Dell EMC Unity™ Family

Version 4.2

Configuring Hosts to Access Fibre Channel (FC) or iSCSI Storage

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DELL EMC

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Additional resources

As part of an improvement effort, revisions of the software and hardware are periodically released. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features. Contact your technical support professional if a product does not function properly or does not function as described in this document.

Where to get help
Support, product, and licensing information can be obtained as follows:

Product information
For product and feature documentation or release notes, go to Unity Technical Documentation at: www.emc.com/en-us/documentation/unity-family.htm.

Troubleshooting
For information about products, software updates, licensing, and service, go to Online Support (registration required) at: https://Support.EMC.com. After logging in, locate the appropriate **Support by Product** page.

Technical support
For technical support and service requests, go to Online Support at: https://Support.EMC.com. After logging in, locate **Create a service request**. To open a service request, you must have a valid support agreement. Contact your Sales Representative for details about obtaining a valid support agreement or to answer any questions about your account.

Special notice conventions used in this document

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Addresses practices not related to personal injury.

Note

Presents information that is important, but not hazard-related.

CHAPTER 1

Setting Up a Windows or Mac OS Host to Use LUN storage over iSCSI

This chapter describes how to set up a Windows or Mac OS host to use EMC LUN storage over iSCSI. It contains the following topics:

- Requirements for setting up a host 10
- VSS HW Provider overview 12
- Windows host — Using multi-path management software over iSCSI 13
- Configuring iSCSI LUNs for the host 14
- Windows host — Setting up for iSCSI LUNs 14
- Windows host — Configuring to connect to an iSCSI interface 17
- Windows host — Setting up to use iSCSI or FC LUNs 26
- Mac OS host — Setting up for iSCSI LUNs 28
- iSCSI troubleshooting 30

Requirements for setting up a host

These system and network requirements must be met before setting up a host to use Unity storage.

Before you can set up a host to use Unity storage, the following storage system and network requirements must be met.

Overview

This document describes how to configure the following hosts to access Fibre Channel (FC) or iSCSI storage provisioned on a system running the latest operating environment:

- Windows hosts
- AIX hosts
- Citrix XenServer hosts
- HP-UX hosts
- Linux hosts
- Solaris hosts

This document is intended for those who are responsible for setting up host to access storage.

Readers of this document should be familiar with FC or iSCSI LUNs and with the operating system running on the hosts that will access the LUNs.

The Unisphere online help provides specific information about storage, features, and functionality. The online help and a complete set of documentation are available on the EMC Online Support website.

System requirements

Before configuring hosts to access the storage system, ensure that these requirements are met.

Complete the following tasks before connecting hosts to the storage system:

- Install and configure the system using the **Initial Configuration** wizard.
- Use Unisphere or the CLI to configure NAS servers or interfaces, or iSCSI or Fibre Channel (FC) LUNs, on the storage system.

Network requirements

For a host to connect to LUNs on an iSCSI interface, the host must be in the same network environment with the iSCSI interface. To achieve best performance, the host should be on a local subnet with each iSCSI interface that provides storage for it. In a multi-path environment, each physical interface must have two IP addresses assigned; one on each SP. The interfaces should be on separate subnets.

To achieve maximum throughput, connect the iSCSI interface and the hosts for which it provides storage to their own private network. That is, a network just for them. When choosing the network, consider network performance.

Path management network requirements

Note

Path management software is not supported for a Windows 7 or Mac OS host connected to a Unity system.

When implementing a highly-available network between a host and your system, keep in mind that:

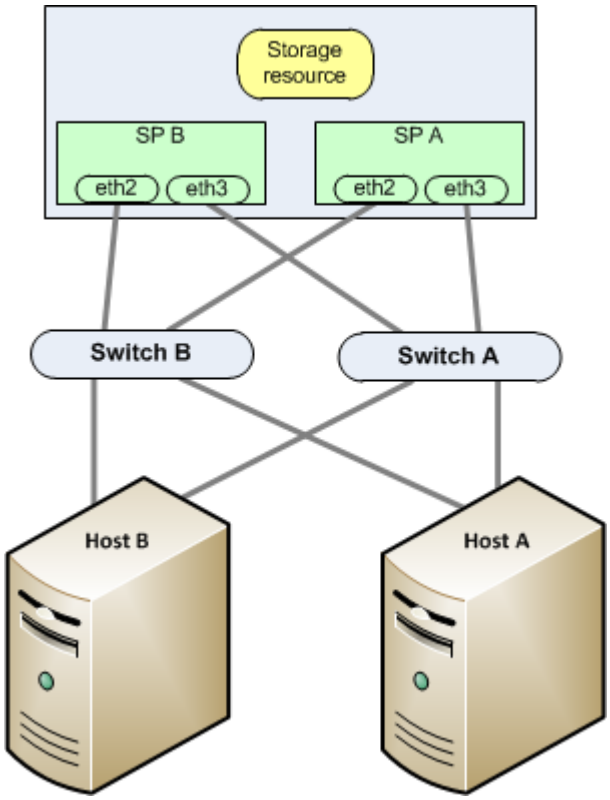
- A LUN is visible to both SPs
- You can configure up to 8 IPs per physical interface. If more than one interface is configured on a physical interface, each interface must be configured on a separate VLAN.
- Network switches may be on separate subnets.

Note

Directly attaching a host to a Unity system is supported if the host connects to both SPs and has the required multipath software.

The following figure shows a highly-available iSCSI network configuration for hosts accessing a storage resource (iSCSI LUNs). Switch A and Switch B are on separate subnets. Host A and Host B can each access the storage resource through separate NICs. If the storage resource is owned by SP A, the hosts can access the storage resource through the paths to the interfaces on SP A. Should SP A fail, the system transfers ownership of the resource to SP B and the hosts can access the storage resource through the paths to the interfaces on SP B.

Figure 1 Highly-available iSCSI network sample



VSS HW Provider overview

The VSS HW Provider runs as a Windows service and provides the interface between the Microsoft Volume Shadow Copy Service (VSS) and your storage system. The VSS HW Provider enables VSS requestor applications, such as VSS-enabled backup applications, to make snapshots of iSCSI and FC LUNs.

Microsoft VSS

VSS provides the backup framework for Windows Server 2003 R2, Windows Server 2008, and Windows Server 2012 and enables the creation of snapshots (called shadow copies for Microsoft VSS) — point-in-time copies of data. VSS is integrated with front-end applications so they can create and access shadow copies.

The VSS architecture includes VSS providers. A VSS provider creates and maintains shadow copies and acts as the interface to point-in-time imaging capabilities either on a storage platform (hardware-based provider) or in a host operating system (software-based provider). The Unity VSS HW Provider is a hardware-based provider that works directly with iSCSI and FC LUNs on the Unity iSCSI and FC interfaces and with the VSS service on Windows Server 2003 R2, Windows Server 2008, or Windows Server 2012 hosts to provide consistent shadow copy creation and addressing.

Because the Unity VSS HW Provider is a hardware-based provider, it reduces the load on the CPU and memory of the host. It is also more efficient in an environment where shadow copies of multiple volumes must be taken simultaneously.

Refer to the Microsoft documentation for more information about VSS.

Windows host — Using multi-path management software over iSCSI

Multi-path management software manages the connections (paths) between the host and the storage system to provide access to the storage if one of the paths fails. The following types of multi-path management software are available for a Windows 2003, Windows Server 2008, or Window Server 2012 connected host :

- EMC PowerPath software on a Windows 2003, Windows Server 2008, or Windows Server 2012 host. Refer to the *Unity Support Matrix* on the support website for compatibility and interoperability information.

  Note

  PowerPath is not supported for Windows 7.

- Native MPIO on Windows 2003, Windows Server 2008, or Windows Server 2012 without Multiple Connections per Session (MCS).

  Note

  The MultiPath IO feature must first be enabled before it can be used. MCS is not supported by Unity.

For information on data availability in your Unity system and your connectivity infrastructure, refer to *EMC Unity High Availability, A Detailed Review* white paper.

Setting up your system for multi-path management software

For your system to operate with hosts running multi-path management software, two iSCSI IPs are required. These IPs should be on separate physical interfaces on separate SPs.

Verify the configuration in Unisphere. For details on how to configure iSCSI interfaces, refer to topics about iSCSI interfaces in the Unisphere online help.

Note

For highest availability, use two network interfaces on the iSCSI interface. The network interfaces should be on separate subnets. You can view the network interfaces for an iSCSI interface within Unisphere.

Installing PowerPath

Procedure

1. On the host or virtual machine, download the latest PowerPath version from the PowerPath software downloads section on the EMC Online Support website.
2. Install PowerPath as described in the appropriate PowerPath installation and administration guide for the host's or virtual machine's operating system.

   This guide is available on EMC Online Support. If the host or virtual machine is running the most recent version and a patch exists for this version, install it, as described in the `readme` file that accompanies the patch.
3. When the installation is complete, reboot the host or virtual machine.

4. When the host or virtual machine is back up, verify that the PowerPath service has started.

Configuring iSCSI LUNs for the host

Use Unisphere or the CLI to:

Procedure

1. Create storage over iSCSI for the host.
2. Add the host to the storage system in Unisphere or by using the Unity CLI and creating a host. If your host is not already logged in, manually create an iSCSI initiator by providing the host IQN.
3. Provide host access to the storage over iSCSI. Host access options are: **No Access**, **LUN**, **Snapshot**, **LUN and Snapshot**.

Note

On a Mac OS host, the Xtend SAN iSCSI initiator will not log into the iSCSI storage if no vdisk0 is configured on the target (iSCSI interface). We recommend that you to create a unique iSCSI interface, create an iSCSI resource on this iSCSI interface, and provide access to the Mac OS host. The first LUN that you create on this iSCSI resource is vdisk0.

For information on performing the above Unisphere tasks, refer to the Unisphere online help.

Windows host — Setting up for iSCSI LUNs

To set up a Windows host for iSCSI LUNs, perform these tasks:

1. Install the Unity VSS HW Provider on page 14
2. Install the Microsoft iSCSI Initiator and iSCSI initiator service on the Windows host (Windows Server 2003 and Windows Server 2008 SP2) on page 15
3. Start the iSCSI initiator service (Windows Server 2008 R2 and Windows Server 2012) on page 16
4. For a multi-path configuration, install the MPIO feature (Windows 2003 and Windows Server 2008 SP2) on page 16
5. Set registry values on page 16

Install the Unity VSS HW Provider

Installing the Unity VSS HW Provider (for Windows Server 2003, Windows Server 2008, and Windows Server 2012) is optional. However, if you plan to take application consistent snapshots using backup software, you must install the Unity VSS HW Provider.
It is recommended that you install the VSS HW Provider on the host that will use the iSCSI or FC LUNs with backup applications.

To install the Unity VSS HW Provider:

Procedure

1. Log in to the host using an account with administrator privileges.

2. Download the software package that you want to install as follows:
   a. Locate the Unity VSS tool on online support.

      Note

      You may need to filter by **Support Tools**.

   b. Choose the correct version for your Windows platform, and select the option to save the software to the host.
3. In the directory where you saved the software, double-click the Unity VSS provider executable file to start the installation wizard.
4. Follow the instructions in the wizard to complete the installation of the Unity VSS provider.

Starting and stopping the Unity VSS HW Provider

The Unity VSS HW Provider runs as a Windows service and is enabled by default. You can stop and start this service from the Windows Services administrative tool.

Install the Microsoft iSCSI Initiator and iSCSI initiator service on the Windows host (Windows Server 2003 and Windows Server 2008 SP2)

To connect to the iSCSI targets (iSCSI interfaces), the host uses an iSCSI initiator, which requires the Microsoft iSCSI Software Initiator and the iSCSI initiator service software. This software is not included with the Windows Server 2003 operating system software, so you must install it on the host if the host is running Windows Server 2003. When you install the software on the host, the iSCSI initiator software starts.
To install the Microsoft iSCSI Initiator and iSCSI service:

Procedure

1. Download the latest iSCSI initiator software and related documentation from the Microsoft website to the host.
2. After you download the appropriate software, double-click the executable to open the installation wizard, click Next in the Welcome page, and follow the steps in the installation wizard.
3. If this is an upgrade of existing iSCSI initiator software, you must restart the host.
4. For shared storage, make the LanManServer service dependent on the iSCSI initiator service by starting the LanManServer before the iSCSI initiator service with the following command:

   ```
   sc config LanManServer depend= MSiSCSI
   ```

   Note

   If you use LanManServer on a Windows Server 2003 host to set up shares on an iSCSI resource, these shares are available only after you reboot the host because the LanManServer service starts before the iSCSI initiator service.

Start the iSCSI initiator service (Windows Server 2008 R2 and Windows Server 2012)

To connect to the targets (iSCSI interfaces), the host uses an iSCSI initiator, which requires the Microsoft iSCSI Software Initiator software and the iSCSI initiator service. This software and service are part of the Windows Server 2008 software; however, the driver for it is not installed until you start the service. You must start the iSCSI initiator service using the administrative tools.

Note

If the host is behind a Windows firewall, Microsoft asks if you want to communicate through the firewall. Before proceeding, we suggest that you consult with your network support administrator.

For a multi-path configuration, install the MPIO feature (Windows 2003 and Windows Server 2008 SP2)

Note

This task is mandatory. Powerpath is an alternative to Native MS MPIO.

If the Windows host will use a multi-path configuration to connect to the LUNs, you should install the MPIO feature. To install MPIO on Windows Server 2008:

Procedure

1. Open Server Manager.
2. In the **Server Manager** tree, click **Features**.
3. In the **Features** pane, under **Features Summary**, click **Add Features**.
4. In the **Add Features Wizard**, select **Multipath I/O**, and click **Next**.
5. In the **Confirm Installation Selections** dialog box, click **Install**.
6. When the installation is complete, in the Installation **Results** dialog box, click **Close**.
7. When prompted to restart the computer, click **Yes**.

   After restarting, the host finalizes the MPIO installation.
8. Click **Close**.

Set registry values

Note

Incorrectly modifying the Registry can cause serious system-wide problems that can require you to reinstall the system. Use the Windows Registry Editor at your own risk.

Procedure

1. On the host, run the Windows Registry Editor (**regedit.exe**).
2. Go to HKEY_LOCAL_MACHINE\SYSTEM\.
3. Right-click **CurrentControlSet**, and search for the **MaxRequestHoldTime** key and modify its value from 60 to 600 (decimal) or from 3c to 258 (hexadecimal).

Note

Verify that the path to the parameter that you found in the CurrentControlSet. If it is not, search for the parameter again. If you make changes to ControlSets other than the top level current set, those changes will not affect the system.

4. If the host is running PowerPath:
   a. Search for the register keys list in Table 1 on page 17.

   Note

   Verify that the path to the parameter that you found in the CurrentControlSet. If it is not, search for the parameter again. If you make changes to ControlSets other than the top level current set, those changes will not affect the system.

   b. Record the value of each of these registry keys, so you have them in case you need to uninstall PowerPath.
   c. Update each of these registry keys. See Table 1 on page 17.

Table 1 Registry keys to update (iSCSI only)

Registry keys	Instructions
LinkDownTime	Set to 600.
AsyncLogoutPauseTimeout (new value)	Add this REG_DWORD key in the same key as LinkDownTime. Set it to 600.
DelayBetweenReconnect PortalRetryCount	Find the DelayBetweenReconnect value. Set the PortalRetryCount value so that PortalRetryCount*DelayBetweenReconnect=600
SrbTimeoutDelta (for PowerPath only)	Set to 100 for PowerPath only.

5. Quit the Registry Editor.

Windows host — Configuring to connect to an iSCSI interface

Before an initiator can establish a session with a target, the initiator must discover where the targets are located and the names of the targets available to it. To obtain this information the initiator uses the iSCSI discovery process. The iSCSI interfaces support discovery with or without an iSNS server. Without iSNS discovery, you must add the target information to the Microsoft iSCSI Initiator. With iSNS discovery, the initiator queries the iSNS server where all iSCSI initiators and targets register themselves, and the server responds with a list of available targets. When the target information is available to the Microsoft iSCSI Initiator, you can connect the host initiator to the target so the host can access the iSCSI LUNs.

Note

Unless you are using iSCSI targets in a clustered environment, avoid giving more than one initiator access to the same LUN. Conflicts can occur if more than one initiator tries to write to the LUN. If the LUN is formatted with the NTFS file system in Windows, simultaneous writes can corrupt the NTFS file system on the LUN.

Each iSCSI interface is a target. If a storage system has two iSCSI interfaces, it has two targets. Each target has one session.

To connect to an iSCSI target, you must add the target IP address in Microsoft iSCSI Initiator. If you have multiple targets (iSCSI interfaces), you can use the Microsoft iSCSI initiator to discover the targets through an individual IP address.

To configure the Windows host initiators:
Go to the section below for the host's configuration:

For Windows Server 2003 or Windows Server 2008 SP2 or earlier:

- Multipath configuration with iSCSI or PowerPath:
  Configuring a Windows Server 2003 or Windows Server 2008 SP2 or earlier initiator to connect to an iSCSI interface — multi-path configuration on page 18

For Windows Server 2008 R2 or Windows Server 2012:

- Multi-path configuration with iSCSI or PowerPath:
  Configuring a Windows Server 2008 R2 or Windows Server 2012 initiator to connect to a storage system iSCSI interface — multi-path configuration on page 22

Setting Up MPIO for a Windows Cluster Using a Storage System on page 85 gives an end-to-end example of setting up a two-node Windows Server 2008 R2 Exchange cluster in an MPIO multi-path configuration.

For Windows 7:
Configuring a Windows 7 initiator to connect to a storage system iSCSI interface on page 25

Configuring a Windows Server 2003 or Windows Server 2008 SP2 or earlier initiator to connect to an iSCSI interface — multi-path configuration

Before you configure a Windows Server 2003 or Windows Server 2008 SP2 or earlier initiator to connect to an iSCSI interface in a multi-path configuration:

- You must have configured the iSCSI interface with two IP interfaces on two separate physical ports. Each IP interface should be on a separate IP subnet.
- The Windows host must have two network interfaces. One interface must be on the IP subnet with one of the storage system iSCSI interfaces, and the other interface must be on the IP subnet with the other storage system iSCSI interface.

To configure a Windows Server 2003 or Windows Server 2008 SP2 or earlier initiator to connect to an iSCSI interface in a multi-path configuration, perform these tasks:

- Multi-path configuration with Native MPIO:
  1. Setup optional mutual CHAP — Windows Server 2003 or Windows Server 2008 SP2 or earlier in multi-path configuration on page 19
  2. Discover the storage system iSCSI interface in an environment — Windows Server 2003 or Windows Server 2008 SP2 or earlier in a multi-path configuration on page 19

3. Identify and set active paths to the storage system on page 21

- Multi-path configuration with PowerPath:
  1. Setup optional mutual CHAP — Windows Server 2003 or Windows Server 2008 SP2 or earlier in multi-path configuration on page 19
  2. Discover the storage system iSCSI interface in an environment — Windows Server 2003 or Windows Server 2008 SP2 or earlier in a multi-path configuration on page 19

Note

MCS is not supported.

Setup optional mutual CHAP — Windows Server 2003 or Windows Server 2008 SP2 or earlier in multi-path configuration

To configure optional mutual Challenge Handshake Authentication Protocol (CHAP) you need the mutual CHAP secret specified for the storage system iSCSI interface. For the storage system iSCSI interface to which you want the host iSCSI initiator to access:

Procedure

1. On the host, start the Microsoft iSCSI Initiator.
2. If mutual CHAP authentication is configured on the storage system iSCSI interface, then in the Microsoft iSCSI Initiator:
   a. Click the **General** tab and select **Secret**.
   b. In the **CHAP Secret Setup** dialog box, enter the mutual CHAP secret for the storage system iSCSI interface.

      If the storage system has multiple iSCSI interfaces, this secret is the same for all. You can find this secret in the **CHAP** section on the **Access** settings page in Unisphere (**Settings** > **Access > CHAP**).
   c. Click **OK**.

Discover the storage system iSCSI interface in an environment — Windows Server 2003 or Windows Server 2008 SP2 or earlier in a multi-path configuration

If the host initiator is configured for optional initiator Challenge Handshake Authentication Protocol (CHAP) on the storage system iSCSI interface, you need the secret (password) specified for the initiator on the storage system.

Procedure

1. On the host, start the Microsoft iSCSI Initiator.
2. Click the **Discovery** tab.
3. Under **Target Portals**, click **Add**.

   The **Add Target Portal** dialog box opens.
4. In the **Add Target Portal** dialog box:
   a. Enter the IP address of the storage system iSCSI interface on the first subnet with the host interface. You can find this address with Unisphere by selecting **Storage** > **Block** > **iSCSI Interfaces**.
   b. Click **Advanced**.

      The **Advanced Settings** dialog box opens.

5. In the **Advanced Settings** dialog box, set the following:
   - **Local adapter** to **Microsoft iSCSI Initiator**.
   - **Source IP** to the IP address of the host interface on the first subnet with the storage system iSCSI interface.
6. If the host initiator is configured for optional initiator CHAP on the storage system iSCSI interface:
   a. Select **CHAP logon information**.
   b. Leave **User name** as the default value, which is the initiator's IQN.
   c. Set **Target secret** to the same secret that is configured for the host initiator on the storage system iSCSI interface. The storage system iSCSI interfaces support CHAP secrets of 12 to 16 characters only.
   d. If the iSCSI interface is configured for mutual CHAP, select **Perform Mutual Authentication**.
7. Click **OK** to close the **Advanced Settings** dialog box.
8. Click **OK** to close the **Add Target Portal** dialog box.
9. In the **Discovery** tab, verify that the address of the first iSCSI interface appears in the **Target Portals** list.
10. Click the **Targets** tab. The IQNs representing the ports configured on the storage system appear in the **Targets** list with an **Inactive** status.
11. In the **Targets** tab, select a storage system iSCSI interface target name, and click **Log On**. The **Log On to Target** dialog box opens.
12. In the **Log On to Target** dialog box:
    a. Select **Automatically restore this connection when the system reboots**.
    b. Select **Enable multi-path**.
    c. Click **Advanced**. The **Advanced Settings** dialog box opens.
13. In the **Advanced Settings** dialog box, set the following:
    - **Local adapter** to **Microsoft iSCSI Initiator**.
    - **Source IP** to the address of the host interface on the first subnet with the storage system iSCSI interface.
    - **Target Portal** to the address of the storage system iSCSI interface on the first subnet with the host interface.
      To find the IP address associated with this IQN, note the IQN name, and then go to **Storage** > **Block** > **iSCSI Interfaces** in Unisphere.
14. If the host initiator is configured for optional initiator CHAP on the storage system iSCSI interface:
    a. Select **CHAP logon information**.
    b. Leave **User name** as the default value, which is the initiator's IQN.
    c. Set **Target secret** to the same secret that is configured for the host initiator on the storage system iSCSI interface. The iSCSI interfaces support CHAP secrets of 12 to 16 characters only.
    d. If the storage system iSCSI interface is configured for mutual CHAP, select **Perform Mutual Authentication**.

15. Click **OK** to close the **Advanced Settings** dialog box.
16. Click **OK** to close the **Log On to Target** dialog box.
17. Repeat steps 11 through 16 for all other targets listed in the **Targets** tab. Ensure that the relevant IP addresses are selected accurately. Once logged on, each listed target must appear with the **Connected** status.

Identify and set active paths to the storage system

Note

This section does not apply to multi-path configuration with PowerPath.

The Microsoft iSCSI Initiator may not accurately identify the active paths to the storage system. Complete the following steps to identify and set the active paths:

Note

To achieve effective load-balancing, ensure that only paths to the SP that owns the LUN are set as Active. Setting paths to the standby SPs as Active can cause issues in your implementation.

Procedure

1. In the **Targets** tab, select a storage system iSCSI interface target, and click **Details**.

   The **Target Properties** dialog box opens.
2. On the **Devices** tab, click **Advanced**. The **Device Details** dialog box opens.
3. Click the **MPIO** tab. This tab lists all valid paths, with a single path set as **Active**. This path goes to the SP owner of the storage resource.
4. Ensure that **Load Balance Policy** is set to **Round Robin With Subset**.
5. Click the interface with the path set as **Active**, and click **Details**.
6. In the **MPIO Path Details** dialog box, note the value in the **Target Portal** column. This is the IP address associated with the iSCSI interface created on the relevant port of the SP.
7. Click **OK** to close the **MPIO Path Details** dialog box.
8. For each interface with the path set as **Standby**, click **Details** to launch the associated **MPIO Path Details** dialog box.
9. Review the value in the **Target Portal** column, and identify the interface that has path to the same SP as the interface with the path set as Active.

   Note

   In Unisphere, go to **Settings** > **iSCSI Settings** to review the list of interfaces/IP addresses with path to the same SP.
10. For the interface with the path to the same SP, on the **MPIO** tab, click **Edit**.
11. In the **Edit Settings** dialog box, set **Path Type** to **Active**.
12. Click **OK** to close the **Edit Settings** dialog box.
13. On the **MPIO** tab, verify that the interface appears with the path set as **Active**.
14. Click **OK** to close the **Device Details** dialog box.

15. Click **OK** to close the **Target Properties** dialog box.
16. Click **OK** to exit the Microsoft iSCSI Initiator.

What next?

Continue to Windows host — Setting up to use iSCSI or FC LUNs on page 26

Configuring a Windows Server 2008 R2 or Windows Server 2012 initiator to connect to a storage system iSCSI interface — multi-path configuration

Before you configure a Windows Server 2008 R2 initiator to connect to a storage system iSCSI interface in a multi-path configuration:

- You must have configured the storage system iSCSI interface with two IP interfaces on two separate physical ports. Each IP interface should be on a separate IP subnet.
- The Windows host must have two network interfaces. One interface must be on the IP subnet with one of the storage system iSCSI interfaces, and the other interface must be on the IP subnet with the other storage system iSCSI interface.

To configure a Windows Server 2008 R2 or later initiator to connect to a storage system iSCSI interface in a multi-path configuration, perform these tasks:

- Multi-path configuration with Native MPIO:
  1. Setup optional mutual CHAP — Windows Server 2008 R2 in multi-path configuration on page 22
  2. Configure MPIO to recognize iSCSI devices on page 23
  3. Discover the storage system iSCSI interface in an environment — Windows Server 2008 R2 in multi-path configuration on page 23
  4. Review the paths to the SP on page 24
  5. Verify the paths MPIO will use for load balancing on page 25
- Multi-path configuration with PowerPath:
  1. Setup optional mutual CHAP — Windows Server 2008 R2 in multi-path configuration on page 22
  2. Discover the storage system iSCSI interface in an environment — Windows Server 2008 R2 in multi-path configuration on page 23

Note

MCS is not supported.

Setup optional mutual CHAP — Windows Server 2008 R2 in multi-path configuration

To configure optional mutual Challenge Handshake Authentication Protocol (CHAP) you need the mutual CHAP secret specified for the storage system iSCSI interface. For the storage system iSCSI interface to which you want the host iSCSI initiator to access:

Procedure

1. On the host, start the Microsoft iSCSI Initiator.
2. If mutual CHAP authentication is configured on the storage system iSCSI interface, then in the Microsoft iSCSI Initiator:
   a. Click the **Configuration** tab.

b. On the **Configuration** tab, click **CHAP**.

The **iSCSI Initiator Mutual Chap Secret** dialog box opens.

c. In the **iSCSI Initiator Mutual Chap Secret** dialog box, enter the mutual CHAP secret for the storage system iSCSI interface.

If the storage system has multiple iSCSI interfaces, this secret is the same for all. You can find this secret in the **CHAP** section on the Access settings page in Unisphere (**Settings** > **Access** > **CHAP Interfaces**).

d. Click **OK**.

Configure MPIO to recognize iSCSI devices

Note

This section does not apply to multi-path configuration with PowerPath.

Procedure

1. Launch the MPIO application.
2. On the **MPIO Properties** dialog box, click the **Discover Multi-Paths** tab.
3. Under **SPC-3 compliant**, select **Add support for iSCSI devices**.
4. Click **Add**. A **Reboot Required** dialog box opens.
5. In the **Reboot Required** dialog box, click **Yes**.
6. Once the server reboots, launch the MPIO application, and verify that the MPIO is configured to claim all iSCSI devices.

Discover the storage system iSCSI interface in an environment — Windows Server 2008 R2 in multi-path configuration

If the host initiator is configured for optional initiator Challenge Handshake Authentication Protocol (CHAP) on the storage system iSCSI interface, you need the secret (password) specified for the initiator on the system.

Procedure

1. On the host, start the Microsoft iSCSI Initiator.
2. Click the **Discovery** tab.
3. Under **Target Portals**, click **Discover Portal**.

   The **Discover Target Portal** dialog box opens.
4. In the **Discover Target Portal** dialog box:

   a. Enter the IP address of the storage system iSCSI interface on the first subnet with the host interface.

   You can find this address with Unisphere by selecting **Storage** > **Block** > **iSCSI Interfaces**.

   b. Click **Advanced**.

   The **Advanced Settings** dialog box opens.
5. In the **Advanced Settings** dialog box, set the following:
   - **Local adapter** to Microsoft iSCSI Initiator.

- **Initiator IP** to the IP address of the host interface on the first subnet with the storage system iSCSI interface.

6. If the host initiator is configured for optional initiator CHAP on the storage system iSCSI interface:
   a. Select **Enable CHAP logon**.
   b. Leave **Name** as the default value, which is the initiator's IQN.
   c. Set **Target secret** to the same secret that is configured for the host initiator on the storage system iSCSI interface.

      The iSCSI interfaces support CHAP secrets of 12 to 16 characters only.

   d. If the storage system iSCSI interface is configured for mutual CHAP, select **Perform Mutual Authentication**.
7. Click **OK** to close the **Advanced Settings** dialog box.
8. Click the **Targets** tab.
9. In the **Targets** tab under **Discovered Targets**, select the storage system iSCSI target and click **Connect**.

   The **Connect to Target** dialog box opens.
10. In the **Connect to Target** dialog box:
    a. Verify that **Add this connection to the list of Favorite Targets** is selected.
    b. Select **Enable Multi-path**.
    c. Click **Advanced**.

       The **Advanced Settings** dialog box opens.
11. In the **Advanced Settings** dialog box, set the following:
    - **Local adapter** to Microsoft iSCSI Initiator.
    - **Initiator IP** to the address of the host interface on the first subnet with the storage system iSCSI interface.
    - **Target portalIP** to the address of the storage system iSCSI interface on the first subnet with the host interface.

    You can find this address with Unisphere by selecting **Storage** > **Block** > **iSCSI Interfaces**.
12. Click **OK** to close the **Advanced Settings** dialog box.
13. Click **OK** to close the **Connect to Target** dialog box.
14. Repeat steps 8 through 13 for all other targets listed in the **Targets** tab. Ensure that the relevant IP addresses are selected accurately. Once connected, each listed target must appear with the **Connected** status.

Review the paths to the SP

Note

This section does not apply to multi-path configuration with PowerPath.

Procedure

1. In the **Targets** tab, select a storage system iSCSI interface target, and click **Devices**.

2. On the **Devices** dialog box, under **Configure Multipath IO (MPIO)**, click **MPIO**. The **Device Details** dialog box opens.

   This tab lists all valid paths, with a single path set as Active. This path goes to the SP owner of the storage resource.

3. In the **MPIO** tab, ensure that **Load Balance Policy** is set to **Round Robin With Subset**.
4. Review the list of paths to each device, and verify that they are set to **Active**.

   Although all paths may appear as Active, it does not mean that the I/O operations will be active on all connections. The I/O will be directed only to the paths on the SP that owns the device or storage resource.

5. Click **OK** to close the **Properties** dialog box.
6. Click **OK** to exit the Microsoft iSCSI Initiator.

Verify the paths MPIO will use for load balancing

Note

This section does not apply to multi-path configuration with PowerPath.

Procedure

1. Launch the MPIO application.
2. On the **MPIO Properties** dialog box, click the **Configuration Snapshot** tab.
3. Under **Snapshot**, specify a path and file name for the output.
4. Select **Open File upon capture**, and then click **Capture**.

   The output will appear in a text editor. It lists available paths to each device or storage resource. Note the following:

   - Paths with **Active/Optimized** state are used to balance I/O to a storage resource.
   - Paths with **Active/Unoptimized** state are used for failovers only.

What next?

Continue to Windows host — Setting up to use iSCSI or FC LUNs on page 26

Configuring a Windows 7 initiator to connect to a storage system iSCSI interface

If the host initiator is configured for optional initiator Challenge Handshake Authentication Protocol (CHAP) on the storage system iSCSI interface, you need the secret (password) specified for the initiator on the storage system.
To configure a Windows 7 to connect to a storage system:

Procedure

1. On the host, start the Microsoft iSCSI Initiator.

   On way to start the iSCSI Initiator is by going to the Control Panel and selecting **All Control Panel Items** > **Administrative Tools** > **iSCSI Initiator**.

2. If prompted to start the iSCSI service, click **Yes**.

3. In the **Targets** tab, enter the IP address of the storage system iSCSI interface and click **Quick Connect**.
4. In the Quick Connect window under Discovered targets, select the storage system iSCSI interface and click **Connect**.

   The storage system iSCSI LUNs on the target (storage system iSCSI interface) for the host are added to Windows 7.
5. Click **Done**.

   The connection to the storage system iSCSI interface appears on the Targets tab as Connected.
6. Click the **Volumes and Devices** tab and click **Auto Configure**.

   The LUNs are connected to the host.

Windows host — Setting up to use iSCSI or FC LUNs

To set up a Windows host to use iSCSI or FC LUNs, perform the following tasks:

1. Register the LUNs as MPIO devices (Windows Server 2008 R2 and Windows Server 2012) on page 26
2. Set the offset for the LUN to 64 KB on page 26
3. Configure a volume on the LUN on page 27

Register the LUNs as MPIO devices (Windows Server 2008 R2 and Windows Server 2012)

If you are using Multipath I/O (MPIO) with Windows Server 2008, you must register LUNs as MPIO devices and set up MPIO to discover iSCSI or FC devices:

Procedure

1. On the host, start the MPIO Administrative Tool:

   Either **Start** > **Administrative Tools** and select **MPIO** or **Start** > **Run** and enter **mpiocpl.exe**.
2. Open the MPIO control panel, and click the **Discover Multi-Paths** tab.
3. Select the **Add support for iSCSI devices** check box, and click **Add**.
4. When prompted to restart the computer, click **Yes**.

   When the computer restarts, the MPIO Devices tab lists the additional hardware ID “MSFT2005iSCSIBusType_0x9.” When this hardware ID is listed, all iSCSI bus attached devices will be claimed by the Microsoft DSM.
5. Restart the host when prompted.

Set the offset for the LUN to 64 KB

Note

This task is only required for systems running Hyper-V on Windows Server 2003, or systems that were upgraded from Windows Server 2003 to Windows Server 2008 or later.

After the initiator logs in to a target, each of the target’s LUNs that the initiator can access appears as an unknown disk in the Windows Disk Management tool.

To set the offset for the LUN on the host:

Procedure

1. Select **Run** > **diskpart**.
2. Select the disk:

   ```
   select disk n
   ```

   where `n` is the disk number.

   If you do not know the disk number, enter:

   ```
   list disk
   ```

3. On the selected disk, create a primary partition with an offset of 64 KB:

   ```
   create part pri align=64
   ```

Configure a volume on the LUN

The following configuration process initializes the LUN, creates a partition, formats a volume on the partition, and mounts the partition on a drive letter:

Procedure

1. On the host, in the Microsoft Disk Management tool, select the LUN.
2. If the system asks you to initialize the disk, click **Yes**, but do not choose to make the disk a dynamic disk because the iSCSI interfaces do not support dynamic disks.

   For a given LUN, its drive letter, disk number, and LUN number are independent.
3. Use a quick format operation (Windows Server 2003 or Windows Server 2008) or the New Simple Volume wizard (Windows 7) to create a volume on the disk with the following properties:
   - NTFS file system
   - 64K location unit size

   Note

   Do not format more than one LUN at a time. Otherwise, some of the volumes can become write-protected and cannot be formatted.

   You can change the volume label. Because the disk number of a LUN can change after system restart or after logging in to and out of a target, be sure to change the default volume label (“New Volume”) to a descriptive label.
4. Assign an available drive letter to the disk.
5. Close the Disk Management tool.

Mac OS host — Setting up for iSCSI LUNs

To set up a Mac OS for iSCSI LUNs, you must perform these tasks:

1. Installing and configuring the ATTO Xtend SAN iSCSI Initiator on a Mac OS host on page 28
2. Set up a Mac OS host to use LUNs on page 29

Installing and configuring the ATTO Xtend SAN iSCSI Initiator on a Mac OS host

To connect a host iSCSI initiator on a Mac OS host to iSCSI storage, you must install the ATTO Xtend SAN iSCSI Initiator and configure the initiator for the target.

Procedure

1. On the storage system, from the **iSCSI Interfaces** page in Unisphere (**Storage** > **Block** > **iSCSI Interfaces**), determine the IP address of the storage system iSCSI interface (target) to which you want the host initiator to connect. This iSCSI interface is the one with the iSCSI storage resources for the host.
2. On the Mac OS host, insert the Xtend SAN CD into a CD drive, and following the steps in the installation wizard.

   An **iSCSI Xtend SAN** icon appears at the location where you chose to install the initiator.
3. Double-click the **iSCSI Xtend SAN** icon.
4. Click the **Discover Targets** tab.
5. In the **Discover Targets** dialog box:
   a. Enter the IP address of the target, which is the IP address of the iSCSI interface with the iSCSI LUNs for the Mac OS.
   b. To use optional CHAP:
      - Enter the target user name.
      - Enter the target secret.
      - For optional CHAP mutual authentication, select the **Mutual Authentication** checkbox.
   c. Click **Finish**.

      The **Setup** dialog box appears, displaying the iqn of the discovered storage system target.
6. In the **Setup** dialog box:
   a. Select **Visible** and **Auto Login**.
   b. Click **Save**.
7. Click the **Status** tab.
8. In the **Status** dialog box, click **Login**.

   When the login operation is complete, the red icon before the iqn name in the left panel turns green.
9. Click **LUNs** to verify the connections.

If the initiator is connected to the iSCSI interface, the iSCSI LUN for the host appears in the LUNs list.

Set up a Mac OS host to use LUNs

Before the Mac OS host can use a LUN, you must use the Mac OS Disk Utility to:

1. Format the LUN on page 29
2. Partition the LUN on page 29

Format the LUN

Procedure

1. On the host, go to **Finder** > **Application** > **Utilities**.
2. Double-click **Disk Utility**.
3. In the left panel, select the LUN.
4. Click the **Erase** tab.
5. For **Volume Format**, select the format that you want, and confirm your format choice.
6. Click **Erase** and verify the erase procedure, and click **Erase** again to start the erase process.

   When the erase process is finished, the LUN is ready for you to partition it.

Partition the LUN

Procedure

1. On the host, go to **Finder** > **Application** > **Utilities**.
2. Double click **Disk Utility**.
3. In the left panel, select the LUN.
4. Click the **Partition** tab.
5. Under Volume Scheme, select the number of partitions for the LUN.

   The utility displays equal-sized partitions to fill the available space on the LUN.
6. For each partition:
   a. Select the partition.
   b. In **Name**, enter a name for the partition.
   c. Under **Format**, select the format for the partition.

      The default format - Mac OS Extended (Journaled) - is a good choice for most uses.
   d. In **Size**, enter the size for the partition.
7. When you have specified, the name, size, and format for each partition, click **Apply**.

   The Disk Utility uses the partition information to create volumes that the host can access and use. When the partitioning process is complete, the new volumes are mounted on the desktop and ready to use.

You are now ready to either migrate data to the LUN or have the host start using the LUN. To migrate data to the LUN, go to Migrating FC or iSCSI Data to the Storage System on page 79.

iSCSI troubleshooting

This section contains information about:

- iSCSI session troubleshooting on page 30
- Known Microsoft iSCSI Initiator problems on page 31

iSCSI session troubleshooting

Procedure

1. Use **ping** with the IP address to verify connectivity from the host to the target's IP address.

   Using the IP address avoids name resolution issues.

   Note

   You can find the IP address for the target by selecting **Storage** > **Block** > **iSCSI Interfaces** in Unisphere.

   Some switches intentionally drop ping packets or lower their priority during times of high workload. If the ping testing fails when network traffic is heavy, verify the switch settings to ensure the ping testing is valid.

2. On the host, verify that the iSCSI initiator service is started.

   Note

   The iSCSI service on the iSCSI interface starts when the system is powered up.

3. In the Microsoft iSCSI Initiator, verify the following for the target portal:
   - IP address(es) or DNS name of the storage system iSCSI interface with the host's LUNs.

     Note

     For a host running PowerPath or Windows native failover, the target portal has two IP addresses.
   - Port is 3260, which is the default communications port for iSCSI traffic.

4. Verify that the iSCSI qualified names (IQN) for the initiators and the iSCSI interface name for the target are legal, globally unique, iSCSI names.

   Note

   An IQN must be a globally unique identifier of as many as 223 ASCII characters.

   For a Windows host initiator — You can find this IQN on the **General** or **Configuration** tab of the Microsoft iSCSI initiator (depending on the version).

5. If you are using optional CHAP authentication, ensure that the following two secrets are identical by resetting them to the same value:
   - The secret for the host initiator in the Microsoft iSCSI Software Initiator or the Linux **open-iscsi** driver.
   - The secret configured for the host initiator on the iSCSI interface.
6. If you are using optional mutual CHAP authentication, ensure that the following two secrets are identical by resetting them to the same value:
   - The secret for the host initiator in the Microsoft iSCSI Software Initiator or the Linux **open-iscsi** driver.
   - The secret for the iSCSI interface on the iSCSI interface.

Known Microsoft iSCSI Initiator problems

The following table describes known problems that with the Microsoft iSCSI Initiator and describes workarounds.

Table 2 Microsoft iSCSI Initiator problems

Problem	Symptom	Workaround
Initiator cannot refresh its targets list.	If you use iSNS and an initiator is disconnected from the network, the initiator may not refresh its target list. When attempting to refresh the target list, the initiator logs the iSNS error auth unknown (0x6) to the Windows Event Log.	1. Select **Windows Administrative Tools** > **Services**. 2. Stop and restart the **Microsoft iSCSI Initiator**.
Login problems occur when you use iSNS for target discovery.	When you configure the initiator with iSNS target discovery, it can intermittently fail to log in to a target with the following error message: The target name is not found or is marked as hidden from login.	The Microsoft iSCSI Initiator eventually recovers from this situation. To speed up the process, refresh the target list a few times until the target in question is discovered.
Initiator messages fill up the Windows Event Log.	If the initiator has an active session with an iSCSI interface and the iSCSI interface becomes unavailable, then the initiator logs multiple messages to the Windows Event Log. If multiple LUNs are configured for each target, the messages that the initiator generates can quickly fill the log.	To avoid this situation, log out all connected initiators before bringing the target down for its scheduled downtime.

Table 2 Microsoft iSCSI Initiator problems (continued)

Problem	Symptom	Workaround
Cannot write to a filesystem on the storage resource connected to the host.	Filesystem is read-only.	1. Verify that the registry values as set as described in Set registry values on page 16. 2. Verify that the Microsoft iSCSI Initiator is configured as described in Windows host — Configuring to connect to an iSCSI interface on page 17

CHAPTER 2

Setting Up a Unix Host to Use iSCSI Storage

This chapter describes how to set up an AIX, Citrix XenServer, HP-UX, Linux, or Solaris host to use iSCSI storage. It contains the following topics:

- Requirements for setting up a host 34
- Using multi-path management software on the host 35
- AIX host — Setting up for iSCSI storage 37
- Citrix XenServer host — Setting up for iSCSI storage 41
- HP-UX host — Setting up for iSCSI storage 42
- Linux host — Setting up for iSCSI storage 45
- Solaris host — Setting up for iSCSI storage 47
- What's next? 49
- iSCSI session troubleshooting 50

Requirements for setting up a host

These system and network requirements must be met before setting up a host to use Unity storage.

Before you can set up a host to use Unity storage, the following storage system and network requirements must be met.

Network requirements

For a host to connect to LUNs on an iSCSI interface, the host must be in the same network environment with the iSCSI interface. To achieve best performance, the host should be on a local subnet with each iSCSI interface that provides storage for it. In a multi-path environment, each physical interface must have two IP addresses assigned; one on each SP. The interfaces should be on separate subnets.

Note

The Linux iSCSI driver, which is part of the Linux operating system and which you configure so that the host iSCSI initiators can access the iSCSI storage, does not distinguish between NICs on the same subnet. As a result, to achieve load balancing, an iSCSI interface connected to a Linux host must have each NIC configured on a different subnet.

To achieve maximum throughput, connect the iSCSI interface and the hosts for which it provides storage to their own private network. That is, a network just for them. When choosing the network, consider network performance.

Path management network requirements

Note

Path management software is not supported for a Windows 7 or Mac OS host connected to a Unity system.

When implementing a highly-available network between a host and your system, keep in mind that:

- A LUN is visible to both SPs
- You can configure up to 8 IPs per physical interface. If more than one interface is configured on a physical interface, each interface must be configured on a separate VLAN.
- Network switches may be on separate subnets.

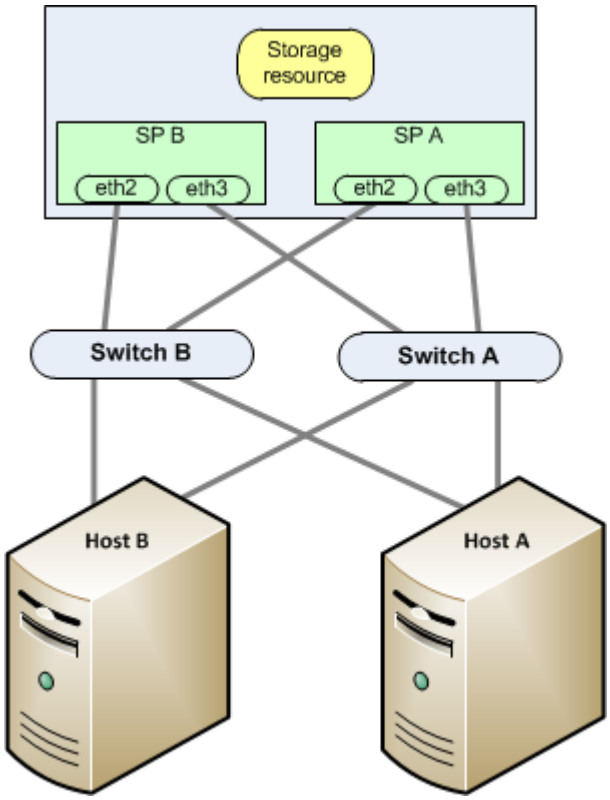
Note

Directly attaching a host to a Unity system is supported if the host connects to both SPs and has the required multipath software.

The following figure shows a highly-available iSCSI network configuration for hosts accessing a storage resource (iSCSI LUNs). Switch A and Switch B are on separate subnets. Host A and Host B can each access the storage resource through separate NICs. If the storage resource is owned by SP A, the hosts can access the storage resource through the paths to the interfaces on SP A. Should SP A fail, the system

transfers ownership of the resource to SP B and the hosts can access the storage resource through the paths to the interfaces on SP B.

Figure 2 Highly-available iSCSI network sample



Storage system requirements

- Install and configure the system using the **Initial Configuration** wizard.
- Use Unisphere or the CLI to configure NAS servers or interfaces, or iSCSI or Fibre Channel (FC) LUNs, on the storage system.

Note

On an HP-UX host, the iSCSI initiator will not discover the FC storage if it does not detect a LUN from the storage system assigned to host LUN ID 0. We recommend that you create a unique target, create a LUN on this interface, and give it access to the HP-UX host. The first LUN that you assign to a host is automatically assigned host LUN ID 0.

Using multi-path management software on the host

Multi-path management software manages the connections (paths) between the host and the storage system should one of the paths fail. The following types of multi-path managements software are available for a host connected to a storage system:

- EMC PowerPath software on an HP-UX, Linux, or Solaris host
- Native mulitpath software on a Citrix XenServer, HP-UX 11i, Linux, or Solaris host

For compatibility and interoperability information, refer to the Unity Support Matrix on the support website.

Setting up your system for multi-path management software

For your system to operate with hosts running multi-path management software, two iSCSI IPs are required. These IPs should be on separate physical interfaces on separate SPs.

Verify the configuration in Unisphere. For details on how to configure iSCSI interfaces, refer to topics about iSCSI interfaces in the Unisphere online help.

Note

For highest availability, use two network interfaces on the iSCSI interface. The network interfaces should be on separate subnets. You can view the network interfaces for an iSCSI interface within Unisphere.

Installing PowerPath

Procedure

1. On the host or virtual machine, download the latest PowerPath version from the PowerPath software downloads section on the EMC Online Support website.
2. Install PowerPath as described in the appropriate PowerPath installation and administration guide for the host's or virtual machine's operating system.

   This guide is available on EMC Online Support. If the host or virtual machine is running the most recent version and a patch exists for this version, install it, as described in the `readme` file that accompanies the patch.
3. When the installation is complete, reboot the host or virtual machine.
4. When the host or virtual machine is back up, verify that the PowerPath service has started.

Installing native multipath software

Whether you need to install multipath software, depends on the host's operating system.

Citrix XenServer
By default XenServer uses the Linux native multipathing (DM-MP) as it multipath handler. This handler is packaged with the Citrix XenServer operating system software.

Linux
To use Linux native multipath software, you must install the Linux multipath tools package as described in Installing or updating the Linux multipath tools package on page 37.

HP-UX 11i
Native multipath failover is packaged with the HP-UX operating system software.

Solaris
Sun's native path management software is Sun StorEdge™ Traffic Manager (STMS).

For Solaris 10 — STMS is integrated into the Solaris operating system patches you install. For information on install patches, refer to the Sun website.

Installing or updating the Linux multipath tools package

To use Linux native multipath failover software, the Linux multipath tools package must be installed on the host. This package is installed by default on SuSE SLES 10 or higher, but is not installed by default on Red Hat.

If you need to install the multipath tools package, install the package from the appropriate website below.

For SuSE:
http://www.novell.com/linux/

The multipath tools package is included with SuSE SLES 9 SP3 and you can install it with YaST or RPM.

For Red Hat:
http://www.redhat.com

The multipath tools package is included with Red Hat RHEL4 U3 or RHEL5, and you can install it with YaST or Package Manager. If an update is available, follow the instructions for installing it on the http://www.novell.com/linux/ or http://www.redhat.com website.

What's next?

Do one of the following:

- To set up an AIX host to use FC storage, refer to AIX host — Setting up for iSCSI storage on page 37.
- To set up a Citrix XenServer host to use FC storage, refer to Citrix XenServer host — Setting up for iSCSI storage on page 41.
- To set up an HP-UX host to use FC storage, refer to HP-UX host — Setting up for iSCSI storage on page 42.
- To set up a Linux host to use FC storage, refer to Linux host — Setting up for FC storage on page 74.
- To set up a Solaris host to use FC storage, refer to Solaris host — Setting up for iSCSI storage on page 47.

AIX host — Setting up for iSCSI storage

To set up an AIX host to use iSCSI storage, perform these tasks:

1. Install Celerra AIX software on page 37
2. Configure the AIX iSCSI initiator on page 38
3. Configure LUNs as AIX disk drives on page 39
4. Prepare the LUNs to receive data on page 40

Install Celerra AIX software

Procedure

1. Log in to the AIX host using an account with administrator privileges.
2. Download the AIX ODM Definitions software package to the /tmp directory on the AIX host as follows:

a. Navigate to AIX ODM Definitions on the software downloads section on the **Support** tab of the EMC Powerlink website.

b. Choose the version of the EMC ODM Definitions for the version of AIX software running on the host, and save the software to the /tmp directory on the host.

3. Start the System Management Interface Tool to install the software:

```
smit installp
```

4. In the /tmp directory, uncompress and untar the EMC AIX fileset for the AIX version running on the host:

```
uncompress EMC.AIX.x.x.x.x.tar.z
                tar -xvf EMC.AIX.x.x.x.x.tar
```

5. In the Install and Update Software menu, select **Install and Update from ALL Available Software** and enter **/tmp** as the path to the software.
6. Select **SOFTWARE to install**.
7. After making any changes to the displayed values, press **Enter**.
8. Scroll to the bottom of the window to see the Installation Summary, and verify that the message "SUCCESS" appears.
9. Reboot the AIX host to have the changes take effect.

Configure the AIX iSCSI initiator

Enable the AIX host to discover iSCSI targets on the storage system:

Procedure

1. On the storage system, from the **iSCSI Interfaces** page in Unisphere (**Storage** > **Block** > **iSCSI Interfaces**), determine the IQN and the IP address of the storage system iSCSI interface (target) to which you want the host initiator to connect.
2. On the AIX host, start the System Management Interface Tool:

```
smit
```

3. Using a text editor, open the file /etc/iscsi/targets.
4. For each iSCSI interface to be accessed by this initiator, add a line in the format:

```
{portal} {port} {target_iqn}
```

where:

- `{portal}` = IP address of the network portal
- `{port}` = number of the TCP listening port (default is 3260)

- `{target_iqn}` = formal iSCSI name of the target

Configure LUNs as AIX disk drives

Install the ODM (Object DatInstall the a Management) kit on the AIX host:

Procedure

1. Remove any drives that are identified as "Other FC SCSI Disk Drive" by the system by running the following command.

```
lsdev -Cc disk | grep "Other FC SCSI Disk Drive" | awk
{'print $1'} | xargs -n1 rmdev -dl
```

2. When applicable, uninstall any existing CLARiiON ODM file sets.

```
installp -u EMC.CLARiiON.*
```

3. Use the following commands to download the AIX ODM package version 5.3.x or 6.0.x from the FTP server at ftp.emc.com.

Note

IBM AIX Native MPIO for Unity requires a different ODM package. Contact your service provider for more information.

   a. Access the FTP server by issuing the following command:

```
ftp ftp.emc.com
```

   b. Log in with a user name of `anonymous` and use your email address as a password.

   c. Access the directory that contains the ODM files:

```
cd /pub/elab/aix/ODM_DEFINITIONS
```

   d. Download the ODM package

```
get EMC.AIX.5.3.x.x.tar.Z
```

   or

```
get EMC.AIX.6.0.x.x.tar.Z
```

4. Prepare the files for installation.

a. Move the ODM package into the user install directory.

```
cd /usr/sys/inst.images
```

b. Uncompress the files.

```
uncompress EMC.AIX.5.3.x.x.tar.Z
```

or

```
uncompress EMC.AIX.6.0.x.x.tar.Z
```

c. Open, or untar, the files.

```
tar -xvf EMC.AIX.5.3.x.x.tar
```

or

```
tar -xvf EMC.AIX.6.0.x.x.tar
```

d. Create or update the TOC file.

```
inutoc
```

5. Install the files.
   - PowerPath:

     ```
     installp -ac -gX -d . EMC.CLARiiON.aix.rte
     installp -ac -gX -d . EMC.CLARiiON.fcp.rte
     ```

   - MPIO:

     ```
     installp -ac -gX -d . EMC.CLARiiON.aix.rte
     installp -ac -gX -d . EMC.CLARiiON.fcp.MPIO.rte
     ```

Note

You can also install the files using the AIX `smitty` command.

Prepare the LUNs to receive data

If you do not want to use a LUN as a raw disk or raw volume, then before AIX can send data to the LUN, you must either partition the LUN or create a database file systems on it. For information on how to perform these tasks, refer to the AIX operating system documentation.

Citrix XenServer host — Setting up for iSCSI storage

To set up a Citrix XenServer host to use iSCSI storage, perform these tasks:

1. Configure the iSCSI software initiator on page 41
2. Configure the iSCSI software initiator for multipathing on page 41

Configure the iSCSI software initiator

The XenServer operating system include iSCSI software that you must configure for each initiator that will connect to the iSCSI storage system.

Procedure

1. On the storage system, from the **iSCSI Interfaces** page in Unisphere (**Storage** > **Block** > **iSCSI Interfaces**), determine the IP address of the system interface (target) to which you want the host initiator to connect.
2. Open the XenCenter console.
3. Click **New Storage** at the top of the console.
4. In the **New Storage** dialog box, under **Virtual disk storage**, select **iSCSI**.
5. Under **Name**, enter a descriptive name of the virtual disk (Storage Repository).
6. To use optional CHAP
   a. Check **Use CHAP**.
   b. Enter the CHAP username and password.
7. Click **Discover IQNs**.
8. Click **Discover LUNs**.
9. Once the **IQN** and **LUN** fields are populated, click **Finish**.

   The host scans the target to see if it has any XenServer Storage Repositories (SRs) on it already, and if any exist you are asked if you want to attach to an existing SR or create a new SR.

Configure the iSCSI software initiator for multipathing

Citrix recommends either enabling multipathing in XenCenter before you connect the pool to the storage device or if you already created the storage repository, putting the host into Maintenance Mode before you enable multipathing.
If you enable multipathing while connected to a storage repository, XenServer may not configure multipathing successfully. If you already created the storage repository and want to configure multipathing, put all hosts in the pool into Maintenance Mode before configuring multipathing and then configure multipathing on all hosts in the pool. This ensures that any running virtual machines that have LUNs in the affected storage repository are migrated before the changes are made.

Procedure

1. In XenCenter enable the multipath handler:
   a. On the host's **Properties** dialog box, select the **Multipathing** tab.
   b. On the **Multipathing** tab, select **Enable multipathing on this server**.

2. Verify that multipathing is enabled by clicking the storage resource's **Storage general properties**.

HP-UX host — Setting up for iSCSI storage

To set up an HP-UX host to use iSCSI storage, perform these tasks:

1. Download and install the HP-UX iSCSI initiator software on page 42
2. Configure HP-UX access to an iSCSI interface (target) on page 42
3. Make the storage processors available to the host on page 44
4. Verify that native multipath failover sees all paths the LUNs on page 44
5. Prepare the LUNs to receive data on page 45

Download and install the HP-UX iSCSI initiator software

Procedure

1. On the HP-UX host, open a web browser and download the iSCSI initiator software from the HP-UX website.
2. Install the initiator software using the information on the site or that you downloaded from the site.

Configure HP-UX access to an iSCSI interface (target)

Before an HP-UX iSCSI initiator can send data to or received data from iSCSI LUNs, you must configure the network parameters for the NIC initiators so that they can connect to the iSCSI interface (target) with the iSCSI LUNs.
To configure access to an iSCSI interface:

Procedure

1. Log into the HP-UX host as superuser (root).
2. Add the path for the iscsi util and other iSCSI executables to the root path:

```
PATH=$PATH:/opt/iscsi/bin
```

3. Verify the iSCSI initiator name:

```
iscsiutil -1
```

The iSCSI software initiator configures a default initiator name in an iSCSI Qualified Name (IQN) format.

For example:

```
iqn.1986-03.com.hp:hpfcs214.2000853943
```

To change the default iSCSI initiator name or reconfigure the name to an IEEE EUI-64 (EUI) format, continue to the next step; otherwise skip to step 5.

4. Configure the default iSCSI initiator name:

```
iscsiutil [iscsi-device-file] -i -N iscsi-initiator-name
```

Note

For mor information on IQN and EUI formats, refer to the HP-UX iscsi software initiator guide.

where:

- `iscsi-device-file` is the iSCSI device path, /dev/iscsi, and is optional if you include the `-i` or `-N` switches in the command.
- `-i` configures the iSCSI initiator information.
- `-N` is the initiator name. When preceded by the `-i` switch, it requires the iSCSI initiator name. The first 256 characters of the name string are stored in the iSCSI persistent information.
- `iscsi-initiator-name` is the initiator name you have chosen, in IQN or EUI format.

5. Verify the new iSCSI initiator name:

```
iscsiutil -1
```

6. For each iSCSI target device you will statically identity, store the target device information in the kernel registry, adding one or more discovery targets:

```
iscsitutil [/dev/iscsi] -a -I ip-address/hostname [-P tcp-port] [-M portal-grp-tag]
```

where

- **-a** adds a discovery target address into iSCSI persistent information. You can add discovery target addresses only with this option.
- **-I** requires the IP address or hostname of the discovery target address.
- `ip-address/hostname` is the IP address or host name component of the target network portal.
- **-P** `tcp-port` is the listening TCP port component of the discovery target network portal (optional). The default iSCSI TCP port number is 3260.
- **-M** `portal-grp-tag` is the target portal group tag (optional). The default target portal group tag for discovery targets is 1.

For example:

```
iscsiutil -a -I 192.1.1.110
```

or, if you specify the hostname,

```
iscsiutil -a -I target.hp.com
```

If an iSCSI TCP port used by the discovery target is different than the default iSCSI port of 3260, you must specify the default TCP port used by the discovery target, for example,

```
iscsiutil -a -I 192.1.1.110 -P 5001
```

or

```
iscsiutil -a -I target.hp.com -P 5001
```

7. Verify the discovery targets that you have configured:

```
iscsiutil -p -D
```

8. To discover the operational target devices:

```
/usr/sbin/ioscan -H 225
ioscan -NfC disk (for HP-UX 11i v3 only)
```

9. To create the device files for the targets:

```
/usr/sbin/insf -H 225
```

10. To display operational targets:

```
iscsiutil -p -O
```

Make the storage processors available to the host

Verify that each NIC sees only the storage processors (targets) to which it is connected:

```
ioscan -fnC disk
insf -e
```

`ioscan -NfC disk` (for HP-UX 11i v3 only)

Verify that native multipath failover sees all paths the LUNs

If you are using multipath failover:

Procedure

1. Rescan for the LUNs:

```
ioscan -NfC disk|
insf -e
```

2. View the LUNs available to the host:

```
ioscan -NfnC disk
```

3. Verify that all paths to the storage system are `CLAIMED`:

```
ioscan -NkfnC lunpath
```

Prepare the LUNs to receive data

If you do not want to use a LUN as a raw disk or raw volume, then before HP-UX can send data to the LUN, perform the following tasks as described in the HP-UX operating system documentation:

Procedure

1. Make the LUN visible to HP-UX.
2. Create a volume group on the LUN.

Linux host — Setting up for iSCSI storage

To set up a Linux host to use iSCSI storage, perform these tasks:

1. Configure Linux iSCSI initiator software on page 45
2. Set up the Linux host to use the LUN on page 47

Configure Linux iSCSI initiator software

The Linux operating system includes the iSCSI initiator software — the iSCSI driver **open-iscsi** — that comes with the Linux kernel. You must configure this open-iscsi driver with the network parameters for each initiator that will connect to your iSCSI storage system.

Note

The Linux iSCSI driver gives the same name to all network interface cards (NICs) in a host. This name identifies the host, not the individual NICs. This means that if multiple NICs from the same host are connected to an iSCSI interface on the same subnet, then only one NIC is actually used. The other NICs are in standby mode. The host uses one of the other NICs only if the first NIC fails.

Each host connected to an iSCSI storage system must have a unique iSCSI initiator name for its initiators (NICs). To determine a host's iSCSI initiator name for its NICs use cat /etc/iscsi/initiatorname.iscsi for open-iscsi drivers. If multiple hosts connected to the iSCSI interface have the same iSCSI initiator name, contact your Linux provider for help with making the names unique.

To configure the Linux **open-iscsi** driver:

Note

The EMC Host Connectivity Guide for Linux on the EMC Online Support website provides the latest information about configuring the **open-iscsi** driver.

Procedure

1. On the storage system, from the **iSCSI Interfaces** page in Unisphere (**Storage** > **Block** > **iSCSI Interfaces**), determine the IP address of the storage system iSCSI interface (target) to which you want the host initiators to connect.

2. For any Linux initiators connected to the iSCSI interface with CHAP authentication enabled, stop the iSCSI service on the Linux host.
3. Using a text editor, such as `vi`, open the `/etc/iscsi/iscsi.conf` file.
4. Uncomment (remove the # symbol) before the recommended variable settings in the iSCSI driver configuration file as listed in the table below:

Table 3 Open-iscsi driver recommended settings

Variable name	Default setting	Recommended setting
`node.startup`	manual	auto
`node.session.iscsi.InitialR2T`	No	Yes
`node.session.iscsi.ImmediateData`	Yes	No
`node.session.timeo.replacment_timeout`	120	120 **Note** In congested networks you may increase this value to 600. However, this time must be greater than the combined `node.conn[0].timeo.timeo.noop_out_interval` and `node.conn[0].timeo.timeo.noop_out_time` times.
`node.conn[0].timeo.timeo.noop_out_interval`	10	later in congested networks `This value should not exceed the values in node.session.timeeo.replacement_timeout.`
`node.conn[0].timeo.timeo.noop_out_timeout`	15	

5. To start the iSCSI service automatically on reboot and powerup, set the run level to 345 for the iSCSI service.
6. Discover and log in to the host to which you want to connect with the `iscsiadm` command for Red Hat 5 or later or YaST for SuSE 10 or later.

   You need to perform a discovery on only a single IP address because the storage system also returns its other iSCSI target, if it is configured for a second iSCSI interface.
7. Configure optional CHAP authentication on the open-iscsi driver initiator:

   For Red Hat 5 or later
   Use the **iscsiadm** command to do the following:

   For optional initiator CHAP:

   a. Enable CHAP as the authentication method.
   b. Set the username for the initiator to the initiator's IQN, which you can find with the **iscsiadm -m node** command.
   c. Set the secret (password) for the initiator to the same secret that you entered for the host initiator on the storage system.

   For optional mutual CHAP

   a. Set the username (username_in) to the initiator's IQN, which you can find with the **iscsiadm -m node** command.

b. Set the secret (password_in) for the target to the same secret that you entered for the iSCSI interface.

For SuSE 10 or later
Use the YaST to do the following for the open-iscsi driver initiator:

For optional initiator CHAP:

a. Enable incoming authentication.

b. Set the initiator CHAP username to the initiator's IQN, which you can find with the **iscsiadm -m node** command.

c. Set the initiator CHAP password (secret) to the same secret that you entered for the host initiator on the storage system.

For mutual CHAP:

a. Enable outgoing authentication (mutual CHAP).

b. Set the mutual CHAP username to the initiator's IQN, which you can find with the **iscsiadm -m node** command.

c. Set the initiator password (secret) for the target to the same secret that you entered for the iSCSI interface.

8. Find the driver parameter models you want to use, and configure them as shown in the examples in the configuration file.
9. Restart the iSCSI service.

Set up the Linux host to use the LUN

Perform the following tasks as described in the Linux operating system documentation:

Procedure

1. Find the LUN ID:
   a. In Unisphere, select **Storage** > **Block** > **LUNs**.
   b. On the LUN, select **Edit**.
   c. On the **Properties** window, select **Access** > **Access details** to determine the LUN ID.
2. On the host, partition the LUN.
3. Create a file system on the partition.
4. Create a mount directory for the file system.
5. Mount the file system.

Results

The Linux host can now write data to and read data from the file system on the LUN.

Solaris host — Setting up for iSCSI storage

To set up a Solaris host to use iSCSI storage, perform these tasks:

1. Configure Sun StorEdge Traffic Manager (STMS) on page 48
2. Configure Solaris access to an iSCSI interface (target) on page 48
3. Prepare the LUN to receive data on page 49

Configure Sun StorEdge Traffic Manager (STMS)

If you plan to use STMS on the host to manage the paths to the LUNs, you must first configure it:

Procedure

1. Enable STMS by editing the following configuration file:

   Solaris 10 — Do one of the following:

   - Edit the **/kernel/drv/fp.conf** file by changing the `mpxio-disable` option from yes to no.
     or
   - Execute the following command:

     ```
     stmsboot -e
     ```

2. We recommend that you enable the STMS auto-restore feature to restore LUNs to their default SP after a failure has been repaired. In Solaris 10, auto-restore is enabled by default.
3. If you want to install STMS offline over NFS, share the root file system of the target host in a way that allows root access over NFS to the installing host, if you want to install STMS offline over NFS. You can use a command such as the following on `target_host` to share the root file system on `target_host` so that `installer_host` has root access:

   ```
   share -F nfs -d 'root on target_host' -o ro,rw=installer
   host,root=installer_host /
   ```

   If the base directory of the package (the default is `/opt`) is not part of the root file system, it also needs to be shared with root access.
4. For the best performance and failover protection, we recommend that you set the load balancing policy to round robin:

   ```
   setting load-balance="round-robin"
   ```

Configure Solaris access to an iSCSI interface (target)

Before a Solaris iSCSI initiator can send or receive data to the iSCSI LUNs, you must configure the network parameters for the NIC initiators so that they can connect to the iSCSI interface (target) with the iSCSI LUNs.
To configure access to an iSCSI interface:

Procedure

1. Log into the Solaris system as superuser (`root`).
2. Configure the target device to be discovered using SendTargets dynamic discovery.

   Example:

   ```
   iscsiadm modify discovery-address 10.14.111.222:3260
   ```

Note

If you do not want the host to see specific targets, use the static discovery method as described in the Solaris server documentation.

3. Enable the SendTargets discovery method.

   Examples:

   ```
   iscsiadm modify discovery --sendtargets enable
   ```

   or

   ```
   iscsiadm modify discovery -t enable
   ```

4. Create the iSCSI device links for the local system.

   For example:

   ```
   devfsadm -i iscsi
   ```

5. If you want Solaris to login to the target more than once (multiple paths), use:

   ```
   iscsiadm modify target-param -c <logins> <target_iqn>
   ```

   where `logins` is the number of logins and `target_iqn` is the IQN of the iSCSI interface (target).

   Note

   You can determine the IQN of the iSCSI interface from Unisphere on the **iSCSI Interfaces** page (**Storage** > **Block** > **iSCSI Interfaces.**).

Prepare the LUN to receive data

If you do not want to use the LUN as a raw disk or raw volume, then before Solaris can send data to the LUN, you must perform the following tasks as described in the Solaris operating system documentation:

Procedure

1. Partition the LUN.
2. Create and mount a files system on the partition.

What's next?

You are now ready to either migrate data to the LUN or have the host start using the LUN. To migrate data to the LUN, go to Migrating FC or iSCSI Data to the Storage System on page 79.

iSCSI session troubleshooting

If you receive a connection error when the host is trying to log in to an iSCSI target (iSCSI interface), or you cannot see the LUNs on the target, you can be having problems with the iSCSI session between the initiator and the target.
If the session cannot be established, or you get unexpected results from the session, follow this procedure:

Procedure

1. Use **ping** with the IP address to verify connectivity from the host to the target's IP address.

   Using the IP address avoids name resolution issues.

   Note

   You can find the IP address for the target by selecting **Storage** > **Block** > **iSCSI Interfaces** in Unisphere.

   Some switches intentionally drop ping packets or lower their priority during times of high workload. If the ping testing fails when network traffic is heavy, verify the switch settings to ensure the ping testing is valid.

2. Check the host routing configuration using Unisphere under **Settings** > **Access** > **Routing**.
3. On the host, verify that the iSCSI initiator service is started.

   Note

   The iSCSI service on the iSCSI interface starts when the system is powered up.

4. In the Microsoft iSCSI Initiator, verify the following for the target portal:
   - IP address(es) or DNS name of the storage system iSCSI interface with the host's LUNs.

     Note

     For a host running PowerPath or Windows native failover, the target portal has two IP addresses.

   - Port is 3260, which is the default communications port for iSCSI traffic.
5. Verify that the iSCSI qualified names (IQN) for the initiators and the iSCSI interface name for the target are legal, globally unique, iSCSI names.

   Note

   An IQN must be a globally unique identifier of as many as 223 ASCII characters.

   For a Linux host initiator — You can find this IQN with the **iscsiadm -m node** command, which lists the IP address and associated iqn for each iSCSI initiator.

   For a Solaris host initiator — You can find this IQN with the iscsi list initiator-node command.

6. If you are using optional CHAP authentication, ensure that the following two secrets are identical by resetting them to the same value:

- The secret for the host initiator in the host's iSCSI software.
- The secret for the iSCSI interface on the iSCSI interface.

7. If you are using optional mutual CHAP authentication, ensure that the following two secrets are identical by resetting them to the same value:
   - The secret for the host initiator in the host's iSCSI software.
   - The secret for the iSCSI interface on the iSCSI interface. You can find this secret in the CHAP section of the **Access Settings** page in Unisphere (**Settings** > **Access** > **CHAP**).

CHAPTER 3

Setting Up a Windows or Mac OS Host to Use LUN storage over FC

This chapter describes how to set up a Windows or Mac OS host to use LUN storage over FC. It contains the following topics:

- Requirements for setting up a host 54
- VSS HW Provider overview 54
- Windows host — Using multi-path management software over FC 55
- Configuring FC LUNs for the host 56
- Windows host — Setting up for FC LUNs 56
- Windows host — Connecting to a FC LUN 58
- Windows host — Setting up to use iSCSI or FC LUNs 60
- Mac OS host — Setting up for FC LUNs 61

Requirements for setting up a host

These system and network requirements must be met before setting up a host to use Unity storage.

Before you can set up a host to use Unity storage, the following storage system and network requirements must be met.

System requirements

Before configuring hosts to access the storage system, ensure that these requirements are met.

Complete the following tasks before connecting hosts to the storage system:

- Install and configure the system using the **Initial Configuration** wizard.
- Use Unisphere or the CLI to configure NAS servers or interfaces, or iSCSI or Fibre Channel (FC) LUNs, on the storage system.

SAN requirements

For a host to connect to FC LUNs or VMware VMFS and Block VVol datastores on the Unity system, the host must be in a SAN environment with the storage system, and zoned so that the host and the storage system are visible to each other over the SAN. For a multi-pathing environment, each Unity FC LUN for the host must have two paths associated with it. These two paths should be on different switches to ensure high availability.

Path management SAN requirements

When implementing a highly-available SAN between a host and the Unity system, keep in mind that:

- A LUN or VMware VMFS datastore is visible to both SPs.
- You can configure multiple paths for a LUN. These paths should be associated with separate physical ports on the same SP.
- Each LUN must present the same LUN ID to all hosts.

Note

Directly attaching a host to a storage system is supported if the host connects to both SPs and has the required multipath software.

VSS HW Provider overview

The VSS HW Provider runs as a Windows service and provides the interface between the Microsoft Volume Shadow Copy Service (VSS) and your storage system. The VSS HW Provider enables VSS requestor applications, such as VSS-enabled backup applications, to make snapshots of iSCSI and FC LUNs.

Microsoft VSS

VSS provides the backup framework for Windows Server 2003 R2, Windows Server 2008, and Windows Server 2012 and enables the creation of snapshots (called shadow

copies for Microsoft VSS) — point-in-time copies of data. VSS is integrated with front-end applications so they can create and access shadow copies.

The VSS architecture includes VSS providers. A VSS provider creates and maintains shadow copies and acts as the interface to point-in-time imaging capabilities either on a storage platform (hardware-based provider) or in a host operating system (software-based provider). The Unity VSS HW Provider is a hardware-based provider that works directly with iSCSI and FC LUNs on the Unity iSCSI and FC interfaces and with the VSS service on Windows Server 2003 R2, Windows Server 2008, or Windows Server 2012 hosts to provide consistent shadow copy creation and addressing.

Because the Unity VSS HW Provider is a hardware-based provider, it reduces the load on the CPU and memory of the host. It is also more efficient in an environment where shadow copies of multiple volumes must be taken simultaneously.

Refer to the Microsoft documentation for more information about VSS.

Windows host — Using multi-path management software over FC

Multi-path management software manages the connections (paths) between the host and the storage system to provide access to the storage if one of the paths fails. The following types of multi-path management software are available for a Windows 2003, Windows Server 2008, or Window Server 2012 connected host :

- EMC PowerPath software on a Windows 2003, Windows Server 2008, or Windows Server 2012 host. Refer to the *Unity Support Matrix* on the support website for compatibility and interoperability information.

  Note

  PowerPath is not supported for Windows 7.

Setting up a storage system for multi-path management software

For a storage system to operate with hosts running multi-path management software, each LUN on the system should be associated with multiple paths.

Note

For highest availability, use multiple paths. The network interfaces can be on separate subnets.

Installing PowerPath

Procedure

1. You cannot configure your storage system FC connections to present the FC LUNs to both a standalone Windows host and its Windows virtual machines. If you will configure your FC connections to present the FC LUNs directly to a stand-alone Windows host with HBAs, install PowerPath software on the stand-alone host. If you will configure your FC connections to present FC LUNs directly to a Windows virtual machine with HBAs, install PowerPath software on the virtual machine. On the host or virtual machine, download the latest PowerPath version from the PowerPath software downloads section on the EMC Online Support website.

2. Install PowerPath using a Custom installation as described in the appropriate PowerPath installation and administration guide for the host's or virtual machine's operating system.

   This guide is available on EMC Online Support. If the host or virtual machine is running the most recent version and a patch exists for this version, install it, as described in the `readme` file that accompanies the patch.

3. When the installation is complete, reboot the host or virtual machine.
4. When the host or virtual machine is back up, verify that the PowerPath service has started.

Configuring FC LUNs for the host

Use Unisphere or the CLI to:

Procedure

1. Create FC LUNs for the host.
2. Add the host to the storage system by accessing the Hosts tab in Unisphere or using the CLI and creating a host.
3. Provide host access to the FC LUNs. Host access options are: **No Access**, **LUN**, **Snapshot**, **LUN and Snapshot**.

   Note

   On a Mac OS host, Xsan will not log into the FC storage if no vdisk0 is configured on the storage system.

   For information on performing the above Unisphere tasks, refer to the Unisphere online help.

Windows host — Setting up for FC LUNs

To set up a Windows host for LUNs, perform these tasks:

1. Install the Unity VSS HW Provider on page 56
2. For a multi-path configuration, install the MPIO feature on page 57
3. Set registry values on page 16

Install the Unity VSS HW Provider

It is recommended that you install the VSS HW Provider on the host that will use the iSCSI or FC LUNs with backup applications.

To install the Unity VSS HW Provider:

Procedure

1. Log in to the host using an account with administrator privileges.
2. Download the software package that you want to install as follows:

   a. Locate the Unity VSS tool on online support.

Note

You may need to filter by **Support Tools**.

b. Choose the correct version for your Windows platform, and select the option to save the software to the host.

3. In the directory where you saved the software, double-click the Unity VSS provider executable file to start the installation wizard.
4. Follow the instructions in the wizard to complete the installation of the Unity VSS provider.

Starting and stopping the Unity VSS HW Provider

The Unity VSS HW Provider runs as a Windows service and is enabled by default. You can stop and start this service from the Windows Services administrative tool.

For a multi-path configuration, install the MPIO feature

If the Windows host will use a multi-path configuration to connect to the LUNs, you should install the MPIO feature. To install MPIO on Windows Server 2008:

Procedure

1. Open Server Manager.
2. In the **Server Manager** tree, click **Features**.
3. In the **Features** pane, under **Features Summary**, click **Add Features**.
4. In the **Add Features Wizard**, select **Multipath I/O**, and click **Next**.
5. In the **Confirm Installation Selections** dialog box, click **Install**.
6. When the installation is complete, in the Installation **Results** dialog box, click **Close**.
7. When prompted to restart the computer, click **Yes**.

   After restarting, the host finalizes the MPIO installation.
8. Click **Close**.

Set registry values

Note

Incorrectly modifying the Registry can cause serious system-wide problems that can require you to reinstall the system. Use the Windows Registry Editor at your own risk.

Procedure

1. On the host, run the Windows Registry Editor (**regedit.exe**).
2. Go to HKEY_LOCAL_MACHINE\SYSTEM\.
3. Right-click **CurrentControlSet**, and search for the **MaxRequestHoldTime** key and modify its value from 60 to 600 (decimal) or from 3c to 258 (hexadecimal).

Note

Verify that the path to the parameter that you found in the CurrentControlSet. If it is not, search for the parameter again. If you make changes to ControlSets other than the top level current set, those changes will not affect the system.

4. If the host is running PowerPath:
   a. Search for the register keys list in Table 4 on page 58.

   Note

   Verify that the path to the parameter that you found in the CurrentControlSet. If it is not, search for the parameter again. If you make changes to ControlSets other than the top level current set, those changes will not affect the system.

   b. Record the value of each of these registry keys, so you have them in case you need to uninstall PowerPath.
   c. Update each of these registry keys. See Table 4 on page 58.

Table 4 Registry keys to update (iSCSI only)

Registry keys	Instructions
LinkDownTime	Set to 600.
AsyncLogoutPauseTimeout (new value)	Add this REG_DWORD key in the same key as LinkDownTime. Set it to 600.
DelayBetweenReconnect PortalRetryCount	Find the DelayBetweenReconnect value. Set the PortalRetryCount value so that PortalRetryCount*DelayBetweenReconnect=600
SrbTimeoutDelta (for PowerPath only)	Set to 100 for PowerPath only.

5. Quit the Registry Editor.

Windows host — Connecting to a FC LUN

Windows hosts connect directly to FC LUNs that they have access to across the SAN. To connect a Windows host to a FC LUN:

- Configuring a Windows Server 2003 host to connect to a FC LUN on page 58
- Configuring a Windows Server 2008 R2, Windows Server 2012, Windows7, or Windows 8 host to connect to a FC LUN on page 59

Configuring a Windows Server 2003 host to connect to a FC LUN

To add FC storage to a Windows Server 2003 host:

Procedure

1. Select **LUN Management** > **Manage Server Connections**.

2. Click **Add**.
3. In the **Add Server** window, add the storage system, and optionally specify a description.
4. Click **OK**. The storage system appears in the **Manage Server Connections** window. All the ports that were discovered appear on the **Fibre Channel Ports** tab.
5. Optionally, add additional FC ports manually:
   a. Select the **Fibre Channel Ports** tab.
   b. Click **Add**.
   c. Specify the WWN of the FC port.
   d. Click **OK**.
6. Enable the FC ports for LUN access:
   a. Select the storage system from the server list.
   b. Select the **Fibre Channel Ports** tab. Select FC ports to enable.

   Note

   If the storage system is not configured for multipathing, enabling more than one FC port may cause data corruption.

   c. Click **OK**.

What's next?

Continue to Windows host — Setting up to use iSCSI or FC LUNs on page 26

Configuring a Windows Server 2008 R2, Windows Server 2012, Windows7, or Windows 8 host to connect to a FC LUN

To add FC storage to a Windows Server 2008 R2, Windows Server 2012, Windows 7, or Windows 8 host:

Procedure

1. Open Storage Manager for SANs. Click **Manage Server Connections**.
2. Click **Add**.
3. In the **Add Server** window, add the storage system, and optionally specify a description.
4. Click **OK**.The storage system appears in the **Manage Server Connections** window. All the ports that were discovered appear on the **Fibre Channel Ports** tab. Optionally, add additional FC ports manually:
   a. Select the **Fibre Channel Ports** tab.
   b. Click **Add**.
   c. Specify the WWN of the FC port.
   d. Click **OK**.
5. Enable the FC ports for LUN access:
   a. Select the storage system from the server list.

6. Select the **Fibre Channel Ports** tab. Select FC ports to enable. If the storage system is not configured for Multipathing, enabling more than one FC port may cause data corruption. Click **OK**.

What's next?

Continue to Windows host — Setting up to use iSCSI or FC LUNs on page 26

Windows host — Setting up to use iSCSI or FC LUNs

To set up a Windows host to use iSCSI or FC LUNs, perform the following tasks:

1. Register the LUNs as MPIO devices (Windows Server 2008 R2 and Windows Server 2012) on page 26
2. Set the offset for the LUN to 64 KB on page 26
3. Configure a volume on the LUN on page 27

Register the LUNs as MPIO devices (Windows Server 2008 R2 and Windows Server 2012)

If you are using Multipath I/O (MPIO) with Windows Server 2008, you must register LUNs as MPIO devices and set up MPIO to discover iSCSI or FC devices:

Procedure

1. On the host, start the MPIO Administrative Tool:

   Either **Start** > **Administrative Tools** and select **MPIO** or **Start** > **Run** and enter **mpiocpl.exe**.
2. Open the MPIO control panel, and click the **Discover Multi-Paths** tab.
3. Select the **Add support for iSCSI devices** check box, and click **Add**.
4. When prompted to restart the computer, click **Yes**.

   When the computer restarts, the MPIO Devices tab lists the additional hardware ID “MSFT2005iSCSIBusType_0x9.” When this hardware ID is listed, all iSCSI bus attached devices will be claimed by the Microsoft DSM.
5. Restart the host when prompted.

Set the offset for the LUN to 64 KB

Note

This task is only required for systems running Hyper-V on Windows Server 2003, or systems that were upgraded from Windows Server 2003 to Windows Server 2008 or later.

After the initiator logs in to a target, each of the target’s LUNs that the initiator can access appears as an unknown disk in the Windows Disk Management tool.

To set the offset for the LUN on the host:

Procedure

1. Select **Run** > **diskpart**.
2. Select the disk:

```
select disk n
```

where `n` is the disk number.

If you do not know the disk number, enter:

```
list disk
```

3. On the selected disk, create a primary partition with an offset of 64 KB:

```
create part pri align=64
```

Configure a volume on the LUN

The following configuration process initializes the LUN, creates a partition, formats a volume on the partition, and mounts the partition on a drive letter:

Procedure

1. On the host, in the Microsoft Disk Management tool, select the LUN.
2. If the system asks you to initialize the disk, click **Yes**, but do not choose to make the disk a dynamic disk because the iSCSI interfaces do not support dynamic disks.

   For a given LUN, its drive letter, disk number, and LUN number are independent.
3. Use a quick format operation (Windows Server 2003 or Windows Server 2008) or the New Simple Volume wizard (Windows 7) to create a volume on the disk with the following properties:
   - NTFS file system
   - 64K location unit size

   Note

   Do not format more than one LUN at a time. Otherwise, some of the volumes can become write-protected and cannot be formatted.

   You can change the volume label. Because the disk number of a LUN can change after system restart or after logging in to and out of a target, be sure to change the default volume label (“New Volume”) to a descriptive label.
4. Assign an available drive letter to the disk.
5. Close the Disk Management tool.

Mac OS host — Setting up for FC LUNs

To set up a Mac OS for FC LUNs, you must perform these tasks:

1. Installing and configuring Xsan on a Mac OS host on page 61
2. Set up a Mac OS host to use LUNs on page 29

Installing and configuring Xsan on a Mac OS host

To connect a Mac OS host to FC storage, you must add the host to the SAN as a client.

Procedure

1. On the host, select **System Preferences** > **Xsan**. Click **Enable Xsan**.
2. Install the Xsan software on the host, and update it to the latest version.
3. Open Xsan Admin and select **Computers**.
4. Add the host to the SAN.

Set up a Mac OS host to use LUNs

Before the Mac OS host can use a LUN, you must use the Mac OS Disk Utility to:

1. Format the LUN on page 29
2. Partition the LUN on page 29

Format the LUN

Procedure

1. On the host, go to **Finder** > **Application** > **Utilities**.
2. Double-click **Disk Utility**.
3. In the left panel, select the LUN.
4. Click the **Erase** tab.
5. For **Volume Format**, select the format that you want, and confirm your format choice.
6. Click **Erase** and verify the erase procedure, and click **Erase** again to start the erase process.

   When the erase process is finished, the LUN is ready for you to partition it.

Partition the LUN

Procedure

1. On the host, go to **Finder** > **Application** > **Utilities**.
2. Double click **Disk Utility**.
3. In the left panel, select the LUN.
4. Click the **Partition** tab.
5. Under Volume Scheme, select the number of partitions for the LUN.

   The utility displays equal-sized partitions to fill the available space on the LUN.
6. For each partition:
   a. Select the partition.
   b. In **Name**, enter a name for the partition.
   c. Under **Format**, select the format for the partition.

      The default format - Mac OS Extended (Journaled) - is a good choice for most uses.

   d. In **Size**, enter the size for the partition.
7. When you have specified, the name, size, and format for each partition, click **Apply**.

The Disk Utility uses the partition information to create volumes that the host can access and use. When the partitioning process is complete, the new volumes are mounted on the desktop and ready to use.
You are now ready to either migrate data to the LUN or have the host start using the LUN. To migrate data to the LUN, go to Migrating FC or iSCSI Data to the Storage System on page 79.

CHAPTER 4

Setting Up a Unix Host to Use Fibre Channel (FC) Storage

This chapter describes how to set up an AIX, Citrix XenServer, HP-UX, Linux, or Solaris host to use FC storage. It contains the following topics:

- Requirements for setting up a host 66
- Using multi-path management software on the host 66
- AIX host — Setting up for FC storage 68
- Citrix XenServer host — Setting up for FC storage 71
- HP-UX host — Setting up for FC storage 72
- Linux host — Setting up for FC storage 74
- Solaris host — Setting up for FC storage 76
- What's next? 77

Requirements for setting up a host

These system and network requirements must be met before setting up a host to use Unity storage.

Before you can set up a host to use Unity storage, the following storage system and network requirements must be met.

SAN requirements

For a host to connect to FC LUNs or VMware VMFS and Block VVol datastores on the Unity system, the host must be in a SAN environment with the storage system, and zoned so that the host and the storage system are visible to each other over the SAN. For a multi-pathing environment, each Unity FC LUN for the host must have two paths associated with it. These two paths should be on different switches to ensure high availability.

Path management SAN requirements

When implementing a highly-available SAN between a host and the Unity system, keep in mind that:

- A LUN or VMware VMFS datastore is visible to both SPs.
- You can configure multiple paths for a LUN. These paths should be associated with separate physical ports on the same SP.
- Each LUN must present the same LUN ID to all hosts.

Note

Directly attaching a host to a storage system is supported if the host connects to both SPs and has the required multipath software.

Storage system requirements

- Install and configure the system using the **Initial Configuration** wizard.
- Use Unisphere or the CLI to configure NAS servers or interfaces, or iSCSI or Fibre Channel (FC) LUNs, on the storage system.

Note

On an HP-UX host, the iSCSI initiator will not discover the FC storage if it does not detect a LUN from the storage system assigned to host LUN ID 0. We recommend that you create a unique target, create a LUN on this interface, and give it access to the HP-UX host. The first LUN that you assign to a host is automatically assigned host LUN ID 0.

Using multi-path management software on the host

Multi-path management software manages the connections (paths) between the host and the storage system should one of the paths fail. The following types of multi-path managements software are available for a host connected to a storage system:

- EMC PowerPath software on an HP-UX, Linux, or Solaris host

- Native mulitpath software on a Citrix XenServer, HP-UX 11i, Linux, or Solaris host

For compatibility and interoperability information, refer to the Unity Support Matrix on the support website.

Setting up a system for multi-path management software

For a system to operate with hosts running multi-path management software, each LUN on the system should be associated with two paths.

Installing PowerPath

Procedure

1. On the host or virtual machine, download the latest PowerPath version from the PowerPath software downloads section on the EMC Online Support website.
2. Install PowerPath using a Custom installation and the Celerra option, as described in the appropriate PowerPath installation and administration guide for the host's or virtual machine' operating system.

   This guide is available on EMC Online Support. If the host or virtual machine is running the most recent version and a patch exists for this version, install it, as described in the `readme` file that accompanies the patch.
3. When the installation is complete, reboot the host or virtual machine.
4. When the host or virtual machine is back up, verify that the PowerPath service has started.

Installing native multipath software

Whether you need to install multipath software, depends on the host's operating system.

Citrix XenServer
By default XenServer uses the Linux native multipathing (DM-MP) as it multipath handler. This handler is packaged with the Citrix XenServer operating system software.

Linux
To use Linux native multipath software, you must install the Linux multipath tools package as described in Installing or updating the Linux multipath tools package on page 37.

HP-UX 11i
Native multipath failover is packaged with the HP-UX operating system software.

Solaris
Sun's native path management software is Sun StorEdge™ Traffic Manager (STMS).

For Solaris 10 — STMS is integrated into the Solaris operating system patches you install. For information on install patches, refer to the Sun website.

Installing or updating the Linux multipath tools package

To use Linux native multipath failover software, the Linux multipath tools package must be installed on the host. This package is installed by default on SuSE SLES 10 or higher, but is not installed by default on Red Hat.

If you need to install the multipath tools package, install the package from the appropriate website below.

For SuSE:
http://www.novell.com/linux/

The multipath tools package is included with SuSE SLES 9 SP3 and you can install it with YaST or RPM.

For Red Hat:
http://www.redhat.com

The multipath tools package is included with Red Hat RHEL4 U3 or RHEL5, and you can install it with YaST or Package Manager. If an update is available, follow the instructions for installing it on the http://www.novell.com/linux/ or http://www.redhat.com website.

What's next?

Do one of the following:

- To set up an AIX host to use storage, refer to AIX host — Setting up for FC storage on page 68.
- To set up a Citrix XenServer host to use storage, refer to Citrix XenServer host — Setting up for FC storage on page 71.
- To set up an HP-UX host to use storage, refer to HP-UX host — Setting up for FC storage on page 72.
- To set up a Linux host to use storage, refer to Linux host — Setting up for iSCSI storage on page 45.
- To set up a Solaris host to use storage, refer to Solaris host — Setting up for FC storage on page 76.

AIX host — Setting up for FC storage

To set up an AIX host to use LUNs over Fibre Channel, perform these tasks:

1. Install Celerra AIX software on page 37
2. Configure LUNs as AIX disk drives on page 39
3. Prepare the LUNs to receive data on page 40

Install Celerra AIX software

Procedure

1. Log in to the AIX host using an account with administrator privileges.
2. Download the AIX ODM Definitions software package to the /tmp directory on the AIX host as follows:
   a. Navigate to AIX ODM Definitions on the software downloads section on the **Support** tab of the EMC Powerlink website.
   b. Choose the version of the EMC ODM Definitions for the version of AIX software running on the host, and save the software to the /tmp directory on the host.
3. Start the System Management Interface Tool to install the software:

```
smit installp
```

4. In the /tmp directory, uncompress and untar the EMC AIX fileset for the AIX version running on the host:

```
uncompress EMC.AIX.x.x.x.x.tar.z
                tar -xvf EMC.AIX.x.x.x.x.tar
```

5. In the Install and Update Software menu, select **Install and Update from ALL Available Software** and enter **/tmp** as the path to the software.
6. Select **SOFTWARE to install**.
7. After making any changes to the displayed values, press **Enter**.
8. Scroll to the bottom of the window to see the Installation Summary, and verify that the message “SUCCESS” appears.
9. Reboot the AIX host to have the changes take effect.

Configure LUNs as AIX disk drives

Install the ODM (Object DatInstall the a Management) kit on the AIX host:

Procedure

1. Remove any drives that are identified as "Other FC SCSI Disk Drive" by the system by running the following command.

```
lsdev -Cc disk | grep “Other FC SCSI Disk Drive” | awk
{‘print $1’} | xargs -n1 rmdev -dl
```

2. When applicable, uninstall any existing CLARiiON ODM file sets.

```
installp -u EMC.CLARiiON.*
```

3. Use the following commands to download the AIX ODM package version 5.3.x or 6.0.x from the FTP server at ftp.emc.com.

Note

IBM AIX Native MPIO for Unity requires a different ODM package. Contact your service provider for more information.

   a. Access the FTP server by issuing the following command:

```
ftp ftp.emc.com
```

   b. Log in with a user name of `anonymous` and use your email address as a password.

   c. Access the directory that contains the ODM files:

```
cd /pub/elab/aix/ODM_DEFINITIONS
```

d. Download the ODM package

```
get EMC.AIX.5.3.x.x.tar.Z
```

or

```
get EMC.AIX.6.0.x.x.tar.Z
```

4. Prepare the files for installation.
   a. Move the ODM package into the user install directory.

```
cd /usr/sys/inst.images
```

   b. Uncompress the files.

```
uncompress EMC.AIX.5.3.x.x.tar.Z
```

   or

```
uncompress EMC.AIX.6.0.x.x.tar.Z
```

   c. Open, or untar, the files.

```
tar -xvf EMC.AIX.5.3.x.x.tar
```

   or

```
tar -xvf EMC.AIX.6.0.x.x.tar
```

   d. Create or update the TOC file.

```
inutoc
```

5. Install the files.
   - PowerPath:

```
installp -ac -gX -d . EMC.CLARiiON.aix.rte
installp -ac -gX -d . EMC.CLARiiON.fcp.rte
```

   - MPIO:

```
installp -ac -gX -d . EMC.CLARiiON.aix.rte
installp -ac -gX -d . EMC.CLARiiON.fcp.MPIO.rte
```

Note

You can also install the files using the AIX `smitty` command.

Scan and verify LUNs

This task explains how to scan the system for LUNs using AIX, PowerPath, or MPIO.

Before you begin

After installing the AIX ODM package for Unity, scan and verify LUNs on the Unity system.

Procedure

1. Use AIX to scan for drives using the following command:

```
cfgmgr
```

2. Verify that all FC drives have been configured properly, and display any unrecognized drives.

```
lsdev -Cc disk
```

PowerPath output example:

```
hdisk1      Available          EMC CLARiiON FCP VRAID Disk
hdisk2      Available          EMC CLARiiON FCP VRAID Disk
```

MPIO output example:

```
hdisk1      Available          EMC CLARiiON FCP MPIO VRAID
Disk
hdisk2      Available          EMC CLARiiON FCP MPIO VRAID
Disk
```

Prepare the LUNs to receive data

If you do not want to use a LUN as a raw disk or raw volume, then before AIX can send data to the LUN, you must either partition the LUN or create a database file systems on it. For information on how to perform these tasks, refer to the AIX operating system documentation.

Citrix XenServer host — Setting up for FC storage

To set up a Citrix XenServer host to use LUNs over Fibre Channel, perform these tasks:

1. Configure the FC target on page 72
2. Configure the FC target for multipathing on page 72

Configure the FC target

The XenServer operating system includes FC software that you must configure for each initiator that will connect to the FC storage.

Procedure

1. Open the XenCenter console.
2. Click **New Storage** at the top of the console.
3. In the **New Storage** dialog box, under **Virtual disk storage**, select **Hardware HBA**.
4. Under **Name**, enter a descriptive name for the LUN (Storage Repository).
5. Click **Next**.
6. Select a LUN, and click **Finish**.

   The host scans the target to see if it has any XenServer Storage Repositories (SRs) on it already, and if any exist you are asked if you want to attach to an existing SR or create a new SR.

Configure the FC target for multipathing

Citrix recommends either enabling multipathing in XenCenter before you connect the pool to the storage device or if you already created the storage repository, putting the host into Maintenance Mode before you enable multipathing.
If you enable multipathing while connected to a storage repository, XenServer may not configure multipathing successfully. If you already created the storage repository and want to configure multipathing, put all hosts in the pool into Maintenance Mode before configuring multipathing and then configure multipathing on all hosts in the pool. This ensures that any running virtual machines that have LUNs in the affected storage repository are migrated before the changes are made.

Procedure

1. In XenCenter enable the multipath handler:
   a. On the host's **Properties** dialog box, select the **Multipathing** tab.
   b. On the **Multipathing** tab, select **Enable multipathing on this server**.
2. Verify that multipathing is enabled by clicking the storage resource's **Storage general properties**.

HP-UX host — Setting up for FC storage

To set up an HP-UX host to use LUNs over Fibre Channel, perform these tasks:

1. Download and install the HP-UX FC HBA software on page 73
2. Make the storage processors available to the host on page 44
3. Verify that native multipath failover sees all paths the LUNs on page 44
4. Prepare the LUNs to receive data on page 45

Download and install the HP-UX FC HBA software

Procedure

1. On the HP-UX host, open a web browser and download the initiator software from the HP-UX website.
2. Install the initiator software using the information on the site or that you downloaded from the site.

Make the storage processors available to the host

Verify that each NIC sees only the storage processors (targets) to which it is connected:

```
ioscan -fnC disk
insf -e
```

`ioscan -NfC disk` (for HP-UX 11i v3 only)

Verify that native multipath failover sees all paths the LUNs

If you are using multipath failover:

Procedure

1. Rescan for the LUNs:

   ```
   ioscan -NfC disk|
   insf -e
   ```

2. View the LUNs available to the host:

   ```
   ioscan -NfnC disk
   ```

3. Verify that all paths to the storage system are `CLAIMED`:

   ```
   ioscan -NkfnC lunpath
   ```

Prepare the LUNs to receive data

If you do not want to use a LUN as a raw disk or raw volume, then before HP-UX can send data to the LUN, perform the following tasks as described in the HP-UX operating system documentation:

Procedure

1. Make the LUN visible to HP-UX.
2. Create a volume group on the LUN.

Linux host — Setting up for FC storage

To set up a Linux host to use LUNs over Fibre Channel, perform these tasks:

- Set up the Linux host to use the LUN on page 47
- Scan the storage system for LUNs on page 75

Scan the storage system for LUNs

Execute the Linux scan LUNs command.

Before scanning the storage system for attached LUNs, they may appear in Linux as **LUNZ**, even after host access is granted to those LUNs. For example:

```
# lsscsi |egrep -i dgc

[13:0:2:0]   disk    DGC      LUNZ             4200  /dev/sdj
[13:0:4:0]   disk    DGC      LUNZ             4200  /dev/sdo
[13:0:5:0]   disk    DGC      LUNZ             4200  /dev/sdv
[13:0:6:0]   disk    DGC      LUNZ             4200  /dev/sdz
[14:0:2:0]   disk    DGC      LUNZ             4200  /dev/sdm
[14:0:4:0]   disk    DGC      LUNZ             4200  /dev/sdu
[14:0:5:0]   disk    DGC      LUNZ             4200  /dev/sdx
[14:0:6:0]   disk    DGC      LUNZ             4200  /dev/sdy
[15:0:2:0]   disk    DGC      LUNZ             4200  /dev/sdac
[15:0:4:0]   disk    DGC      LUNZ             4200  /dev/sdag
                  .........
```

Note

The first column in the output shows [*Host:Bus:Target:LUN*] of each SCSI device, with the last value representing the LUN number.

Procedure

1. In Unisphere, grant LUN access to the Linux host.

   Note

   Ensure that at a LUN with LUN ID 0 is present on the Unity system. See Modify Host LUN IDs on page 84 for information on manually changing LUN IDs.

2. On the Linux server, run the SCSI bus scan command with the `-r` option:

   ```
   rescan-scsi-bus.sh -a -r
   ```

3. On the Linux server, rerun the `lsscsi |egrep -i dgc` command to verify the LUN IDs show up appropriately on the Linux host.

   ```
   # lsscsi |egrep -i dgc

   [13:0:2:0]   disk    DGC      VRAID            4200  /dev/sdbl
   [13:0:2:1]   disk    DGC      VRAID            4200  /dev/sdcf
   [13:0:2:2]   disk    DGC      VRAID            4200  /dev/sdcg
   [13:0:4:0]   disk    DGC      VRAID            4200  /dev/sdad
   [13:0:4:1]   disk    DGC      VRAID            4200  /dev/sdch
   [13:0:4:2]   disk    DGC      VRAID            4200  /dev/sdci
   [13:0:5:0]   disk    DGC      VRAID            4200  /dev/sdbj
   [13:0:5:1]   disk    DGC      VRAID            4200  /dev/sdcj
   [13:0:5:2]   disk    DGC      VRAID            4200  /dev/sdck
                     .........
   ```

4. If **LUNZ** continues to display, rerun the rescan command using the `--forcerescan` option.

```
rescan-scsi-bus.sh --forcerescan
```

If the issue persists and **LUNZ** still displays, a Linux reboot may be required in order for Linux to recognize the LUNs. Refer to the following Linux knowledgebase article for more information: https://www.suse.com/support/kb/doc/?id=7009660

Set up the Linux host to use the LUN

Perform the following tasks as described in the Linux operating system documentation:

Procedure

1. Find the LUN ID:
   a. In Unisphere, select **Storage** > **Block** > **LUNs**.
   b. On the LUN, select **Edit**.
   c. On the **Properties** window, select **Access** > **Access details** to determine the LUN ID.
2. On the host, partition the LUN.
3. Create a file system on the partition.
4. Create a mount directory for the file system.
5. Mount the file system.

Results

The Linux host can now write data to and read data from the file system on the LUN.

Solaris host — Setting up for FC storage

To set up a Solaris host to use LUNs over Fibre Channel, perform these tasks:

1. Configure Sun StorEdge Traffic Manager (STMS) on page 48
2. Prepare the LUN to receive data on page 49

Configure Sun StorEdge Traffic Manager (STMS)

If you plan to use STMS on the host to manage the paths to the LUNs, you must first configure it:

Procedure

1. Enable STMS by editing the following configuration file:

   Solaris 10 — Do one of the following:

   - Edit the **/kernel/drv/fp.conf** file by changing the `mpxio-disable` option from yes to no.
     or

- Execute the following command:

```
stmsboot -e
```

2. We recommend that you enable the STMS auto-restore feature to restore LUNs to their default SP after a failure has been repaired. In Solaris 10, auto-restore is enabled by default.
3. If you want to install STMS offline over NFS, share the root file system of the target host in a way that allows root access over NFS to the installing host, if you want to install STMS offline over NFS. You can use a command such as the following on `target_host` to share the root file system on `target_host` so that `installer_host` has root access:

```
share -F nfs -d 'root on target_host' -o ro,rw=installer
host,root=installer_host /
```

   If the base directory of the package (the default is `/opt`) is not part of the root file system, it also needs to be shared with root access.
4. For the best performance and failover protection, we recommend that you set the load balancing policy to round robin:

```
setting load-balance="round-robin"
```

Prepare the LUN to receive data

If you do not want to use the LUN as a raw disk or raw volume, then before Solaris can send data to the LUN, you must perform the following tasks as described in the Solaris operating system documentation:

Procedure

1. Partition the LUN.
2. Create and mount a files system on the partition.

What's next?

You are now ready to either migrate data to the LUN or have the host start using the LUN. To migrate data to the LUN, go to Migrating FC or iSCSI Data to the Storage System on page 79.

CHAPTER 5

Migrating FC or iSCSI Data to the Storage System

You can migrate FC or iSCSI disk data to the storage system with either a manual copy or an application-specific tool, if one is available. This chapter contains the following topics:

- FC or iSCSI data migration environment and limitations 80
- Migrating iSCSI disk data 80

FC or iSCSI data migration environment and limitations

The following table outlines the environment for a manual copy migration and an application tool migration of FC or iSCSI data.

Table 5 MIgration environment

Component	Requirement
Unity storage	LUN sized to accommodate the data in the LUN that you want to migrate and to allow for data growth
Host	Single host with access to the LUN with data to be migrated and also to the LUN for the migrated data
LUN	Single LUN on either a local or attached FC or iSCSI storage device that you migrate in its entirety to the storage system share

The downtime for a manual copy migration is relative to the time required for copying the data from the LUN to the storage system LUN. The downtime for an application-specific tool migration should be less than the downtime for a manual copy.

Migrating iSCSI disk data

To migrate iSCSI data to a storage system LUN, perform these tasks:

1. Attach the host or virtual machine to the new storage system LUN on page 80
2. Migrate the data on page 80

Attach the host or virtual machine to the new storage system LUN

Procedure

1. Configure each host or virtual machine initiator that needs access to the LUN to connect to the iSCSI interface (target) with the new LUN, as described in Windows host — Configuring to connect to an iSCSI interface on page 17 for a Windows host or virtual machine or Linux host — Setting up for iSCSI storage on page 45 for a Linux host.
2. Prepare the new LUN to receive data, as described in Windows host — Setting up to use iSCSI or FC LUNs on page 26 for a Windows host or Linux host — Setting up for iSCSI storage on page 45 for a Linux host.

Migrate the data

Procedure

1. If any host or virtual machine applications are actively using the device (LUN) with the data being migrated, stop the applications gracefully.
2. Migrate the data with the method best suited for copying data from the device to the new storage system LUN.

   On a Windows host, this method can be a simple cut and paste or drag and drop operation.

3. When the copy operation is complete:

   On a Windows host:

   a. Assign a temporary drive letter to the LUN.

   b. Assign the old drive letter to the LUN to which you copied the data.

   On a Linux host:

   a. Unmount the original file system on the device.

   b. Adjust the host's mount tables, which are typically in **/etc/fstab**, to reflect the new location of the data.

   c. Mount the new LUN using the **mount -a** or a similar command.

4. Restart the applications on the host.

CHAPTER 6

General Tasks for Block Hosts

This chapter contains the following topics:

- Modify Host LUN IDs 84

Modify Host LUN IDs

The Modify Host LUN IDs feature lets you change the IDs of the LUNs so that you can achieve the same mapping view of LUNs for each host in a cluster. It also enables you to configure a bootable LUN that will allow a host to boot from the Storage Area Network (SAN).

Procedure

1. Under **Access**, select **Hosts**.
2. Select the relevant host, and then select the **Edit** icon.
3. On the **Host Properties** screen, select the **LUNs** tab.
4. Select **Modify Host LUN IDs**.
5. On the **Modify Host LUN IDs** screen, under **LUN ID**, set the relevant numeric value.

   To configure a bootable LUN, set the value for the relevant LUN to **0**.
6. Click **OK**.

APPENDIX A

Setting Up MPIO for a Windows Cluster Using a Storage System

This appendix provides an end-to-end example of a two node Windows Server 2008 R2 cluster in an MPIO multi-path configuration with a storage system. It contains the following topics:

- Configuration 86
- Setting up cluster nodes (hosts) 87

Configuration

The components in this configuration are:

- Two server hosts on page 86
- One storage system on page 86

Two server hosts
Two Server hosts -exhost1, exhost2 - running:

- Windows Server 2008 R2
- Microsoft iSCSI Initiator 2.08
- Failover Clustering
- Multipath I/O

One storage system
One storage system configured as follows:

- Two iSCSI interfaces (iscsia, iscsib) configured as described in the table below.

  Note

  The second iSCSI interface is optional.

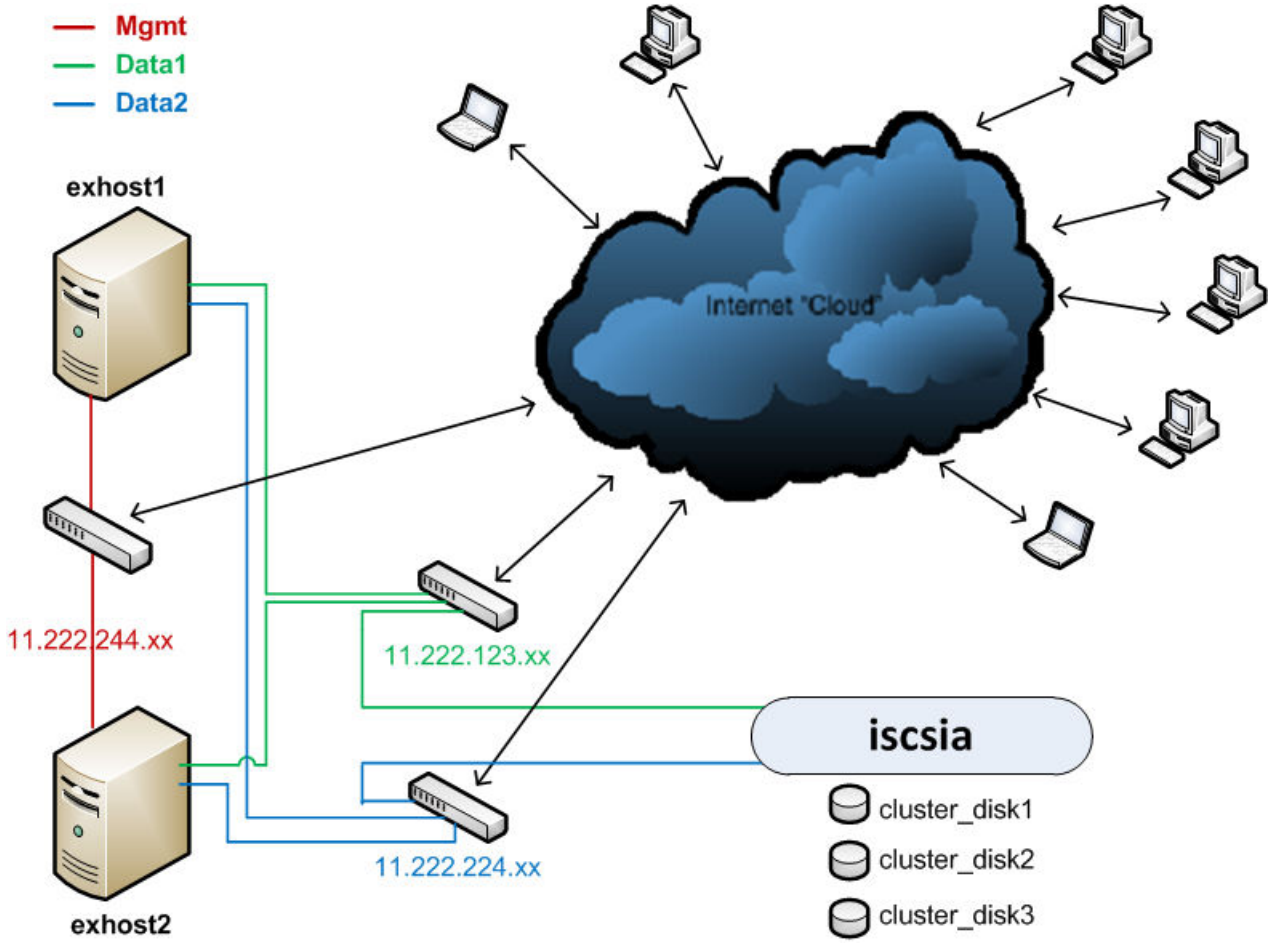
  Table 6 Storage System iSCSI interface configuration

Name	Details
iscsia	▪ **IP addresses**: 11.222.123.156, 11.222.224.231 ▪ **Target**: IQN.192-05.com.emc: fcnev1005000720000-1 ▪ **Storage processor**: SP A ▪ **Ethernet interface**: eth3, et2
iscsib	▪ **IP addresses**: 11.222.123.157, 11.222.224.232 ▪ **Target**: IQN.192-05.com.emc: fcnev1005000720000-2 ▪ **Storage processor**: SP B ▪ **Ethernet interface**: eth3, et2

- iSCSI storage resources:
  - cluster_disk1 (Quorum disk, which is required for Windows Server 2003 and optional, though recommended for Windows Server 2008)
  - cluster_disk2 (optional)
  - cluster_disk3 (optional)

The following figure shows how these components are networked together.

Figure 3 Network configuration



Setting up cluster nodes (hosts)

For simplicity, this section shows only the setup for the single target iscsia. It includes the following tasks

Procedure

1. Configure the iSCSI initiator with MPIO on each cluster node on page 87
2. Enable MPIO on each cluster node on page 88
3. Verify the MPIO settings on each cluster node on page 88
4. Present the storage devices to the Primary Node in the cluster on page 89
5. Configure the cluster configuration on the Primary Node on page 89

Configure the iSCSI initiator with MPIO on each cluster node

On each node in the cluster (exhost1 and exhost2):

Procedure

1. In the Microsoft iSCSI Initiator, select **Discovery** > **Discover Portal**, add the target portal IP address or the DNS name.

2. Select **Discover Portal** > **Advanced** and in the **Advanced Settings** dialog box set the following for both the primary and secondary local adapters:
   - **Local adapter** to **Microsoft iSCSI Initiator**.
   - **Initiator IP** to the IP address for the local adapter interface on subnet 11.222.123.xxx for the primary local adapter, and to 11.222.224.xxx for the secondary local adapter.
     The host will look for targets on the following portals:

Address	Port	Adapter	IP address
11.222.123.156	3260	Microsoft iSCSI Initiator	11.222.123.xxx
11.222.224.231	3260	Microsoft iSCSI Initiator	11.222.224.xxx

3. Select **Targets** > **Log On** > **Connect**, select the following in the Connect to Target dialog box:
   - Add this connection to the list of Favorites
   - Enable multi-path (ensure the Windows MPIO feature is installed first)
4. Select **Connect To Target** > **Advanced** and in the **Advanced Settings** dialog box, set the following:
   - **Local adapter** to **Microsoft iSCSI Initiator**.
   - **Initiator IP** to the IP address for the local adapter interface on subnet 11.222.123.xxx.
   - **Target portal IP** to **11.222.123.156 / 3260**.
5. Add the secondary session to the existing connection for MPIO:
   a. Select **Targets** > **Connect to Target** > **Advanced**.
   b. In the **Advanced Settings** dialog box, set the following:
      - **Local adapter** to **Microsoft iSCSI Initiator**.
      - **Initiator IP** to the IP address for the local adapter interface on subnet 11.222.124.xxx.
      - **Target portal IP** to **11.222.224.231 / 3260**.

Enable MPIO on each cluster node

On each node in the cluster (exhost1 and exhost2):

Procedure

1. Click **Start** and enter **MPIO** to launch the control panel applet.
2. Click the **Discover Multi-Path** tab, select **Add support for iSCSI devices**, and click **Add**.
3. Reboot the node when prompted to do so.

Verify the MPIO settings on each cluster node

On each node in the cluster (exhost1 and exhost2):

Procedure

1. After the node finishes rebooting, go to **MPIO Properties** > **MPIO Devices** and verify that the MPIO hardware IDs (MSInitiator) for the storage system devices were added.

   Note

   Device Hardware ID **MSFT2005iSCSIBusType_0x9** adds support for all iSCSI devices.

2. Verify the MPIO settings in the Microsoft iSCSI Initiator:
   a. In the **Targets** tab, select the storage system target and click **Properties**.
   b. In the **Sessions** tab, select the identifier for the session, click **Devices**.
   c. In the **Devices** tab, for each storage device (cluster_disk1, cluster_disk2, cluster_disk3), do the following:
      - Select the device and click **MPIO**.
      - In the **MPIO** tab, select the first connection, click **Connections**, and verify the following:

Source Portal	Target Portal
11.222.123.123/xxxx	11.222.123.156/3260

      - In the **MPIO** tab, select the second connection, click **Connections**, and verify the following:

Source Portal	Target Portal
11.222.123.224/yyyy	11.222.224.231/3260

Present the storage devices to the Primary Node in the cluster

On the Primary Node in the cluster (exhost1), format each storage device (cluster_disk1, cluster_disk2, cluster_disk3) and assign a respective letter to each partition. In this example, E is assigned to cluster_disk1_ quorum; F is assigned to cluster_disk2; and, G is assigned to cluster_disk3.

Configure the cluster configuration on the Primary Node

The steps below follow Microsoft's best practices for clusters.

On the Primary Node (exhost1), in **Failover Cluster Manager**:

Procedure

1. Select **Create a Cluster...** > **Add preferred Domain Joined computers (nodes) to the select servers list** and create an Access Point for administering the cluster and choose the static cluster IP.

   For example:

   - **Domain**: app.com
   - **Node 1**: exhost1.app.com

- **Node 2**: exhost2.app.com
- **Cluster Name**: ex_cluster1.app.com
- **Network**: 11.222.224.0/xx with address 11.222.224.yyy

2. Configure the network settings:
   a. Select the cluster (ex_cluster1).
   b. Select **Networks** > **Cluster Network #** > **Properties** > **Mgmt Network** > **11.222.224.x** (Cluster Network 3) with the following default settings:
      - **Allow cluster network communications on this network**
      - **Allow clients to connect through this network**
   c. Select **Networks** > **Cluster Network #** > **Properties** > **Data networks (iscsi)** > **11.222.123.x** (Cluster Network 1) with the following default settings:
      - **Do not allow cluster network communication on this network**
   d. Select **Networks** > **Cluster Network #** > **Properties** > **Data networks (iscsi)** > **11.222.224.x** (Cluster Network 2) with the following default settings:
      - **Do not allow cluster network communication on this network**
3. Verify dependencies:
   a. Select the cluster (ex_cluster1).
   b. Click **Cluster Core Resources** and verify the following:
      - In the cluster's **Name:ex_cluster1 Properties** dialog box, verify that the dependencies are **IP address (11.22.224.x) AND cluster_disk1**.
      - In the cluster's **IP Address: 11.222.224.x Properties** dialog box, verify that the dependencies is **cluster_disk1**.

Note

The Cluster Disk Witness should always be the Quorum disk **cluster_disk1**, which is the default setting, but it can be changed.