to create volumes by using the Vserver Setup wizard:

```
cluster1::> vserver setup -vserver vs2 -storage true
Welcome to the Vserver Setup Wizard, which will lead you through
the steps to create a virtual storage server that serves data to clients.

You can enter the following commands at any time:
"help" or "?" if you want to have a question clarified,
"back" if you want to change your answers to previous questions, and
"exit" if you want to quit the Vserver Setup Wizard. Any changes
you made before typing "exit" will be applied.

You can restart the Vserver Setup Wizard by typing "vserver setup". To
accept a default or omit a question, do not enter a value.

Vserver Setup wizard creates and configures only data Vservers.
If you want to create a repository Vserver use the vserver create command.



Step 1. Create a Vserver.
You can type "back", "exit", or "help" at any question.

Choose the Vserver data protocols to be configured {nfs, cifs, fcp, iscsi}
[fcp]:
Choose the Vserver client services to be configured {ldap, nis, dns}:

Vserver vs2's allowed protocol list has been modified to fcp


Step 2: Create a data volume
You can type "back", "exit", or "help" at any question.

Do you want to create a data volume? {yes, no} [yes]:
.................................................
```

If you want to...	Enter the following command...

Configure services for an existing Vserver	**vserver setup -vserver *vserver_name* -services ldap,nis,dns**
	vserver_name is the name of the Vserver.
	The following example shows how to configure services by using the Vserver Setup wizard:
	`cluster1::> vserver setup -vserver vs2 -services ldap`
	`Welcome to the Vserver Setup Wizard, which will lead you through`
	`the steps to create a virtual storage server that serves data to clients.`
	
	`You can enter the following commands at any time:`
	`"help" or "?" if you want to have a question clarified,`
	`"back" if you want to change your answers to previous questions, and`
	`"exit" if you want to quit the Vserver Setup Wizard. Any changes`
	`you made before typing "exit" will be applied.`
	
	`You can restart the Vserver Setup Wizard by typing "vserver setup". To`
	`accept a default or omit a question, do not enter a value.`
	
	`Vserver Setup wizard creates and configures only data Vservers.`
	`If you want to create a repository Vserver use the vserver create command.`
	
	`Step 1. Create a Vserver.`
	`You can type "back", "exit", or "help" at any question.`
	
	`Choose the Vserver data protocols to be configured {nfs, cifs, fcp, iscsi}`
	`[fcp]:`
	`Vserver vs2's allowed protocol list has been modified to fcp`
	
	`Step 2: Configure LDAP (Lightweight Directory Access Protocol).`
	`You can type "back", "exit", or "help" at any question.`
	
	`Do you want to configure LDAP? {yes, no} [yes]:`
	`.....`

If you want to...	Enter the following command...

Configure protocols for an existing Vserver	**`vserver setup -vserver` *`vserver_name`* `-protocols nfs,cifs,iscsi,fcp`**
	`vserver_name` is the name of the Vserver.
	Note: When you specify the protocols value as `fcp`, you can configure both FC and FCoE for a Vserver.
	The following example shows how to configure protocols by using the Vserver Setup wizard:
	`cluster1::> vserver setup -vserver vs2 -protocols iscsi`
	`Welcome to the Vserver Setup Wizard, which will lead you through`
	`the steps to create a virtual storage server that serves data to clients.`
	
	`You can enter the following commands at any time:`
	`"help" or "?" if you want to have a question clarified,`
	`"back" if you want to change your answers to previous questions, and`
	`"exit" if you want to quit the Vserver Setup Wizard. Any changes`
	`you made before typing "exit" will be applied.`
	
	`You can restart the Vserver Setup Wizard by typing "vserver setup". To`
	`accept a default or omit a question, do not enter a value.`
	
	`Vserver Setup wizard creates and configures only data Vservers.`
	`If you want to create a repository Vserver use the vserver create command.`
	
	`Step 1. Create a Vserver.`
	`You can type "back", "exit", or "help" at any question.`
	
	`Choose the Vserver client services to be configured {ldap, nis, dns}:`
	
	`Vserver vs2's allowed protocol list has been modified to cifs,fcp,iscsi`
	
	`Step 2: Configure iSCSI.`
	`You can type "back", "exit", or "help" at any question.`
	
	`Do you want to configure iSCSI? {yes, no} [yes]:`
	`.....`

2. Follow the prompts to complete the Setup wizard:
   - To accept the default value for a prompt, press Enter.
   - To enter your own value for the prompt, enter the value and then press Enter.
3. Use the `vserver show` command to verify the newly created Vserver.

   You can view the attributes of the Vserver in detail by using the `vserver show -instance` command.

Example

The following example shows how to display information about all existing Vservers:

```
cluster1::>vserver show
                    Admin     Root                  Name    Name
Vserver     Type    State     Volume     Aggregate  Service Mapping
```

```
----------- ------- --------- ---------- ---------- ------- -------
example     cluster running   root_vol   aggr1      file    file
cluster1     admin   -         -          -          -       -
cluster1-01  node    -         -          -          -       -
cluster1-02  node    -         -          -          -       -
vs2         cluster running   root_vol   aggr2      file    file
5 entries were displayed.
```

Result

When you set up a Vserver, it is started automatically. By default, the vsadmin user account is created and is in the locked state. The vsadmin role is assigned to the default vsadmin user account.

Note: To delegate the administration to a Vserver administrator, you must set up a password, unlock the vsadmin user account, and create a LIF for accessing and managing the Vserver.

For more information about delegating administration to a Vserver administrator, see the *Data ONTAP System Administration Guide for Cluster-Mode*.

Where to go from here

After setting up the software, you can use the NetApp Support Site to find information about how to configure your storage system for third-party storage, provision storage, and manage the cluster.

For information about configuring the software to use third-party storage in a V-Series system, see the *Data ONTAP Physical Storage Management Guide for Cluster-Mode*.

For information about provisioning your storage, see the *Data ONTAP Logical Storage Management Guide for Cluster-Mode*.

To find documentation about managing your storage system after the software is set up, see the *Data ONTAP Documentation Map for Cluster-Mode*.

Related information

The NetApp Support Site at support.netapp.com

Copyright information

Trademark information

How to send your comments

You can help us to improve the quality of our documentation by sending us your feedback.

Your feedback is important in helping us to provide the most accurate and high-quality information. If you have suggestions for improving this document, send us your comments by email to *doccomments@netapp.com*. To help us direct your comments to the correct division, include in the subject line the product name, version, and operating system.

You can also contact us in the following ways:

- NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.
- Telephone: +1 (408) 822-6000
- Fax: +1 (408) 822-4501
- Support telephone: +1 (888) 463-8277

Index

C

F

H

L

N

P

Q

S

T

V