IBM System Storage N series

Clustered Data ONTAP 8.2 FC Configuration and Provisioning for Windows Express Guide

SC27-6403-00

Contents

Preface

About this guide

This document applies to IBM N series systems running Data ONTAP, including systems with gateway functionality. If the terms *Cluster-Mode* or *clustered Data ONTAP* are used in this document, they refer to the Data ONTAP features and functionality designed for clusters, which are different from 7-Mode and prior Data ONTAP 7.1, 7.2, and 7.3 release families.

In this document, the term *gateway* describes IBM N series storage systems that have been ordered with gateway functionality. Gateways support various types of storage, and they are used with third-party disk storage systems—for example, disk storage systems from IBM, HP®, Hitachi Data Systems®, and EMC®. In this case, disk storage for customer data and the RAID controller functionality is provided by the back-end disk storage system. A gateway might also be used with disk storage expansion units specifically designed for the IBM N series models.

The term *filer* describes IBM N series storage systems that either contain internal disk storage or attach to disk storage expansion units specifically designed for the IBM N series storage systems. Filer storage systems do not support using third-party disk storage systems.

Supported features

IBM System Storage N series storage systems are driven by NetApp Data ONTAP software. Some features described in the product software documentation are neither offered nor supported by IBM. Please contact your local IBM representative or reseller for further details.

Information about supported features can also be found on the N series support website (accessed and navigated as described in Websites).

Websites

IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. The following web pages provide N series information:

- A listing of currently available N series products and features can be found at the following web page:

  www.ibm.com/storage/nas/
- The IBM System Storage N series support website requires users to register in order to obtain access to N series support content on the web. To understand how the N series support web content is organized and navigated, and to access the N series support website, refer to the following publicly accessible web page:

  www.ibm.com/storage/support/nseries/

  This web page also provides links to AutoSupport information as well as other important N series product resources.
- IBM System Storage N series products attach to a variety of servers and operating systems. To determine the latest supported attachments, go to the IBM N series interoperability matrix at the following web page:

www.ibm.com/systems/storage/network/interophome.html

- For the latest N series hardware product documentation, including planning, installation and setup, and hardware monitoring, service and diagnostics, see the IBM N series Information Center at the following web page:

  publib.boulder.ibm.com/infocenter/nasinfo/nseries/index.jsp

Getting information, help, and service

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your IBM N series product, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure they are connected.
- Check the power switches to make sure the system is turned on.
- Use the troubleshooting information in your system documentation and use the diagnostic tools that come with your system.
- Refer to the N series support website (accessed and navigated as described in Websites) for information on known problems and limitations.

Using the documentation

The latest versions of N series software documentation, including Data ONTAP and other software products, are available on the N series support website (accessed and navigated as described in Websites).

Current N series hardware product documentation is shipped with your hardware product in printed documents or as PDF files on a documentation CD. For the latest N series hardware product documentation PDFs, go to the N series support website.

Hardware documentation, including planning, installation and setup, and hardware monitoring, service, and diagnostics, is also provided in an IBM N series Information Center at the following web page:

publib.boulder.ibm.com/infocenter/nasinfo/nseries/index.jsp

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services. Visit the following web page for support telephone numbers:

www.ibm.com/planetwide/

Firmware updates

IBM N series product firmware is embedded in Data ONTAP. As with all devices, ensure that you run the latest level of firmware. Any firmware updates are posted to the N series support website (accessed and navigated as described in Websites).

Note: If you do not see new firmware updates on the N series support website, you are running the latest level of firmware.

Verify that the latest level of firmware is installed on your machine before contacting IBM for technical support.

How to send your comments

Your feedback helps us to provide the most accurate and high-quality information. If you have comments or suggestions for improving this document, please send them by email to starpubs@us.ibm.com.

Be sure to include the following:

- Exact publication title
- Publication form number (for example, GC26-1234-02)
- Page, table, or illustration numbers
- A detailed description of any information that should be changed

Deciding whether to use this guide

This guide describes how to quickly set up the FC service on a Vserver, provision a LUN, and make the LUN available using an FC HBA on a Windows host computer. You should use this guide if you want a standard configuration following best practices.

This guide does not provide information about all the available options or a lot of conceptual background for the tasks.

This guide is based on the following assumptions:

- Your storage system has been successfully installed and a cluster has been created.
- You have downloaded and are running OnCommand System Manager 3.0 or later for all applicable tasks.

  This guide does not include procedures using the Data ONTAP CLI except when the CLI is the only way to complete a task.
- You are using traditional FC HBAs and switches.

  This guide does not cover FCoE.
- You are not configuring FC SAN boot.
- You are not using virtual Fibre Channel (VFC) with Hyper-V guests.

If these assumptions are not correct for your installation, or if you want more conceptual background information, you should see the following documentation instead:

- *Clustered Data ONTAP SAN Administration Guide*
- *Clustered Data ONTAP SAN Configuration Guide*
- *Windows Host Utilities Installation and Setup Guide*
- *Data ONTAP DSM for Windows MPIO Installation and Administration Guide*
- *OnCommand System Manager Help*

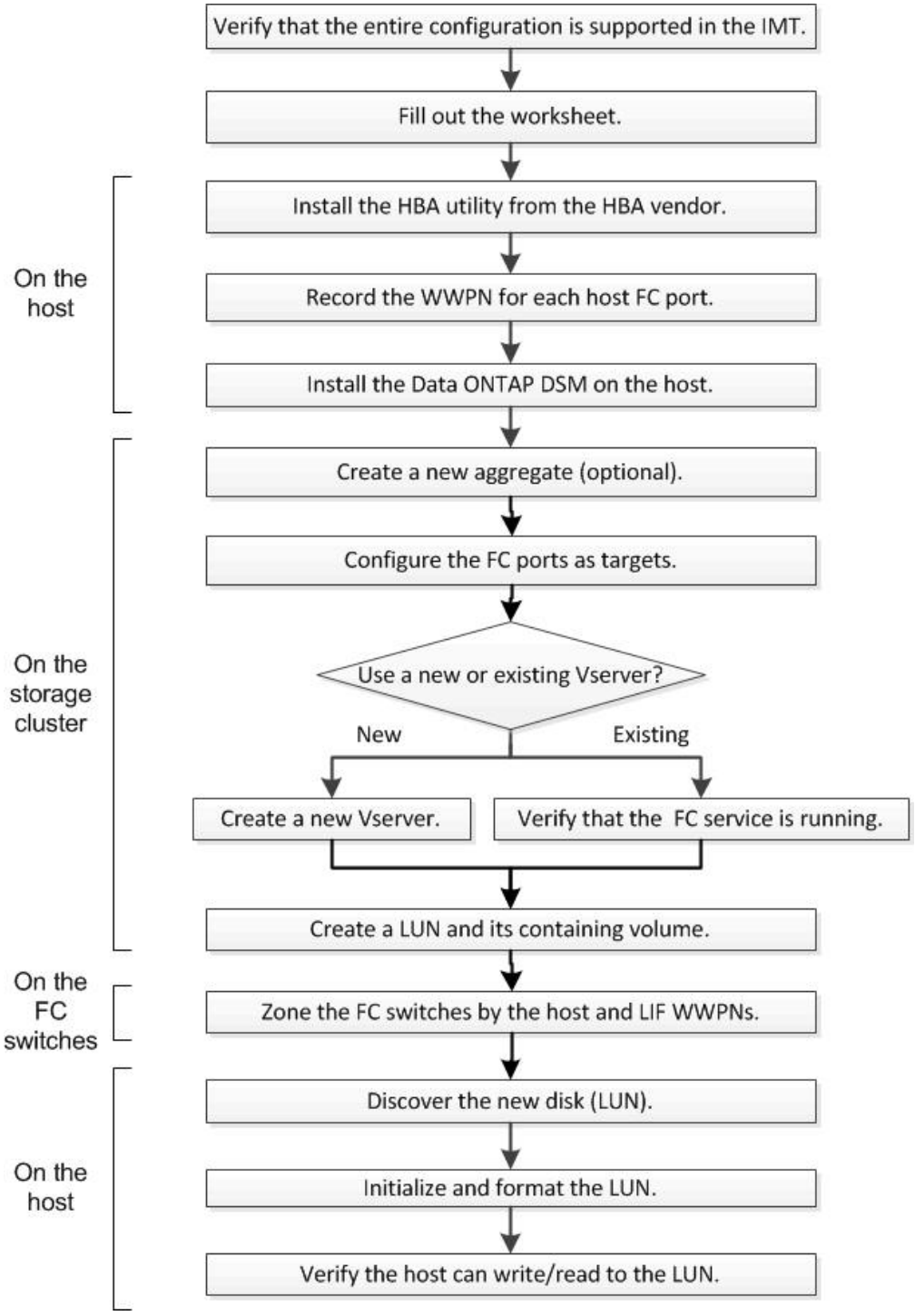
This documentation is available on the IBM N series support website (accessed and navigated as described in Websites).

Related information:

IBM N series support website: www.ibm.com/storage/support/nseries

FC configuration and provisioning workflow

When you make storage available to a host using FC, you provision a volume and LUN on the Vserver, and then connect to the LUN from the host.



Verifying that the FC configuration is supported

To ensure reliable operation, you must verify that the entire FC configuration is supported. The IBM N series interoperability matrix website (accessed and navigated as described in Websites) lists the supported configurations.

Procedure

1. Go to the IBM N series interoperability matrix website (accessed and navigated as described in Websites) to verify that you have a supported combination of the following components:
   - Data ONTAP software
   - Host computer CPU architecture (for standard rack servers)
   - Specific processor blade model (for blade servers)
   - Storage protocol (FC)
   - Windows operating system version
   - Data ONTAP DSM for Windows MPIO
2. Click the configuration name for the selected configuration. Details for that configuration are displayed in the Configuration Details window.
3. Review the information in the following tabs:
   - Notes

     Lists important alerts and notes that are specific to your configuration.

     Review the alerts to identify the hotfixes that are required for your operating system.
   - Policies and Guidelines

     Provides general guidelines for all SAN configurations.

Related information:

IBM N series interoperability matrix: www.ibm.com/systems/storage/network/interophome.html

Filling out the FC provisioning worksheet

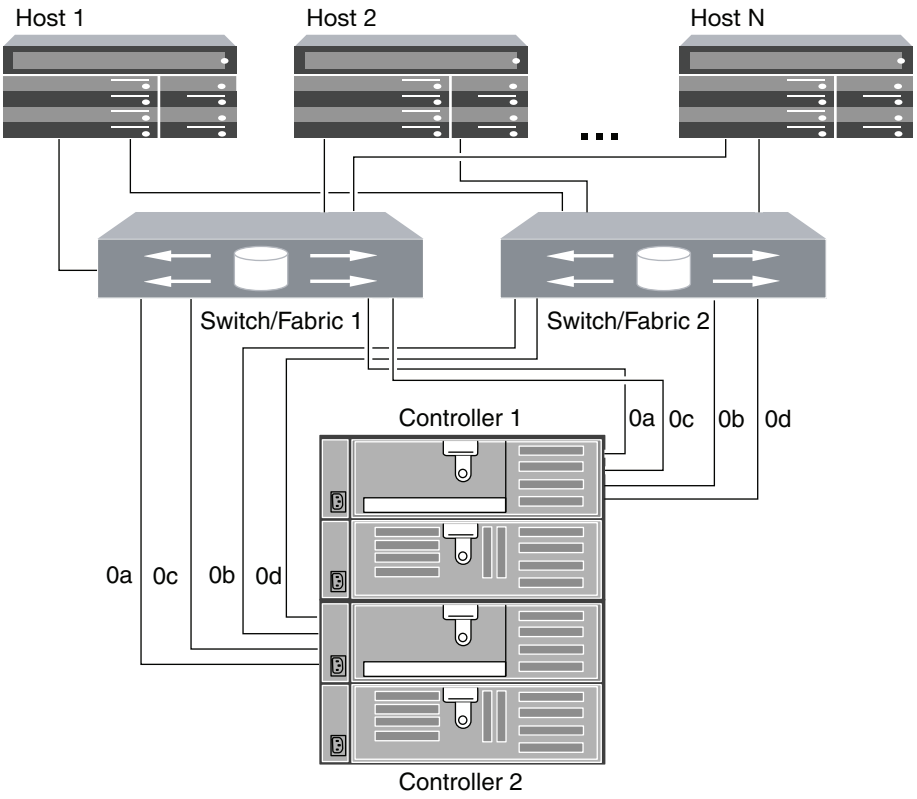
You require FC initiator and target WWPNs and storage configuration information to perform FC provisioning tasks.

FC host WWPNs

Port	WWPN
Initiator (host) port connected to FC switch 1	
Initiator (host) port connected to FC switch 2	

FC target WWPNs

You require at least four FC data LIFs. The WWPNs are assigned by Data ONTAP when you create the LIFs as part of creating the Vserver.



LIF	WWPN
Node 1 LIF with port connected to FC switch 1	
Node 2 LIF with port connected to FC switch 1	
Node 1 LIF with port connected to FC switch 2	
Node 2 LIF with port connected to FC switch 2	
Node 3 LIF with port connected to FC switch 1 (optional)	
Node 4 LIF with port connected to FC switch 1 (optional)	
Node 3 LIF with port connected to FC switch 2 (optional)	
Node 4 LIF with port connected to FC switch 2 (optional)	

Storage configuration

If the aggregate or Vserver is already created, record their names here. Otherwise you can create them as required.

Node to own LUN	
Aggregate name	

Vserver name	

LUN information

LUN size	
Host operating system	
LUN name (optional)	
LUN description (optional)	

Vserver information

If you are not using an existing Vserver, you require the following information to create a new one.

Vserver name	
Aggregate for Vserver root volume	
Vserver user name (optional)	
Vserver password (optional)	
Vserver management LIF (optional)	IP address:
	Network mask:
	Gateway:
	Home node:
	Home port:

Installing the HBA utility from the HBA vendor

The HBA utility enables you to view the worldwide port name (WWPN) of each FC port. The utility is also useful for troubleshooting FC issues.

About this task

Each HBA vendor offers an HBA utility for their FC HBAs. You must download the correct version for your host operating system and CPU.

The following is a partial list of HBA utilities:

- Emulex OneCommand Manager for Emulex HBAs
- QLogic QConvergeConsole for QLogic HBAs

Procedure

1. Download the appropriate utility from your HBA vendor's web site.
2. Run the installation program and follow the prompts to complete the installation.

Related information:

Emulex downloads

QLogic downloads

Recording the WWPN for each host FC port

The worldwide port name (WWPN) is required to zone the FC switches and to create the igroups that allow the host to access its LUN.

Before you begin

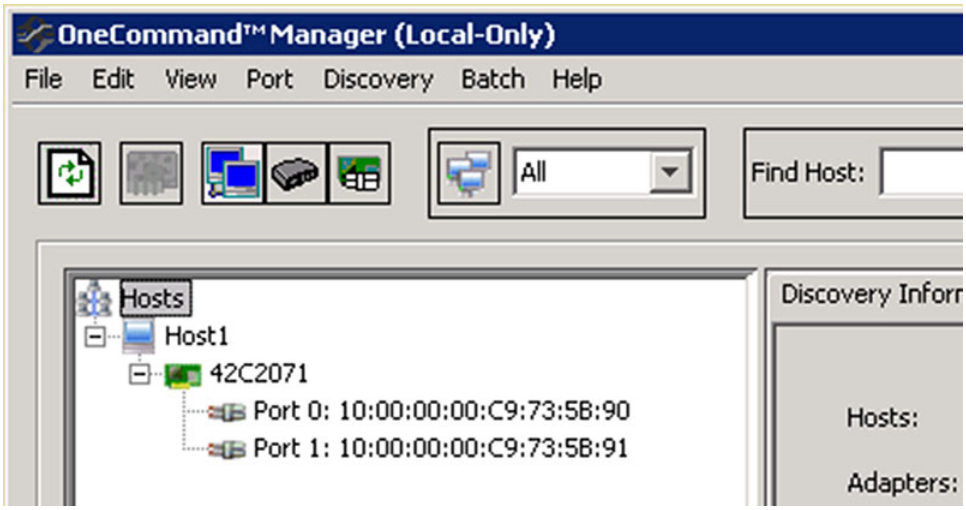
You must have installed the vendor's HBA utility for the HBAs in your host.

About this task

The WWPN is used for all configuration. You do not have to record the worldwide node name (WWNN).

Procedure

1. Run the HBA utility for your FC HBA type.
2. Select the HBA.
3. Record the WWPN of each port. The following example shows Emulex OneCommand Manager.



   Other utilities, such as QLogic QConvergeConsole, provide the equivalent information.
4. Repeat the previous step for each FC HBA in the host.

Installing the Data ONTAP DSM for Windows MPIO

The Data ONTAP DSM for Windows MPIO manages multiple paths between the Windows host and the storage cluster. Multiple paths are required to ensure that your host can access its LUN if a path or component fails. The Data ONTAP DSM sets the required timeout values and storage parameters on the host.

Before you begin

You must have completed the following tasks:

- Identified the required version of the Data ONTAP DSM for Windows MPIO from the IBM N series interoperability matrix website (accessed and navigated as described in Websites)

- Identified any required Windows hotfixes from the IBM N series interoperability matrix website (accessed and navigated as described in Websites)

  The *Data ONTAP DSM for Windows MPIO Installation and Administration Guide* lists the basic hotfix requirements. The specific row in the N series Interoperability Matrices website (accessed and navigated as described in Websites) for your configuration lists the latest hotfix requirements.
- Obtained a license key for the Data ONTAP DSM for Windows MPIO

About this task

This task requires rebooting the Windows host.

Detailed installation information is available in the *Data ONTAP DSM for Windows MPIO Installation and Administration Guide*, available with the software download.

Procedure

1. Download the appropriate version of the Data ONTAP DSM from the IBM N series support website (accessed and navigated as described in Websites).
2. Install any required Windows hotfixes. The Data ONTAP DSM installer will not proceed until the required hotfixes have been installed.
3. For Windows Server 2003 and 2008, install Windows PowerShell 2.0 or later. Installing PowerShell is not required for Windows Server 2008 R2 or later.
4. Run the Data ONTAP DSM installation program and follow the prompts.
5. Reboot the Windows host when prompted.

Related information:

IBM N series interoperability matrix: www.ibm.com/systems/storage/network/interophome.html

IBM N series support website: www.ibm.com/storage/support/nseries

Creating an aggregate

You create an aggregate to provide storage to one or more FlexVol volumes. Aggregates are made up of physical storage objects, such as HDDs and SSDs.

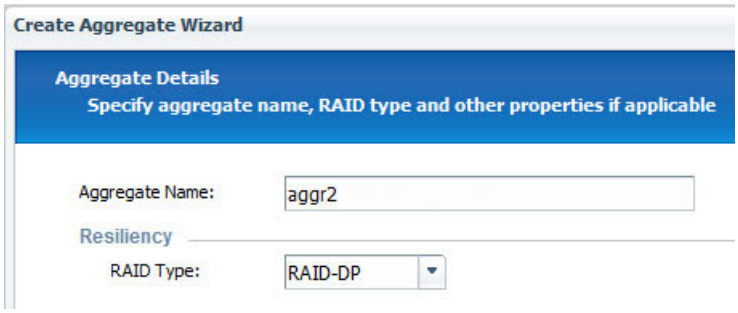
About this task

This procedure is performed using System Manager.

Procedure

1. From the home page, double-click the appropriate storage system.
2. Expand either the **Cluster** or the **Nodes** hierarchy in the left navigation pane.
3. In the navigation pane, click **Storage** > **Aggregates**.
4. Click **Create**.
5. In the Create Aggregate wizard, click **Next**.

6. Optional: If you want to change the default name, specify a new name, such as `aggr2`. The default aggregate name ends in a date and time stamp.



7. Accept the default value for **RAID Type**, and click **Next**. You can change the RAID type later if necessary.
8. In the Aggregate Details page, click **Select disks**.
9. In the Change Disk Selection page, select the node on which you want to create the aggregate, specify at least 5 disks in the **Number of capacity disks to use** field, and click **Save and Close**.
10. Click **Create**.
11. Click **Finish**.

Results

The aggregate is created with the specified configuration and added to the list of aggregates in the Aggregates window.

Configuring FC ports as targets

FC ports must be configured as targets to enable host connections. Onboard ports and some FC adapters are configured as FC initiators by default.

About this task

- This task must be completed using the Data ONTAP CLI.
- The nodes require a storage failover (takeover and giveback) for the configuration change to take effect.

  The command output shows "reboot"; the takeover and giveback operations are the preferred way to reboot the node.
- This task applies to onboard FC ports and to the X2056-R6 4-port 8-Gb FC adapter and the X1132A-R6 4-port 8-Gb FC adapter.
- This task is not required for dedicated FC target adapters.

Procedure

1. Log in to the Data ONTAP command line.
2. For each node in the cluster, configure at least two FC ports as targets:
   a. Verify the current configuration:
   `system node run -node` *`node_name`* `fcadmin config`

```
                Local
Adapter Type    State          Status
------------------------------------------
  0a   initiator  CONFIGURED     online
  0b   initiator  CONFIGURED     online
  0c   initiator  CONFIGURED     online
  0d   initiator  CONFIGURED     online
```

b. Take offline the ports that you are configuring:
   `system node run -node node_name fcadmin config -d port`
c. Configure each desired port as a target:
   `system node run -node node_name fcadmin config -t target port`
   If you are configuring only two ports as target, use 0a and 0c, or 0b and 0d to avoid putting both target ports on the same chipset.

```
innovate::> system node run -node innovate-02 fcadmin config -t target 0a
A reboot is required for the new adapter configuration to take effect.
innovate::> system node run -node innovate-02 fcadmin config -t target 0c
A reboot is required for the new adapter configuration to take effect.
```

d. Take over the node:
   `storage failover takeover -ofnode node_name`
e. Give back the node:
   `storage failover giveback -ofnode node_name`
f. Bring online the target ports:
   `network fcp adapter modify -node node_name -adapter port -state up`
g. Verify the target ports are correctly configured and online:
   `system node run -node node_name fcadmin config`

```
                Local
Adapter Type      State          Status
------------------------------------------
  0a   target     CONFIGURED     online
  0b   initiator  CONFIGURED     online
  0c   target     CONFIGURED     online
  0d   initiator  CONFIGURED     online
```

Creating a new Vserver

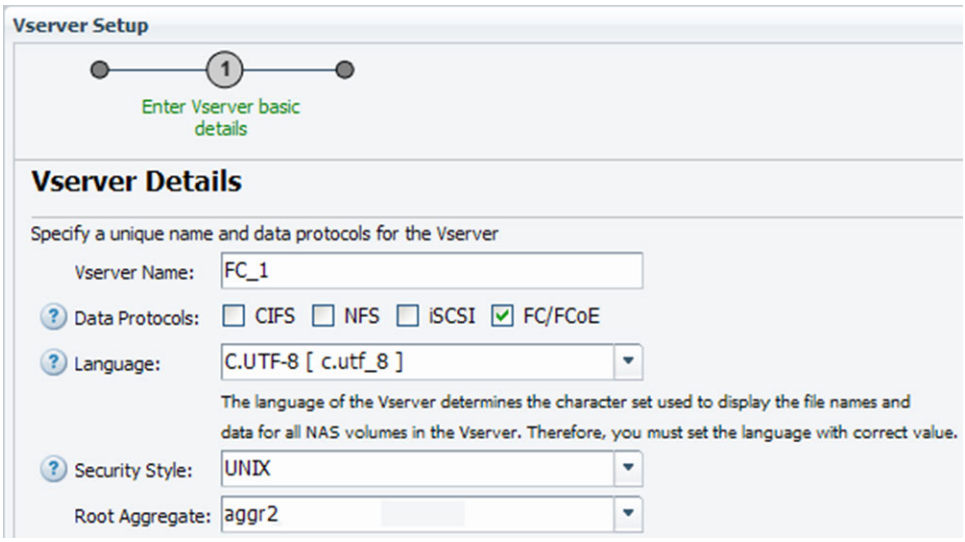
The Vserver provides the FC target and owns the LUN and its containing volume. The logical interfaces (LIFs) that provide paths to the LUN are owned by the Vserver.

About this task

The Vserver can always be managed by the cluster administrator. You can optionally define an administrator for only this Vserver.

Procedure

1. From the OnCommand System Manager home page, double-click the appropriate storage system.
2. Expand the **Vservers** hierarchy in the left navigation pane.
3. In the Vserver window, click **Create**.
4. On the Vserver Details page, enter a name for the Vserver, select **FC/FCoE** as the data protocol, and then select an aggregate for the root volume.



5. Click **Submit & Continue** to accept the remaining default values.
6. Create the data LIFs. Each node must have two LIFs on separate fabrics for high availability.
   a. On the Configure FC/FCoE Protocol page, select **Configure Data LIFs for FC**.
   b. Optional: Select **Review or Edit the Interface Association** and modify the default LIF name and home port.
7. Review the summary information, and then click **OK**. The Vserver is created.
8. In the navigation pane, click **Configuration** > **Network interfaces** and record the WWPN of each LIF. You require the WWPNs to zone the FC switches.

Verifying that the FC service is running on an existing Vserver

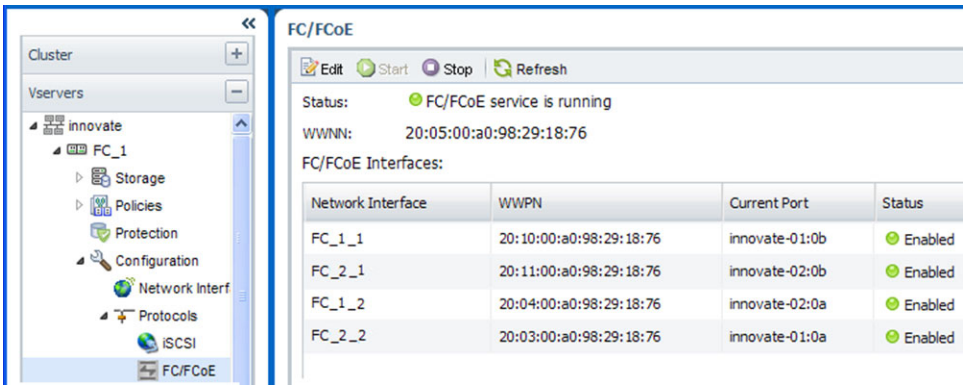
If you choose to use an existing Vserver, you must verify that the FC service is running on the Vserver. You must also verify that FC LIFs are already created.

Before you begin

You must have selected an existing Vserver on which you plan to create a new LUN.

Procedure

1. From the OnCommand System Manager home page, double-click the appropriate storage system.
2. Expand the **Vservers** hierarchy in the left navigation pane.
3. In the navigation pane, select the Vserver and click **Configuration** > **Protocols** > **FC/FCoE**.
4. Verify that the FC service is running.



5. Verify that there are at least two FC LIFs listed for each node.

What to do next

If the FC service is not running, start the FC service or create a new Vserver.

If there are fewer than two FC LIFs per node, update the FC configuration on the Vserver or create a new Vserver for FC.

Creating a LUN and its containing volume

The Create LUN wizard creates a LUN and the FlexVol volume that contains the LUN. The wizard also creates the igroup and maps the LUN to the igroup, which enables the specified host to access the LUN.

Before you begin

- There must be an aggregate with enough free space to contain the LUN.
- There must be a Vserver with the FC protocol enabled and the appropriate LIFs created.
- You must have recorded the WWPNs of the host FC ports.

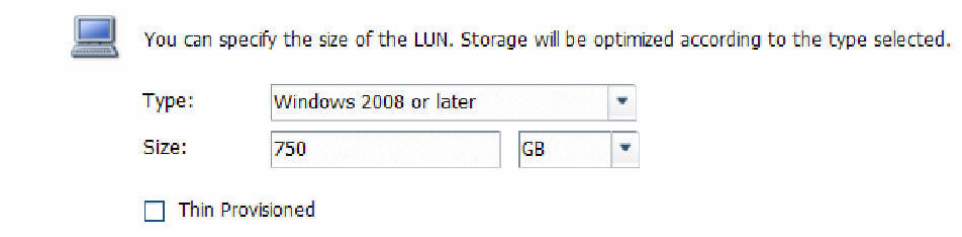
About this task

If your organization has a naming convention, you should use names for the LUN, volume, and so on that fit your convention. Otherwise you should accept the default names.

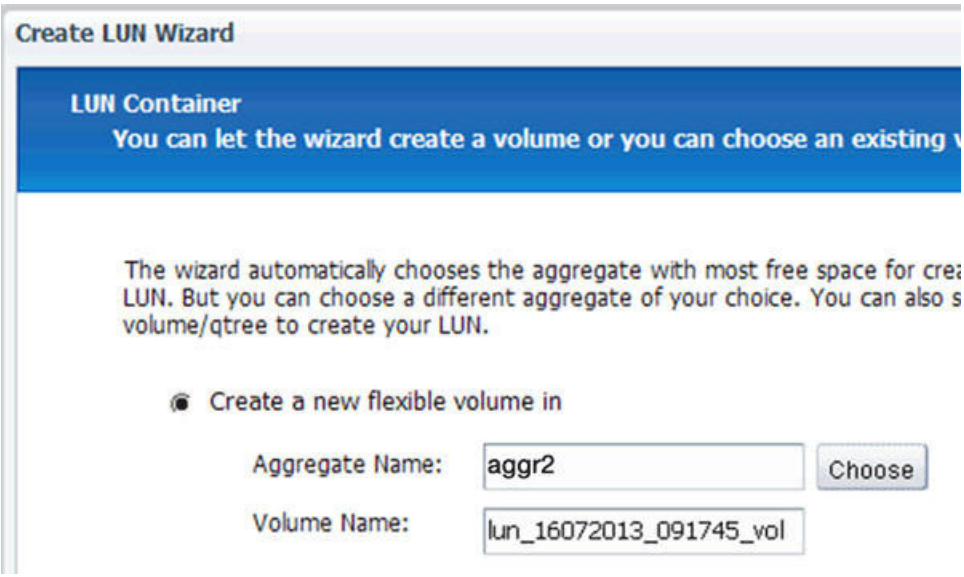
Procedure

1. From the OnCommand System Manager home page, double-click the appropriate storage system.
2. Expand the **Vservers** hierarchy in the left navigation pane.
3. In the navigation pane, select the Vserver and click **Storage** > **LUNs**.
4. In the **LUN Management** tab, click **Create**.
5. Type or select information as prompted by the wizard.
6. On the General Properties page, retain the default (deselected) value for **Thin Provisioned**. To learn more about thin provisioning and the requirements for using it, see the *Clustered Data ONTAP SAN Administration Guide*.

   You must select the LUN type that matches your version of Windows. There are two types for Windows Server 2003 (MBR or GPT) and one type for all versions of Windows Server 2008 and later.



7. On the LUN Container page, create a new FlexVol volume.



8. On the Initiators Mapping page, click **Add Initiator Group**, enter the required information on the General tab, and then on the Initiators tab, enter all the WWPNs of the host FC ports that you recorded.
9. Confirm the details and click **Finish** to complete the wizard.

Zoning the FC switches by the host and LIF WWPNs

Zoning the FC switches enables the hosts to connect to the storage and limits the number of paths. You zone the switches using the management interface of the switches.

Before you begin

- You must have administrator credentials for the switches.
- You must know the WWPN of each host initiator port and of each FC LIF for the Vserver in which you created the LUN.

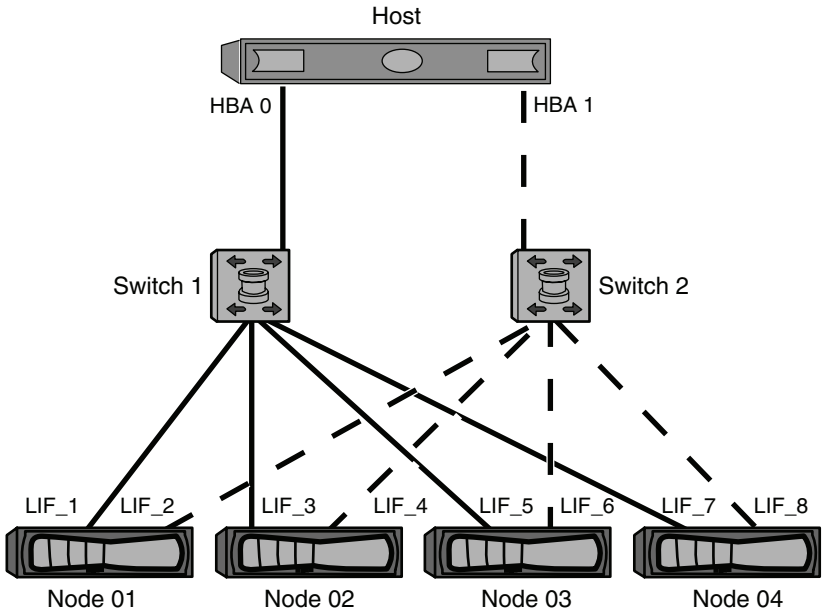
About this task

For details about zoning your switches, see the switch vendor's documentation.

You must zone by WWPN, not by physical port. Each initiator port must be in a separate zone with all of its corresponding target ports.

The following illustration shows a host connected to a four-node cluster. There are two zones, one zone indicated by the solid lines and one zone indicated by the dashed lines. Each zone contains one initiator from the host and a LIF from each

storage node.



You must ensure that you use the WWPNs of the target LIFs, not the WWPNs of the physical FC ports on the storage nodes. The LIF WWPNs are all in the range `2`*`x`*`:`*`xx`*`:00:a0:98:`*`xx`*`:`*`xx`*`:`*`xx`* , where *x* is any hexadecimal digit. The physical port WWPNs are all in the range `50:0a:09:8`*`x`*`:`*`xx`*`:`*`xx`*`:`*`xx`*`:`*`xx`* .

Procedure

1. Log in to the FC switch administration program and select the zoning configuration option.
2. Create a new zone that includes the first initiator that also includes all of the FC LIFs that connect to the same FC switch as the initiator.
3. Create additional zones for each FC initiator in the host.
4. Save the zones and activate the new zoning configuration.

Discovering new disks

LUNs on your storage system appear as disks to the Windows host. Any new disks for LUNs you add to your system are not automatically discovered by the host. You must manually rescan disks to discover them.

Procedure

1. Open the Windows Computer Management utility:

For...	Click...
Windows Server 2012	**Tools** > **Computer Management**
Windows Server 2008	**Start** > **Administrative Tools** > **Computer Management**
Windows Server 2003	**Start** > **Administrative Tools** > **Computer Management**

2. Expand the **Storage** node in the navigation tree.
3. Click **Disk Management**.

4. Click **Action** > **Rescan Disks**.

Initializing and formatting the LUN

When a new LUN is first accessed by the Windows host, it has no partition or file system. You must initialize the LUN, and optionally format it with a file system.

Before you begin

The LUN must have been discovered by the Windows host.

About this task

LUNs appear in Windows Disk Management as disks.

You can initialize the disk as a basic disk with a GPT or MBR partition table.

You typically format the LUN with a file system such as NTFS. But some applications use raw disks.

Procedure

1. Start Windows Disk Management.
2. Right-click the LUN, and select the required disk or partition type.
3. Follow the instructions in the wizard. If you choose to format the LUN as NTFS, you must select the **Perform a quick format** check box.

Verifying that the host can write to and read from the LUN

Before using the LUN, you should verify that the host can write data to the LUN and read it back.

Before you begin

The LUN must be initialized and formatted with a file system.

About this task

If the cluster node on which the LUN is created can be failed over to its partner node, you should verify reading the data while the node is failed over. This test might not be possible if the cluster is in production use.

Procedure

1. On the host, copy one or more files to the LUN.
2. Copy the files back to a different folder on the original disk.
3. Compare the copied files to the original. You can use the **comp** command at the Windows command prompt to compare two files.
4. Optional: Fail over the cluster node containing the LUN and verify that you can still access the files on the LUN.
5. Use the Data ONTAP DSM to view the paths to the LUN and verify that you have the expected number of paths.

What to do next

If any of the tests fail, verify that the FC service is running and check the FC paths to the LUN.

Where to find additional information

There are additional documents to help you learn more about FC configuration and provisioning.

All of the following documentation is available from the N series support website (accessed and navigated as described in Websites):

Clustered Data ONTAP SAN Configuration Guide
Describes supported FC, iSCSI, and FCoE topologies for connecting host computers to storage controllers in clusters.

Clustered Data ONTAP SAN Administration Guide
Describes how to configure and manage the iSCSI, FCoE, and FC protocols for clustered SAN environments, including configuration of LUNs, igroups, and targets.

OnCommand System Manager Help
Describes how to use OnCommand System Manager to complete typical tasks.

Data ONTAP DSM for Windows MPIO Installation and Administration Guide
Describes how to install and use the Data ONTAP DSM for Windows MPIO software.

Related information:

IBM N series support website: www.ibm.com/storage/support/nseries

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