

iSCSI HP-UX® Host Utilities 3.0 for Native OS **Setup Guide**

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Preface

About this guide

This guide describes how to configure the iSCSI initiator in HP-UX to access a logical unit of storage identified by numbers (LUNs) on a NetApp® storage system. It also explains how to configure the storage system to work with the initiator.

See the NetApp Interoperability Matrix at <http://now.netapp.com/NOW/products/interoperability>, or the NetApp SAN Support Matrix at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/index.shtml for information about the specific supported HP-UX versions.

Audience

This guide is for NetApp storage systems administrators who configure the iSCSI initiator in HP-UX host to access NetApp storage system.

Terminology

This guide uses the following terms:

- ◆ NetApp storage products (storage systems, FAS appliances and NearStore® systems) are all *storage systems*—also sometimes called storage appliances.
- ◆ The term *type* means pressing one or more keys on the keyboard.

Command conventions

You can enter storage system commands on the system console or from any client that can obtain access to the storage system using a Telnet session. In examples that illustrate commands executed on a HP-UX workstation, the command syntax and output might differ, depending on your version of HP-UX.

**Formatting
conventions**

The following table lists different character formats used in this guide to set off special information.

Formatting convention	Type of information
<i>Italic font</i>	◆ Words or characters that require special attention. ◆ Placeholders for information you must supply. For example, if the guide requires you to enter the <code>fcctest adaptername</code> command, you enter the characters “fcctest” followed by the actual name of the adapter. ◆ Book titles in cross-references.
Monospaced font	◆ Command and daemon names. ◆ Information displayed on the system console or other computer monitors. ◆ The contents of files.
Bold monospaced font	Words or characters you type. What you type is always shown in lowercase letters, unless your program is case-sensitive and uppercase letters are necessary for it to work properly.

**Keyboard
conventions**

This guide uses capitalization and some abbreviations to refer to the keys on the keyboard. The keys on your keyboard might not be labeled exactly as they are in this guide.

What is in this guide...	What it means...
hyphen (-)	Used to separate individual keys. For example, Ctrl-D means holding down the Ctrl key while pressing the D key.
<i>Enter</i>	Used to refer to the key that generates a carriage return; the key is named Return on some keyboards.
<i>type</i>	Used to mean pressing one or more keys on the keyboard.
<i>enter</i>	Used to mean pressing one or more keys and then pressing the Enter key.

Special messages

This guide contains special messages that are described as follows:

Note

A note contains important information that helps you install or operate the system efficiently.

Attention

An attention notice contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

Overview

About this chapter

This chapter provides an overview of the following:

- ◆ How Data ONTAP software implements iSCSI
- ◆ The main features that Host Utilities supports
- ◆ The Host Utilities setup process

This chapter also helps you to find additional information about the multipath support.

How Data ONTAP software implements iSCSI

The iSCSI protocol is a licensed service on the storage system that enables you to transfer block data to hosts using the SCSI protocol over TCP/IP. The iSCSI protocol standard is defined by RFC 3720, published by the Internet Engineering Task Force. You can get a copy of the standard from www.ietf.org.

In an iSCSI network, storage systems are targets that have storage target devices, which are referred to as logical units. A HP-UX host running the iSCSI initiator software uses the iSCSI protocol to access the logical units of storage identified by numbers (LUNs) on a storage system running Data ONTAP® software. The host does not have a hardware iSCSI host bus adapter (HBA). The iSCSI protocol is implemented over the host's standard gigabit Ethernet interfaces using a software driver.

The connection between the initiator and target uses a standard TCP/IP network. No special network configuration is needed to support iSCSI traffic. The network can be a dedicated TCP/IP network, or it can be your regular public network, but NetApp recommends to use a private network to transfer data between the host and storage. The storage system listens for iSCSI connections on IP port 3260.

For more information on using iSCSI with your storage system, see the *Block Access Management Guide* for your version of Data ONTAP.

Overview of iSCSI HP-UX Host Utilities

iSCSI HP-UX Host Utilities 3.0 provides the tools and information necessary to enable an HP-UX host to connect to your storage systems.

Host Utilities consists of the following:

- ◆ Sanlun utility, scripts, and support files, which make up the SAN Toolkit.
- ◆ Documentation, including this setup guide, Release Notes, and a quick command reference guide.

For information on the supported stack, see the NetApp Interoperability Matrix at <http://now.netapp.com/NOW/products/interoperability>, or the NetApp SAN Support Matrix at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/index.shtml. NetApp adds components on an ongoing basis. NetApp qualifies new host bus adapters (HBAs), patches, and other host components between Host Utilities releases. This online site is updated frequently to provide you with information about the current stack.

iSCSI HP-UX Host Utilities provides a SAN Toolkit. The SAN Toolkit contains scripts and commands which you can use to display information about LUNs, add required settings, and to troubleshoot your system.

The SAN Toolkit contains the following components:

- ◆ `enable_ontap_pvlinks` script
This script helps in enabling the active/passive multipathing policy for PVLinks with Data ONTAP® LUNs. The `enable_ontap_pvlinks` script is applicable to HP-UX11iv3 February 2007 Release only.
- ◆ `filer_info` script
This script collects information about the storage system.
- ◆ `hpux_info` script
This script collects configuration information about your host.
- ◆ `ntap_config_paths` script
When you use Physical Volume Links (PVLinks), you can use `ntap_config_paths` to add missing paths to LVM groups and place them in the correct order.
- ◆ `san_version` command
This command displays the version of the SAN Toolkit that you are running.
- ◆ `sanlun` utility
You can use this utility to display information about the LUNs on the storage system that are available to the host.
- ◆ Additional diagnostic scripts
The following scripts can also be used to collect troubleshooting information:
 - ❖ `SHsupport.pm` is the support library for the `*info` scripts.
 - ❖ `FTP.pm` is the support library for `*info` scripts.
 - ❖ `Telnet.pm` support library for `*info` scripts.
- ◆ The manual (`man`) pages for `sanlun`, the diagnostic scripts, the `enable_ontap_pvlinks` script, and the `ntap_config_paths` script.

Main features supported by Host Utilities

This Host Utilities supports HP-UX 11iV3, 11iV2 and 11iV1 operating systems. This Host Utilities also supports Data ONTAP 7.2.

For more information about the supported configurations and versions, see the NetApp Interoperability Matrix at <http://now.netapp.com/NOW/products/interoperability>, or the NetApp SAN Support Matrix at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/index.shtml.

Understanding multipathing

iSCSI HP-UX Host Utilities manage the volumes using HP-UX Logical Volume Manager (LVM). LVM uses PVLlinks to provide alternate paths if a problem causes the active path to fail. If you use PVLlinks, you also need to use the `ntap_config_paths` script to ensure that all the paths are in LVM's group and that they are in the correct order.

Setup procedure overview

The procedure for setting up the iSCSI protocol on a host and storage system follows the same basic sequence for all host types.

Step	Action
1	On the host, complete the following tasks: ◆ Download and install the iSCSI initiator software ◆ Install the Host Utilities software ◆ Install required packages on the host, and recording or changing the host's iSCSI node name ◆ Configure the multipath support ◆ Setting the initiator parameters, including the IP address of the target on the storage system ◆ Optional: Configuring Challenge Handshake Authentication Protocol (CHAP)
2	Configure the storage system, including the following: ◆ Licensing and starting the iSCSI service ◆ Optional: Configuring CHAP ◆ Creating LUNs, creating an igroup that contains the host's iSCSI node name, and mapping the LUNs to that igroup

Step	Action
3	Access the LUNs from the host, including the following: ◆ Discovering the LUN ◆ Installing special device files ◆ Creating file systems on the device and mounting them

Where to go for more information

The following table describes where to find additional information about using iSCSI on your storage system.

If you want to see...	Go to...
Changes in this release of Host Utilities, a list of known problems, and limitations of Host Utilities	The <i>Release Notes</i> for this Host Utilities.
The most current system requirements for the HP-UX host	The NetApp Interoperability Matrix at http://now.netapp.com/NOW/products/interoperability , or the NetApp SAN Support Matrix at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/index.shtml .
The supported storage system models for Data ONTAP licensed with iSCSI	◆ The NetApp Interoperability Matrix at http://now.netapp.com/NOW/products/interoperability, or the NetApp SAN Support Matrix at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/index.shtml. ◆ The <i>System Configuration Guide for Data ONTAP</i> online version at: http://now.netapp.com/NOW/knowledge/docs.
Information about how to configure and manage the iSCSI service on the storage system	The following documentation for your release of Data ONTAP: ◆ Data ONTAP <i>Block Access Management Guide</i> ◆ Data ONTAP <i>Release Notes</i>
Information about configuring and managing the iSCSI initiator on HP-UX	◆ HP-UX documentation at the HP Web site.

Configuring the iSCSI Software Initiator

Configuration overview

This chapter explains how to complete the installation and initial configuration of the iSCSI software initiator and multipathing software on the HP-UX host.

Topics in this chapter

This chapter includes the following topics:

- ◆ [“Downloading and installing the iSCSI software initiator”](#) on page 8
- ◆ [“Recording or changing the initiator node name on the host”](#) on page 10
- ◆ [“Configuring the iSCSI initiator”](#) on page 12

Requirement for root privileges

To configure initiator settings, you require root privileges. Before you configure the initiator, make sure you are logged in with root privileges.

Downloading and installing the iSCSI software initiator

Downloading the iSCSI software initiator

Download the iSCSI software initiator from the HP Web site. To download the initiator, complete the following steps.

Step	Action
1	Go to the HP Web site at http://www.software.hp.com .
2	In the Search box, enter iSCSI software initiator and search.
3	Click on Receive for Free in the search result.
4	Select the HP-UX version on which you want to install the iSCSI initiator.
5	Complete the required fields and click Next.
6	Click on the iSCSI initiator version that you would like to download. Note _____ For more information on installing the iSCSI software initiator, click on Installation Instructions in the document column. _____

Installing the iSCSI software initiator

On the HP-UX host, complete the following steps to install the iSCSI initiator.

Step	Action
1	Log in as root.
2	To verify that the file is downloaded correctly, run the following command: <code>swlist @ /<depot_path></code>

Step	Action
3	To install, enter the following command: <pre>swinstall -x autoreboot=true -s /<depot file></pre> where <i><depot file></i> is the path and name of the downloaded file. Note_____ The autoreboot=true option will cause a system reboot when installation is complete. _____ Note_____ For information on path dependencies, see the HP-UX iSCSI Software Initiator Release Notes and for instructions on configuring the iSCSI Subsystem, see the iSCSI Software Initiator Support Guide. _____

Verifying the installation

To verify the installation, complete the following steps.

Step	Action
1	Enter the following command: <pre>swlist iSCSI-00</pre> If it is installed correctly, the output will be similar as given in the following example. Example: <pre>iSCSI-00 B.11.31.01 HP-UX iSCSI Software Initiator iSCSI-00.ISCSI-SWD B.11.31.01 HP-UX iSCSI Software Initiator</pre>
2	Enter the following command: <pre>ioscan -fnC iscsi</pre> If the software is installed correctly, the output will be similar to the following example. Example: <pre>Class I H/W Path Driver S/W State H/W Type Description ===== iscsi 1 255/0 iscsi CLAIMED VIRTBUS iSCSI Virtual Node</pre>

Recording or changing the initiator node name on the host

Initiator node name The initiator node name is required to create initiator groups (igroups) on the storage system. You map LUNs to specific igroups. Only the hosts in the igroup can discover the LUNs as local devices.

The default initiator node name uses the following format:

`iqn.1996-04.com.hp:RandomNumber`

It is recommended that you set the initiator node name to `iqn.1996-04.com.hp:host-name`, where *host-name* is the name of your host.

You can change the initiator node name or use the default node name.

Viewing the initiator node name To view the initiator node name, run the following command:

```
# iscsiutil -l
```

Configuring the initiator node name To configure the initiator node name, run the following command:

```
# iscsiutil [iscsi-device-file] -i -N <iSCSI-initiator-name>
```

[iscsi-device-file] is the iSCSI device file path, /dev/iscsi. You can use this optionally when other options such as `-i` and `-N` are included in the command.

`-i` configures iSCSI initiator information.

`-N` is the initiator name option. When preceded by `-i`, it requires the iSCSI Initiator Name as an argument. The first 256 characters of the name string will be stored in the iSCSI persistent information.

`<iSCSI-initiator-name>` is the initiator name you have chosen, in the iqn format.

Node name rules If you change the host's initiator node name, be sure the new name follows all of the following rules:

- ◆ An initiator node name can be up to 223 bytes.
- ◆ Upper-case characters are always mapped to lower-case characters.

- ◆ An initiator node name can contain alphabetic characters (a to z), numbers (0 to 9), and the following three special characters:
 - ❖ Period (.)
 - ❖ Hyphen (-)
 - ❖ Colon (:)
- ◆ The underscore character (_) is *not* supported.

Configuring the iSCSI initiator

Configuring the iSCSI initiator node name

To configure the iSCSI initiator node name, complete the following steps.

Step	Action
1	Add the iscsiutil and other iscsi executables to the root path as given below: PATH=\$PATH:/opt/iscsi/bin
2	Configure the iSCSI initiator name, if not configured. For information on configuring the iSCSI initiator name, see “Configuring the initiator node name” on page 10

Discovering the targets

To discover the targets, complete the following steps.

Step	Action
1	To add one or several discovery targets, enter the following command: iscsiutil [/dev/iscsi] -a -I <ip-address> [-P <tcp-port>] [-M <portal-grp-tag>] where -a adds a discovery target address into iSCSI persistent information. Only discovery target addresses can be added using this option. <ip-address> is the IP address or hostname component of the target network portal <tcp-port> is the TCP port component of the discovery target network portal. The default iSCSI TCP port number is 3260. <portal-grp-tag> is the target portal group tag. The default target portal group tag for discovery targets is 1.
2	To view the configured discovery targets, run the following command: iscsiutil -p -D

Step	Action
3	To discover the operational target devices, enter the following command: <code>/usr/sbin/ioscan -H 255/0</code>
4	To create the device files for the targets, enter the following command: <code>/usr/sbin/insf -H 255/0</code>
5	To display operational targets, enter the following command: <code>iscsiutil -p -O</code>

CHAP authentication

For information about CHAP configuration, see the *HP-UX iSCSI Software Initiator Support Guide*.

Installing the Host Utilities software

About this chapter This chapter explains how to install Host Utilities.

Requirement for root privileges To configure initiator settings, you require root privileges. Before you configure the initiator, make sure you are logged in with root privileges.

Before you begin Verify that you have the correct Host Utilities for your version of HP-UX. For details, see the NetApp Interoperability Matrix at <http://now.netapp.com/NOW/products/interoperability>, or the NetApp SAN Support Matrix at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/index.shtml.

After your host is set up, you can install the Host Utilities software package. NetApp provides the Host Utilities as a standard HP-UX depot file. You can install it the same way you normally install an HP-UX depot file.

Step	Action
1	Use the <code>gunzip</code> command to uncompress the files.
2	Execute the <code>swinstall</code> command to install the NetApp software.

Note

You need not provide a depot path when issuing the `swinstall` command. The installation directory is determined by the depot file.

Actions performed during the installation

The installation performs the following actions:

- ◆ Checks your system to confirm that it meets the system requirements. The installation fails if your system does not meet the requirements.
- ◆ Installs NetApp's SAN Toolkit, scripts, and support files in the appropriate directories. (You cannot specify which directories.)
- ◆ Adds paths to the NetApp Host Utilities, and man pages to the appropriate HP-UX search paths.

Obtaining the software

Download the Host Utilities file from the NOW site at <http://now.netapp.com/NOW/cgi-bin/software> to a working directory on your HP-UX host.

To verify that you have the latest software package, see the NetApp Interoperability Matrix at <http://now.netapp.com/NOW/products/interoperability>, or the NetApp SAN Support Matrix at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/index.shtml.

Installing the Host Utilities software

To install the Host Utilities software, complete the following steps.

Step	Action
1	Enter the following command to uncompress the netapp_iscsi_hpux_host_utilities_3.0_ia_pa.depot.gz file: <pre># gunzip netapp_iscsi_hpux_host_utilities_3.0_ia_pa.depot.gz</pre> Result: The system places the extracted software in the directory to which you downloaded or copied the netapp_iscsi_hpux_host_utilities_3.0_ia_pa.depot.gz file.
2	Use the <code>swinstall</code> command to install the software. You do not need to enter a directory path name with this command. The depot file provides the installation directory information. Attention _____ The installation fails if your system does not meet the system requirements. Result: This command runs an installation script that verifies the status of your HP-UX setup. If your system meets the requirements, this script installs the NetApp sanlun utility and diagnostic scripts in the <code>/opt/NetApp/iscsitools/bin</code> directory.

Configuring the Storage System

Before you begin

You need the host's iSCSI initiator node name that you recorded in [Chapter 2](#), before you can configure the storage system. You use the initiator node name to create igroups on the storage system.

Tasks for configuring the storage system

To configure the storage system and prepare it for initiator access, you must complete the following tasks.

Step	Action
1	Ensure that the iSCSI service is licensed and started.
2	If you want to use CHAP authentication, use the <code>iscsi security</code> command or the FilerView® interface to configure a CHAP user name and password.
3	Create LUNs, create an igroup using the host's initiator node name, and then map the LUNs to the igroup for the HP-UX host. You can manage LUNs using the Web-based FilerView interface or using the Data ONTAP command line. Be sure to specify the LUN type and iSCSI igroup type as <code>hpux</code> .

For detailed configuration steps

For detailed steps, see the *Block Access Management Guide* for your version of Data ONTAP.

About this chapter

This chapter provides the following information:

- ◆ Tasks required to add LUNs to systems with HP-UX hosts
- ◆ How to create igroups and LUNs on the storage system
- ◆ How to configure LUNs and make them accessible to the host
- ◆ How to use the sanlun utility to manage host LUN and HBA information

Note

The procedures in this chapter require root privileges.

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Overview of adding LUNs to an HP-UX host”](#) on page 20
- ◆ [“Creating igroups and LUNs”](#) on page 21
- ◆ [“Configuring the LUNs”](#) on page 29
- ◆ [“Displaying LUN information”](#) on page 39

Overview of adding LUNs to an HP-UX host

Tasks you perform on the storage system

You perform the following tasks on the storage system when you add a LUN to an HP-UX host.

1. Make sure the storage system is correctly set up for adding the HP-UX LUNs.
2. Create an igroup for the HP-UX the host iSCSI software initiator.
3. Create a LUN and map it to the igroup.

Tasks you perform on the host

You must perform the following tasks on the HP-UX host when you add a LUN.

1. Discover the newly created LUNs.
2. Create device special files (/dev/dsk/ and /dev/rdisk/) for the newly discovered LUN.
3. Configure device special files to be managed by HP-UX LVM.

Note

To perform some of these tasks, you must use NetApp's sanlun utility. When you installed Host Utilities on the host, the installation program has placed the utility in /opt/NetApp/iscsitools/bin and added it to the system search path.

Creating igroups and LUNs

Tasks to create and map LUNs on the storage system

Before you complete your HP-UX setup with a NetApp storage system, you must perform the following tasks.

Step	Action
1	Create an igroup on the storage system. An igroup is a collection of host iSCSI software iqns. Each igroup should map to a host and should include the iSCSI initiators used by the host to access its data.
2	Create one or more LUNs on the storage system and map the LUNs to an igroup. ◆ Ensure that the LUNs are at the root of a qtree or a volume. ◆ Do not put LUNs in the root volume. The default root volume is /vol/vol0.

For more information about creating and managing LUNs, see the *Data ONTAP Block Access Administration Guide*.

Creating an igroup

To create an igroup, complete the following steps.

Step	Action
1	Log in as root on the host.

Step	Action
2	Run the following command on the HP-UX host: <pre>iscsiutil -l</pre> Result: When you execute the <code>iscsiutil -l</code> command, it displays the details of iSCSI software initiator with <code>iqn</code>. Example: Running <code>iscsiutil -l</code> produces the following output on an HP-UX system called <code>hostA</code>. <pre>Initiator Name : iqn.1986-03.com.hp:hostA Initiator Alias : Authentication Method : CHAP CHAP Method : CHAP_UNI Initiator CHAP Name : CHAP Secret : NAS Hostname : NAS Secret : Radius Server Hostname : Header Digest : None,CRC32C (default) Data Digest : None,CRC32C (default) SLP Scope list for iSLPD :</pre>
3	On the host, in a different session, use the <code>telnet</code> command to access the storage system.
4	To create an <code>igroup</code> on the storage system, run the following command: <pre>igroup create -i [-t <ostype>] <initiator_group> [<initiator iqn> ...]</pre>

Step	Action
5	On the storage system command line, verify that the new igroup exists, by entering the following command: <pre>igroup show</pre> Result: The storage system displays the newly created igroup with the host's iSCSI software iqns. Example: The following is the output of the <code>igroup show</code> command. <pre>hpux_hostA(iSCSI) (ostype: hpux): iqn.1986-03.com.hp:hostA (logged in on: e0b, e0a)</pre> Note If you change the <code>ostype</code> attribute to <code>hpux</code> after you have created the igroup, you must manually set the <code>vsa</code> attribute, which HP-UX sets correctly by default.

Creating a LUN using the interactive script

The `lun setup` command starts an interactive script that prompts you for information required to perform the following tasks:

- ◆ Create a LUN
- ◆ Create a new igroup (or use the igroup you created in the previous section)
- ◆ Map the LUN to an igroup

You can interrupt the `lun setup` command at any time by pressing Ctrl-C. Any information that you entered is discarded.

Note

You can also create a LUN using the `lun setup` command in command line mode. Instead of answering the prompts from the interactive script, supply the *size*, *type*, *lun_path* values as command-line options using the format: `lun create -s size -t type [-o noreserve] lun_path`

To create LUNs on the storage system using the `lun setup` command interactive script, complete the following steps.

Step	Action
1	On the command line, start the LUN creation process by entering the following command: <pre>lun setup</pre> Result: The storage system starts an interactive script that prompts you for information needed to create a LUN.
2	Enter <code>y</code> in response to the prompt: <pre>Do you want to create a LUN? [y]: y</pre>
3	Enter <code>hpux</code> to specify the host operating system: <pre>Multiprotocol type of LUN (image/solaris/windows/hpux/aix/linux) [image]: hpux</pre>
4	Enter the LUN path: Do not put LUNs in <code>/vol/vol0</code> (the root volume). A LUN path must be absolute. A LUN can only reside in a volume or qtree root. For example, to create a LUN with the name "lun0" in the qtree root <code>/vol/vol1/q0</code>, specify the path as <code>"/vol/vol1/q0/lun0"</code> <pre>Enter LUN path: <i>lun_path</i></pre> <i>lun_path</i> is the path name of the LUN. Result: The name of the LUN (the LUN path) is defined. Example: The following are some examples of a <i>lun_path</i>: <pre>/vol/vol1/qtree1/lun_sdata /vol/vol1/hostA_0</pre>
5	Enter <code>y</code> or <code>n</code> to specify whether you want to use space reservations. Note NetApp strongly recommends that you enable space reservations. A LUN can be created with or without space reservations being enabled. Space reservation guarantees that data writes to that LUN will never fail. <pre>Do you want the LUN to be space reserved? [y]: y</pre> Result: The LUN you are creating will use space reservations.

Step	Action
6	Enter the size of the LUN. Size for a LUN is specified in bytes. You can use singlecharacter multiplier suffixes: b(sectors), k(KB), m(MB), g(GB) or t(TB). Enter LUN size: x_x <i>x_x</i> is the size you want the LUN to be. Result: The setup script accepts the value you enter here as the size for the LUN you are creating. The quantity of usable disk space by the host varies depending on the host's operating system and the application using the LUN. Example: An example of a size you might enter is 5g, which means 5 GB of raw disk. Enter LUN size: 5g
7	Enter a comment string, or press Enter in response to the next prompt. You can add a comment string to describe the contents of the LUN. Please type a string (without quotes), or hit ENTER if you don't want to supply a comment. Enter comment string:_____ Note_____ If you press Enter and do not add a comment, you can add a comment later with the <code>lun comment</code> command. If you are using the FilerView® browser interface, a LUN description is the same as a comment. For more information about the <code>lun comment</code> command, see the Data ONTAP <code>na_lun (1)</code> man page.

Step	Action
8	Specify the igroup in one of the following ways: ◆ To use an existing igroup, enter that igroup name. You can see the existing igroups by entering ? at the prompt. Go to Step 12 to continue setting up a LUN. ◆ To create an igroup, enter a unique name for the group when prompted. Go to Step 9 to continue setting up the LUN. ◆ To accept the default igroup (shown in brackets), press Enter. Go to Step 12 to continue setting up a LUN. The LUN will be accessible to an initiator group. You can use an existing group name, or supply a new name to create a new initiator group. Enter ? to see existing initiator group names. Name of initiator group [default_igroup]: new_group_name <i>new_group_name</i> is either the name of an existing igroup or the name of a group you want to create. A group name can be something similar to hpux_groupB or hostA. Result: The program either creates a new igroup or uses the existing group that you specify. Example 1: This example uses an existing igroup. Name of initiator group [hostA]: hostA Example 2: This example creates a new igroup called hpuxB. Name of initiator group [hostA]: hpuxB
9	When you create an igroup (as illustrated in Example 2 in the previous step), you must specify the setup information for the igroup. Press Enter to accept iSCSI as the protocol. Type of initiator group new_group_name (FCP/iSCSI) [iSCSI]: Result: Choosing iSCSI means that the iSCSI software initiator iqns in this igroup are using iSCSI to access the LUN. Note_____ If you created an igroup as shown in “Creating igroups and LUNs” on page 21, you would have already specified this information, so you would not see this prompt or any other prompts until Step 12.

Step	Action
10	Enter host iscsi initiator iqn separated by commas in response to the next prompt: Enter comma separated nodenames: iqn.1986-03.com.hp:hostA
11	Enter hpux in response to the next prompt: OS type of initiator group "new_group_name" (default/solaris/windows/hpux/aix/linux) : hpux Result: The operating system for the igroup is defined.
12	Enter the LUN ID for the LUN that is mapped to the igroup in response to the next prompt. The program supplies the next available LUN ID. (Enter ? to display the LUNs already in use.) Note Make sure you record the LUN ID associated with the lun_path and the igroup name (new_group_name). The LUN will be accessible to all the initiators in the initiator group. Enter ? to display LUNs already in use by one or more initiators in group new_group_name. LUN ID at which initiator group new_group_name sees lun_path[0]. Result: The LUN ID is assigned to the LUN (LUN path) and mapped to the igroup. Example: This example contains output you might see in response to the preceding prompt. LUN ID at which initiator group "hostA" sees /vol/voll/hostA_0" [0]:
13	Respond to the next prompt by entering y to accept the configuration or n to discard the configuration: Do you want to accept this configuration? [y]: Result: If you enter y, the LUN is mapped to the specified igroup and all changes to the system are committed. At this point, Ctrl-C cannot undo the changes.
14	Terminate this session or continue to create additional LUNs by responding to the final prompt as n or y respectively. Do you want to create another LUN? [n]:

Verifying the mapped LUN

To verify the mapped LUN, complete the following step.

Step	Action
1	On the command line, display information about the mapped LUN by entering the following command: <pre>lun show -v <i>lun-path</i></pre> <i>lun-path</i> is the path to a specific LUN. Result: The information for the specified LUN is displayed. Example: The following example shows information about the LUN hostA. <pre>lun show -v /vol/vol1/hostA_0 /vol/vol1/hostA_0 1g (1073741824) (r/w, online, mapped) Serial#: C413FJEoTwq8 Share: none Space Reservation: enabled Multiprotocol Type: hpux Maps: hostA=0</pre>

Configuring the LUNs

Getting the host to discover the new LUNs

To get the host to discover the new LUNs and manage them using LVM, complete the following steps.

- ◆ Reboot the host. The host automatically discovers the new LUNs when you reboot the host.
- ◆ If rebooting the host is not a reasonable action for your system, perform the following steps.

Step	Action
1	Log in as root on the host.
2	To see whether the newly created LUNs are discovered, enter the following command on the HP-UX host: <code>ioscan -fnC disk</code>
3	To create the device entries on the HP-UX host, enter the following command: <code>ioinit -i</code> If the <code>ioinit -i</code> command does not create device special files, use the <code>insf -e</code> command to install the device special files.

Step	Action
4	To display the information about the device special files, enter the following command: <pre>sanlun lun show -p all</pre> For each LUN, specify the paths that are primary; you will need this information later. Example: The following examples shows the type of output you see using the <code>sanlun lun show</code> command before you configure the LUN by using a volume manager. Sample output 1: <pre>f3020-210-14:/vol/vol150/lun50 (LUN 49) VG: /dev/vg01 1g (1073741824) lun state: GOOD Filer_CF_State: Partner Takeover Filer Partner: f3020- 210-14 Multipath_Policy: A/P Multipath-provider: HP PV Links</pre> <pre>----- host filer primary partner PVlinks path path dev/dsk host filer filer path failover state type filename HBA port port priority -----</pre> <pre>up iscsi /dev/dsk/c17t6d1 lan0 10.72.210.14 0 up iscsi /dev/dsk/c5t6d1 lan0 10.72.210.14 1</pre>

Step	Action
	Sample output 2: f3070-210-38:/vol/vol1/lun1 (LUN 0) Agile Filename: /dev/rdisk/disk12 1g (1073741824) lun state: GOOD Filer_CF_State: Cluster Enabled Filer Partner: f3070-210-37 Multipath_Policy: None Multipath-provider: None <pre>----- host filer primary partner path path /dev/dsk host filer filer state type filename HBA port port ----- up iscsi /dev/dsk/c11t0d0 lan0 10.72.210.38 up iscsi /dev/dsk/c12t0d0 lan0 10.72.210.101</pre>

Step	Action
5	HP-UX 11iV3 February 2007 Release, does not support Asymmetric Logical Unit Access (ALUA). In this case, the default multipathing policy for all the disk storage is active/active. So if you are using HP-UX 11iV3 February 2007 Release, you might need to change the multipathing policy to active/passive for Data ONTAP LUNs. You can use the <code>enable_ontap_pvlinks</code> script to change the multipathing policy to active/passive for Data ONTAP LUNs without disturbing the other vendors' LUNs. Note With later versions of HP-UX 11iV3, ALUA is supported. The <code>enable_ontap_pvlinks</code> command has the following format: <pre>enable_ontap_pvlinks [set show unset]</pre> Run the following command to set the multipathing policy to active/passive for all ONTAP LUNs without disturbing other Vendors' LUNs: <pre>enable_ontap_pvlinks set</pre> Run the following command to display the current multipathing policy for all ONTAP LUNs: <pre>enable_ontap_pvlinks show</pre> Note If you are using HP-UX 11iV2, you do not need to use this script.

Note

Doing the above steps enables the host to discover the LUNs without requiring a host reboot.

Managing LUNs using LVM

To configure LUNs as disks by using LVM, complete the following steps.

Step	Action
1	Create a physical volume on the LUN by entering the following command: <pre>pvcreate /dev/rdisk/path_disk_device</pre> <i>path_disk_device</i> is the path to the disk device that contains the LUN. Note You only need to perform this process once for each LUN, even if you have multiple paths to that LUN. Example: The <code>pvcreate</code> command produces output similar to the following: <pre># pvcreate /dev/rdisk/c14t0d0 Physical volume "/dev/rdisk/c14t0d0" has been successfully created.</pre>
2	Check the minor numbers of all existing volume groups by entering the following command: <pre>ls -l /dev/*/group</pre> LVM requires a unique minor number for each volume group device entry. Example: The <code>ls -l /dev/*/group</code> command provides output similar to the following. <pre>ls -l /dev/*/group crw-r----- 1 root sys 64 0x000000 Oct 5 02:05 /dev/vg00/group</pre>
3	Use the <code>mkdir</code> command to create a <code>/dev</code> entry: <pre>mkdir /dev/directory_name</pre> Example: <pre>mkdir /dev/vg_ntap01</pre>

Step	Action
4	Create a device node on the host for the physical volume group using the <code>mknod</code> command. You must supply a unique minor device number. Do not enter a number that another volume group is using. Note The device node you create is used only for volume group and logical volume operations; it is not used for I/O. Example: <pre>mknod /dev/vg_ntap01/group c 64 0x010000</pre>
5	Use the <code>vgcreate</code> command to create a volume group with one primary path. Use a regular or block disk device node. Do not use raw disk devices. vgcreate <i>vg_name</i> /dev/dsk/<i>path_disk_device</i> <i>vg_name</i> is a volume group name, with or without the /dev/ prefix. <i>path_disk_device</i> is the path name to the disk. Example: In this example, the <code>vgcreate</code> command sets up a primary path to the volume group. <pre>vgcreate vg_ntap01 /dev/dsk/c14t0d0</pre>

Step	Action
6	Add the remaining paths to the volume group using the <code>ntap_config_paths</code> utility, which is in the <code>/opt/NetApp/iscsitools/bin/</code> directory. Enter the following command: <pre>ntap_config_paths</pre> Note This utility adds missing NetApp paths to the LVM's group and places them in the correct order. It specifies the disk device special files that correspond to the primary paths first and then the device special files that correspond to the secondary paths. Example: The <code>ntap_config_paths</code> utility adds the rest of the paths using the <code>vgextend</code> command. <pre># /opt/NetApp/iscsitools/bin/ntap_config_paths</pre> Getting information from sanlun... Adding missing path with: <pre>vgextend /dev/vg_ntap01 /dev/dsk/c12t0d0</pre> Volume group "/dev/vg_ntap01" has been successfully extended. Volume Group configuration for /dev/vg_ntap01 has been saved in /etc/lvmconf/vg_ntap01.conf You can verify the path ordering with the following command: <pre>vgdisplay -v volume_group</pre>

Step	Action
7	Create one or more logical volumes in the volume group using the following command: <pre>lvcreate [-L -l] size volume_group</pre> <i>size</i> with an uppercase -L option is the total size of the logical volume in megabytes. <i>size</i> with a lowercase -l option is the number of physical extents that you want to assign to the logical volume. The value you supply for <i>size</i> must not equal or exceed the available free physical extents in the volume group. The LUN reserves an area for physical volume, volume group, and LVM information. The lvcreate and the lvextend commands fail if the size you specify here does not fit into the volume group. You can check the available free physical extents by using the following command: <pre>vgdisplay -v volume_group</pre> Note After you create a logical volume, PVLinks path management is in effect on the logical volume. Example: The following example creates a logical volume for <code>/dev/vg_ntap01</code>. The vgdisplay command displays the number of available physical extents (511). The lvcreate command with a lowercase -l option assigns them to the logical volume. See the man pages for more information about vgdisplay and lvcreate. <pre># lvcreate -L 10 vg_ntap01 Warning: rounding up logical volume size to extent boundary at size "12" MB. Logical volume "/dev/ vg_ntap01/lvol1" has been successfully created with character device "/dev/ vg_ntap01/rlvol1". Logical volume "/dev/ vg_ntap01/lvol1" has been successfully extended. Volume Group configuration for /dev/vg_ntap01 has been saved in /etc/lvmconf/vg_ntap01.conf</pre>

Step	Action
8	If you want to create a file system on the logical volume device special file, use the <code>newfs</code> command. <pre>newfs -F vxfs /dev/volume_group/character_device</pre> <i>character_device</i> is the character device listed in the output of the following command: <pre>vgdisplay -v volume_group</pre> Example: <pre># newfs -F vxfs /dev/vg_ntap01/rlvol1 version 6 layout 12288 sectors, 12288 blocks of size 1024, log size 1024 blocks largefiles supported</pre>
9	After you create the new file system, create a mount point for it. Example: <pre># mkdir /mnt/vg_ntap01_lv1</pre>
10	Mount the new file system using the <code>mount</code> command. <pre>mount logical_volume mount_point</pre> Example: <pre>mount /dev/vg_ntap01/lvol1 /mnt/vg_ntap01_lv1</pre>

Step	Action
11	Verify that the LUN is visible to the host by entering the following command: <pre>sanlun lun show -p all</pre> Example: This example shows a sample output of the sanlun command. <pre>f3020-210-14:/vol/vol150/lun50 (LUN 49) VG: /dev/vg01 1g (1073741824) lun state: GOOD Filer_CF_State: Partner Takeover Filer Partner: f3020- 210-14 Multipath_Policy: A/P Multipath-provider: HP PV Links ----- host filer primary partner PVlinks path path dev/dsk host filer filer path failover state type filename HBA port port priority ----- up iscsi /dev/dsk/c17t6d1 lan0 10.72.210.14 0 up iscsi /dev/dsk/c5t6d1 lan0 10.72.210.14 1</pre>

Displaying LUN information

Displaying host LUN information

To display the host LUN information, complete the following steps.

Step	Action
1	Log in as root on the host.
2	At the host command line, use the <code>sanlun lun show</code> command to display LUN information. This command has two basic formats: ◆ <code>sanlun lun show -p [-v] [<filer name:filer pathname> <filer name> all]</code> Note _____ You must use the <code>-p</code> version of the command if you want to see information about the primary and secondary paths. You cannot use the <code>-d</code> option if you use the <code>-p</code> option. ◆ <code>sanlun lun show [-v] [-d <host_device_filename> all <filer_name> <filer_name:filer pathname>]</code>

Step	Action
	-p provides information about the primary and secondary paths available to the LUN when you are using multipathing. It lists the multipathing software being used to access the LUN and the multipathing policy. For example, if you are using PVLlinks, the -p option provides information about path priority. -v produces verbose output. -d specifies the special device file on the host (host_device_filename); for example, -d /dev/rdisk/c4t0d7. <i>filer_name</i> is the name of the target storage system. <i>filer_pathname</i> is the path to the LUN on the storage system. all displays information for all LUNs that are currently attached to the host. If you enter <code>sanlun lun show</code>, <code>sanlun lun show -p</code>, or <code>sanlun lun show -v</code> without any parameters, the utility responds as if you had included all parameters.

Step	Action
	The command line you enter depends on the information you want to view: ◆ To display a listing of the paths and multipathing policy associated with the LUN, enter the following command: sanlun lun show -p If you are using the HP-UX LVM, this command is useful if you need to view path ordering for PVLlinks, or to troubleshoot a problem with path ordering. ◆ To display the summary listing of the storage system LUNs associated with the host device /dev/rdisk/c3t4d2s2, enter the following command: sanlun lun show -d /dev/rdisk/c3t4d2s2 ◆ To display verbose output for all the LUNs currently available on the host, enter the following command: sanlun lun show -v all ◆ To display a summary listing of all the LUNs available to the host served by a storage system called filerA, enter the following command: sanlun lun show filerA ◆ To display a list of paths between the host and a specific LUN on the storage system (for example, lun0) on the storage system filerA, enter the following command: sanlun lun show filerA:lun_path

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