

Installation and Setup Guide 1.0 **for Fibre Channel Protocol on IBM® AIX®**

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Preface

- | | |
|----------------------------------|---|
| About this guide | This guide describes how to set up the interaction between an IBM® AIX® host and a Network Appliance™ storage appliance (filer) running Data ONTAP™ software with the Fibre Channel Protocol (FCP) for SCSI licensed. |
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 | |
| Audience | This guide is for system installers and administrators who are familiar with the AIX operating system (see “Verifying that the host meets system requirements” on page 14 for information on the specific AIX systems that NetApp supports). It assumes that you understand how to configure and administer a filer and use the filer-licensed SAN protocol, FCP, to store and retrieve data on a filer. See the <i>SAN Setup Overview for FCP</i> for pointers to documents that explain configuring and administering a filer. |
|
 | |
| Terminology | <p>This guide uses the following terms:</p> <ul style="list-style-type: none">◆ <i>LUN</i> (Logical Unit Number) refers to a logical unit of storage identified by a number.◆ <i>LUN ID</i> refers to the numerical identifier for a LUN.◆ <i>Filer</i> refers to a NetApp® storage appliance that incorporates the CompactFlash™ unit and supports FCP.◆ <i>Type</i> refers to pressing one or more keys on the keyboard.◆ <i>Enter</i> refers to pressing one or more keys and then pressing the Enter key. |
|
 | |
| Filer command conventions | You can enter filer commands on either the system console or from any host system that can access the filer through a Telnet session. |
|
 | |
| Keyboard conventions | When describing key combinations, this guide uses the hyphen (-) to separate individual keys. For example, “Ctrl-d” means pressing the “Control” and “d” keys simultaneously. Also, this guide uses the term “Enter” to refer to the key that generates a carriage return, although the key is named “Return” on some keyboards. |

Typographic
conventions

The following table describes typographic conventions used in this guide.

Convention	Type of information
<i>Italic type</i>	◆ Words or characters that require special attention. ◆ Placeholders for information you must supply. For example, if the guide says to enter the lun show -v <i>lunpath</i> command, you enter the characters “lun show -v” followed by the actual path to the LUN. ◆ Book titles listed 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 you must type it in uppercase letters.

Special messages

This guide contains the following types of special messages:

Note_____

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

Caution_____

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

WARNING_____

A warning contains instructions that you must follow to avoid personal injury.

About this chapter This chapter provides a brief explanation of the host and filer communication and supported configurations.

Topics covered in this chapter This chapter presents the following topics:

- ◆ “Understanding host and filer communication” on page 2
- ◆ “Supported host/filer configurations” on page 3
- ◆ “How target FCP ports process traffic for a cluster” on page 5

Understanding host and filer communication

How the host and filer communicate

The AIX host uses the SCSI protocol over Fibre Channel (FCP) to access data on NetApp filers running Data ONTAP software. The filers are target FCP storage appliances. Each host must have Fibre Channel HBAs that use FCP to access logical units of storage (LUNs) on a filer to store and retrieve data.

Note

You should install the HBA on the host before you install the NetApp software package. Make sure that you use an HBA supported by NetApp.

On a host, a World Wide Port Name (WWPN) identifies each physical and virtual port on the HBA. You supply the WWPNs when you create initiator groups (igroups) on a filer. An igroup permits the host access to specific LUNs on a filer.

Each target HBA on a filer has two ports—Port A and Port B. Port A is always active. Whether Port B is active depends on the following:

- ◆ If it is part of a clustered pair, the filer's cfmode setting determines when Port B is active.

Note

For information about the settings for cluster failover mode (cfmode) on the filer, see the *Data ONTAP Block Access Management Guide for FCP*.

- ◆ If it is a stand-alone filer, Port B is always active.

Supported host/filer configurations

Configuration components

NetApp supports several types of configuration with a variety of components.

Filer configurations: Basic configurations for the filer can consist of the following components:

- ◆ Filer, which can be one of the following:
 - ❖ A high-availability clustered filer pair
 - ❖ A single filer unit
 - ❖ A NearStore® backup storage appliance
- ◆ Up to four target HBAs per filer (that is, a total of eight target HBAs if you have a clustered pair)

Host configurations: Basic configurations for the host can consist of the following components:

- ◆ Up to four initiator HBAs

Connection topologies: The connection topology between the filer and the host can be one of the following:

- ◆ A direct connection where each host HBA is directly connected to the filer's target HBA.
- ◆ Switched fabric (SAN) consisting of either one Fibre Channel switch or a pair of redundant Fibre Channel switches (you can also have more switches)

A complete configuration: The completed configuration of host and filers can consist of multiple hosts and multiple filers connected directly or using either a single SAN fabric or several disjointed SAN fabrics. Regardless of the connection you use, if you have two or more physical paths to the same LUN, you must have multipathing software installed on the host. This release of the Host Attach Kit uses SANpath® from Dot Hill® to provide multipathing.

Recommended production configurations

NetApp recommends the following configurations for production environments. For additional information about supported configurations, including topology and cabling examples, see the FCP/iSCSI Configuration Guide at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/.

F8xx or FAS9xx series storage appliances: Production configurations consist of a storage appliance cluster, one or more hosts, and redundant fabrics. Each host is multi-attached so that it has one or more connections to each switch. Each storage appliance has two or more connections to each switch.

These configurations require that you have multipathing software installed on the host.

By combining multipathing, redundant fabrics, and filer clustering, these configurations create a no-single-point-of-failure solution between the host and the storage appliances.

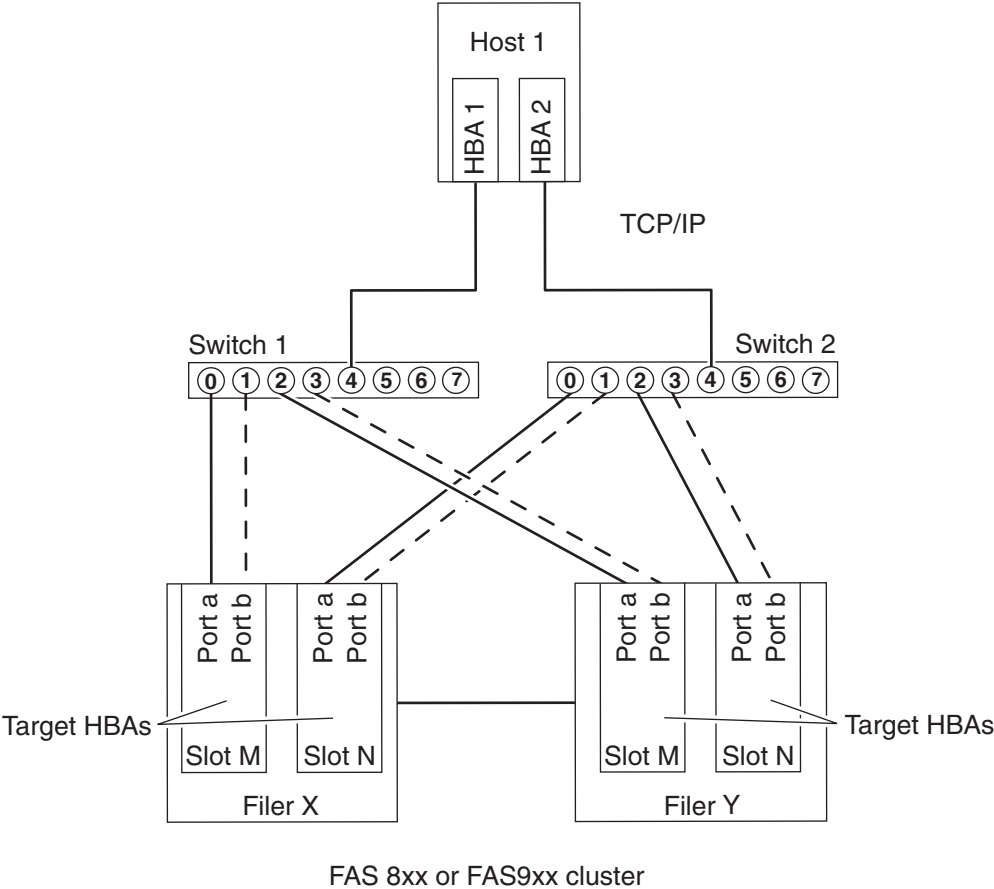
FAS270 storage appliances: Production configurations consist of a FAS270 cluster, one or more multi-attached hosts, and two switches. A FAS270 cluster consists of two storage appliances integrated into a NetApp disk shelf. Each storage appliance has one connection to each switch. FAS270 cluster configurations also require that you have multipathing software installed on the host.

How target FCP ports process traffic for a cluster

Default target port settings for F8xx or FAS9xx clusters

Each target HBA on an F8xx or a FAS9xx filer has two ports that are labeled Port A and Port B.

When you have the default filer target port settings (that is, the filer cfmode is set to partner), Port A provides access to local LUNs, and Port B provides access to LUNs on the partner filer. The following figure shows a sample configuration with a multi-attached host connecting to a cluster. The solid lines represent paths to LUNs on the local filer; the dotted lines represent paths to partner LUNs.



Multipathing software must be installed on the host when the filer ports operate in this mode because each LUN is accessible over multiple paths. The multipathing software reports Port A as a primary path and Port B as a secondary path.

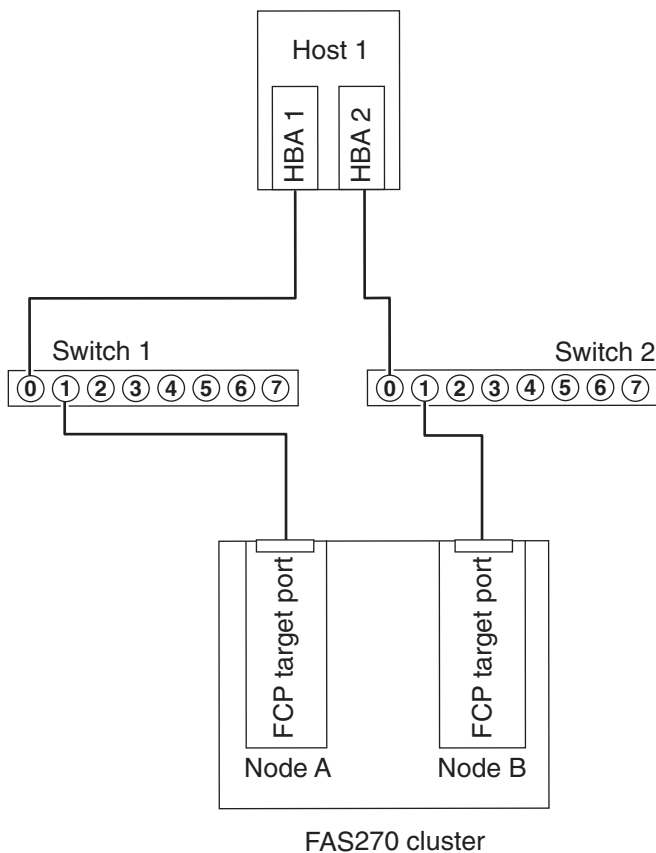
The table shows paths to a LUN on each filer in the configuration example.

Filer/LUN	Type of path	Target FCP ports
Filer X LUN	Local/Primary	Port A, Slot M on Filer X Port A, Slot N on Filer X
	Partner/Secondary	Port B, Slot M on Filer Y Port B, Slot N on Filer Y
Filer Y LUN	Local/Primary	Port A, Slot M on Filer Y Port A, Slot N on Filer Y
	Partner/Secondary	Port B, Slot M on Filer X Port B, Slot N on Filer X

Default target port settings for FAS270 clusters

A FAS270 cluster consists of two storage appliances integrated into a DS14 MK2 disk shelf. Each storage appliance has two Fibre Channel ports. The port labeled Fibre Channel 1 operates as a Fibre Channel target port after you license the FCP service and reboot the storage appliance. The port labeled Fibre Channel 2 is used to connect additional disk shelves to the FAS270 cluster.

The following figure shows a configuration example, in which a multi-attached host accesses a FAS270 cluster.



On FAS270 clusters, the FCP target ports log into the fabric using loop topology. Each physical port supports a virtual local port, which provides access to local LUNs, and a virtual partner port, which provides access to LUNs on the partner node.

The virtual ports enable the FAS270, which has only one target FCP port, to support traffic for both nodes in the cluster. For example, if Switch 1 fails, the multipathing software on the host uses Switch 2 to access the partner port on Node B. When the cluster is in a takeover state, the virtual partner port on the takeover node provides access to LUNs on both nodes.

About this chapter

This chapter describes the tasks you should perform before installing the NetApp software package on the AIX host.

Topics in this chapter

This chapter discusses the following topics:

- ◆ “Overview of the Host Attach Kit installation and setup” on page 10
- ◆ “Completing the preinstallation tasks” on page 13
- ◆ “Where to go for more information” on page 21

Overview of the Host Attach Kit installation and setup

Checklist of tasks to perform

Installing the Host Attach Kit and setting up your system involves a number of steps that are performed on both the filer and the host. The following is a high-level checklist of the tasks you must perform and the machines involved.

Step	Action	Machine	Details
Preparing to install the NetApp software package			
1	Review the information on the supported configurations and plan your configuration.		Chapter 1
2	Get a copy of the Host Attach Kit and review its contents.		Chapter 2
3	Verify that your system meets the system requirements and that you have the host HBA (or HBAs) installed. Note _____ NetApp does not supply the host HBA.	Host	Chapter 2
4	Confirm that you have the correct operating system version and filesets.	Host	Chapter 2
5	Verify that the filer is set up and configured as outlined in the <i>SAN Setup Overview</i> . This document is included with your Host Attach Kit.	Filer	<i>SAN Setup Overview</i> , Chapter 2
6	Verify that the switch, if you're using a fabric connection, is set up correctly and, if appropriate for your system, zoned.	Switch, Filer, Host	Chapter 2, <i>SAN Setup Overview</i> , <i>FCP/iSCSI Configuration Guide</i>

Step	Action	Machine	Details
7	Verify that the power to the switches, disk shelves, filers, and hosts is turned on in the correct order.	Switch, Disk shelves, Filer, Host	Chapter 2
8	Verify that the host and filer can communicate.	Filer, Host	Chapter 2
Installing the NetApp software package			
9	Get a copy of the NetApp software package, either by downloading it from the NOW site or from the CD.		Chapter 3
10	If you downloaded the NetApp software package, uncompress it and extract the files. If you are using the Host Attach Kit CD, mount the CD.	Host	Chapter 3
11	Install the NetApp software package, and, if you are using multipathing, the Dot Hill SANpath package. Note _____ SANpath provides multipathing. If you don't install it during the installation process, your setup will not have multipathing capabilities. _____	Host	Chapter 3
12	NetApp sets the initiator HBA queue depth. Make sure the depth is appropriate for your system.	Host	Chapter 3
Creating and configuring LUNs			
13	Display information about the HBA.		

Step	Action	Machine	Details
14	If you have a filer cluster, verify that the <code>cfmode</code> is correct. If you have a direct-attached filer, verify that the media type is correct.	Filer	Chapter 4
15	Create an igroup using AIX as the value for the <code>ostype</code> attribute.	Host, Filer	Chapter 4
16	Create a LUN and map it to the igroup.	Filer	Chapter 4
17	Use <code>cfgmgr</code> to get the host to discover the new LUNs.	Host	Chapter 4
18	If you are using multipathing, run the <code>sanlun</code> utility to display information about the paths to the LUNs.	Host	Chapter 4
19	Create a volume group, logical volume, and, if needed, file system.	Host	Chapter 4
20	Display information about the HBA.	Host	Chapter 4

Completing the preinstallation tasks

- Tasks to perform

This section describes the following tasks you should perform in preparation to installing the NetApp software and setting up you system, including:

- ◆ Verify the contents of the Host Attach Kit.
 - ◆ Verify that your host meets the system requirements.
 - ◆ Verify that the filer is installed and configured properly.
 - ◆ Verify that the switch is installed and configured.
 - ◆ Verify that the filer is cabled to the switch according to the topology requirements of your configuration.
 - ◆ Verify that the host and filer can communicate.

Verifying the contents of the Host Attach Kit

To verify the contents of the Host Attach Kit, complete the following step.

Step	Action
1	Open the Host Attach Kit and check for the following items: ◆ <i>SAN Setup Overview for FCP</i> ◆ <i>SAN Host Attach Kit 1.0 for Fibre Channel Protocol on IBM AIX Installation and Setup Guide</i> (this guide) ◆ Media kit ❖ <i>SAN Host Release Notes 1.0 for Fibre Channel Protocol on AIX</i> ❖ CD-ROM. The CD-ROM contains the following NetApp software packages in a standard installable package format: NetApp.fcp_attach_kit NetApp.fcp_toolkit These packages contain the NetApp device definitions and other utilities that NetApp supplies with this release. ❖ (Multipathing version only) CD-ROM SANpath® software. This software, provided by Dot Hill®, is necessary to enable multipathing. ❖ License agreement

Correct order for powering up the equipment

The different pieces of hardware communicate with each other in a prescribed order, which means that problems occur if you turn on power to the equipment in the wrong order. Throughout the procedures that follow, this is the order you must use when powering on the equipment:

- ◆ Configured Fibre Channel switches
It can take several minutes for the switches to boot.
- ◆ Disk shelves
- ◆ Filers
- ◆ Host

Verifying that the host meets system requirements

At the time this manual was printed, NetApp supported the following operating system, platform, and HBA requirements for FCP on AIX. For the most up-to-date information on system requirements, see the support matrix in the online *FCP/iSCSI Configuration Guide* at <http://now.netapp.com/NOW/knowledge/docs/docs.shtml>

Note
NetApp does not provide the AIX components. If you have any questions about setting up any of the components, see the AIX documentation that came with your system.

Component	Requirement
Host OS	AIX 5.1 ML4
AIX platforms	◆ Entry level: F80, p610, p615, p620, p630, p640 ◆ Mid-range: H80, p650, p655, p660H, M80, p660M, p670 ◆ High-end: p690

Component	Requirement
HBA	Native AIX: ◆ 2 GB Fibre Channel PCI Adapter 64-bit PCI HBA: FC 6228 Type 4 ◆ 2 GB Fibre Channel PCI-X Adapter: FC 6239 Type 5704 Note_____ Make sure that you have a copy of the following driver file sets: ◆ devices.common.IBM.fc.hba-api version 5.1.0.0 ◆ devices.pci.df1000f7.com version 5.1.0.57
Multipathing software	SANpath 4.0.5 Note_____ Multipathing version of the Host Attach Kit only.
Host clustering	HACMP/ES 4.5
Logical partitioning	LPAR qualified Note_____ Dynamic LPAR is not available on AIX 5.1
Storage appliances	◆ NetApp F8xx series ◆ NetApp FAS9xx series ◆ NetApp FAS270 ◆ NetApp NearStore® Rxxx Caution_____ Only NetApp Fibre Channel storage appliances are supported with this release of the Host Attach Kit. This release does not support mixed SAN storage arrays (other than NetApp filers) on the same host or Fibre Channel switch.
Filer OS	Data ONTAP 6.5 and later

Component	Requirement
Cable	50 micron multimode fiber optic cable Purchase the length of optical cable appropriate for your site requirements. Note— The <i>Cable Support for FCP</i> page in the <i>FCP/iSCSI Configuration Guide</i> on the NetApp NOW site contains the most up-to-date information on cabling specifications and requirements. It also has information on ordering cables.

Check your operating system version

If you're not sure you have the correct version of the operating system, enter the following command:

```
oslevel -r
```

Result: Information about your operating system and maintenance level version appears. This command gives you basic information about the operating system level, but it may not be complete. You may need additional file sets.

Example: This command displays information on your operating system level.

```
oslevel -r
5100-04
```

Check the version of the prerequisite filesets

If you're not sure you have the correct version of the filesets, use the `lslpp` command to check these versions. This command has the following format:

```
lslpp -L <fileset_name>
```

`-L` displays information about all the filesets installed on the host.

`fileset_name` tells the command to display information about that fileset on the host.

Result: The output from this command tells you which filesets are installed on the host or provides information about a fileset on the host.

Example: The following example displays information about the fileset `devices.pci.df1000f7.com`.

```
# lsllpp -L devices.pci.df1000f7.com
  Filesset                               Level  State  Type  Description
(Uninstaller)
```

```
-----
devices.pci.df1000f7.com  5.1.0.57    C      F      Common PCI FC
Adapter Device Software
```

State codes:

```
A -- Applied.
B -- Broken.
C -- Committed.
E -- EFIIX Locked.
O -- Obsolete. (partially migrated to newer version)
? -- Inconsistent State...Run lppchk -v.
```

Type codes:

```
F -- Installp Filesset
P -- Product
C -- Component
T -- Feature
R -- RPM Package
```

Verifying that the host HBA is installed

The host HBAs should be installed before you install the NetApp software package. If you have not installed the HBA, complete the following steps.

Step	Action
1	Power down your host machine.
2	Install the HBA card(s). See the documentation that came with your HBA cards for information on doing this.
3	Restart the system.

**Verifying that the
filer is installed and
configured**

To verify that the filer is installed and configured, complete the following step.

Step	Action
1	Confirm that the filer is set up and configured as described in the <i>SAN Setup Overview</i>. This document provides a high-level overview for setting up your NetApp SAN, including setting up the filer and connecting it to the host. This book presents the correct order for powering on the different components. Caution_____ The filer must be set up and configured before creating initiator groups and LUNs on the filer. _____ For the filer to be set up correctly, you should have completed the at least following tasks: ◆ Set up the AIX host and the initiator HBAs. ◆ Installed the filer and target HBAs (if needed). ◆ Cabled the filer according to your configuration topology. You can cable a host and filer in the following ways: ❖ Fabric-attached, where a host is cabled to a filer cluster through a single or dual switch fabric. ❖ Direct-attached, where a single-attached host with one HBA or a multi-attached host with multiple HBAs is cabled directly to a stand-alone filer. ◆ Set up and configured Data ONTAP on the filer. Note_____ For more information, see the <i>Data ONTAP Block Access Management Guide</i>. _____ ◆ Licensed and enabled the FCP protocol and any other protocols appropriate for the filer. ◆ Created working filer volumes and qtrees (if desired) on the filer. Note_____ NetApp strongly recommends that you create volumes with space reservations enabled. _____

Verifying that the switch is installed and configured

If you have a fabric-attached configuration, verify that the switch is installed and configured by completing the following step.

Step	Action
1	Check that the switch is set up and configured as outlined in the <i>SAN Setup Overview</i>. You should have completed the following tasks: ◆ Installed the switch in a system cabinet or rack. ◆ Turned on power to the switch based on the order listed in the <i>SAN Setup Overview</i>. ◆ Configured the network parameters for the switch, including its serial parameters and IP address.

Determine whether to use switch zoning

If you have a fabric-attached configuration, determine whether switch zoning is appropriate for your system setup.

The SANpath multipathing software limits the number of paths per LUN to a maximum of 32. If your host has more than 32 paths, you can use switch zoning to reduce the number of those paths that are visible to the LUN.

Zoning requires more configuration on the switch, but it results in the following:

- ◆ Configuring the host is simplified.
- ◆ Information becomes more manageable. The output from host tools such as `iostat` and `lsdev` is easier to read because fewer paths are displayed.

If you have a high-availability configuration, make sure that there is at least one primary path and one secondary path through each switch for each LUN. For example, if you have two switches, you would have minimum of four paths per LUN.

NetApp recommends that your configuration have no more than eight paths per LUN. For more information on zoning, see the *FCP/iSCSI Configuration Guide*, which is online at <http://now.netapp.com/NOW/knowledge/docs/docs.shtml>

Verifying the host and filer can communicate

To verify that the host can issue commands to the filer through the filer's console or command line, complete the following step.

Step	Action
1	Issue a command from the host to the filer. There are two ways to do this: ◆ Use a remote login, such as <code>telnet</code>, to connect with the filer and enter a command at the filer prompt. ◆ Go to the filer console and enter a command such as <code>date</code>.

Where to go for more information

Documentation relevant to this Host Attach Kit

This guide provides information on the basic tasks involved in setting up an AIX host using Fibre Channel protocol with a NetApp storage appliance. The information in it is current as of its publication.

For more recent information or additional information, you might want to consult the following documents:

- ◆ *The FCP/iSCSI Configuration Guide*
This is a dynamic, online document that contains the most up-to-date information about NetApp's FCP Host Attach Kit for AIX.
It also provides the most current details about filer and host platforms, cabling issues, switch issues, and configurations. This document is available at the NOW site: <http://now.netapp.com/NOW/knowledge/docs/docs.shtml>.
- ◆ *The SAN Host Release Notes 1.0 for Fibre Channel Protocol on IBM AIX*
This document contains any last-minute information that you need to get your configuration up and running smoothly. A printed copy of this document comes with the NetApp Host Attach Kit. You can also download it from the NOW site.
- ◆ *The SAN Setup Overview*
This is a high-level document that provides an overview of setting up a filer to work with a host. By following the order specified in this document, you can avoid problems that might occur when you perform steps out of order. This document is part of the NetApp Host Attach Kit.
- ◆ *System Configuration Guide*
This is an online document that contains information about the supported filer models for Data ONTAP licensed with FCP. It is available at the NOW site: <http://now.netapp.com/NOW/knowledge/docs/docs.shtml>.
- ◆ *Data ONTAP Block Access Management Guide*
This document provides information about using Data ONTAP. It contains information on setting up your filer to work with Data ONTAP.
- ◆ *Network Appliance FCP Quick Reference Commands-IBM AIX*
The quick reference summarizes the commands you use on an IBM AIX system attached to a NetApp filer. This document is available online as part of the FCP/iSCSI Configuration guide (http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/related_docs.shtml).

- ◆ *SANpath User's Guide for IBM AIX Operating Systems*

This document explains how to use SANpath. A printed copy of this document comes with the multipathing version of the NetApp Host Attach Kit. You can also download it from the NOW site.

- ◆ Host operating system and HBA information

NetApp does not provide these documents. See the readme files and other documentation that you received when you got your IBM AIX operating system.

About this chapter

This chapter describes procedures for installing the NetApp's software package for an AIX host connected to a NetApp storage appliance running Data ONTAP with FCP.

Note

All installation procedures require root privileges. In addition, you must have the host and HBA set up before you install your NetApp software package.

Topics in this chapter

This chapter discusses the following topics:

- ◆ “Obtaining the NetApp software package” on page 24
- ◆ “Installing the NetApp software package” on page 28
- ◆ “Uninstalling the NetApp software” on page 37

Obtaining the NetApp software package

Software provided by NetApp

NetApp provides two software packages that it creates using the IBM AIX Licensed Program Product (LPP) format. These packages contain the following components:

- ◆ The NetApp toolkit. This toolkit contains the `sanlun` utility and diagnostic and troubleshooting utilities. The `sanlun` utility helps you manage LUNs and host HBAs. The diagnostic and troubleshooting utilities are available if a problem occurs with your system. To determine the cause, NetApp customer support might ask you to run one of these utilities.
- ◆ The NetApp AIX-specific Host Attach Kit, which contains NetApp FCP device definitions.

The multipathing version of the Host Attach Kit also includes the Dot Hill SANpath multipathing software, which is packaged separately.

Ways to obtain the NetApp software package

You can obtain the NetApp software packages in two ways:

- ◆ Download it from the NOW site. The Host Attach Kit on the NOW site bundles the software packages into a single compressed .tar file. Information on getting this file is detailed in the section “Downloading the software” on page 25.
- ◆ Get it from a CD-ROM provided with the media package in your NetApp SAN Host Attach Kit for Fibre Channel Protocol on IBM AIX. Information on getting the software packages from the CD-ROM is detailed in the section “Getting the software from the CD-ROM” on page 26.

Note

To verify that you have the latest NetApp software package, check the *FCP/iSCSI Configuration Guide*, which is online at <http://now.netapp.com/NOW/knowledge/docs/docs.shtml>.

Downloading the software

To download the software from the NOW site, complete the following steps.

Step	Action
1	Log in to the NOW site at http://now.netapp.com . In the fields on the right side of the page, complete the following steps: 1. Enter your user name and password. 2. From the Select Start Page list box, click Download Software. 3. Click the Login button.
2	On the Download Software page, go to the SAN Host Attach Kit product row of the table and select AIX from the Select Platform drop-down list.
3	Click Go!
4	Follow the prompts to reach the Software Download page.
5	Download the NetApp software file to a local directory.
6	To get the software necessary for multipathing, download the SANpath software file to the same directory where you downloaded the NetApp software.
7	If you download the files to a machine other than the AIX host, you'll need to move them to the host.

Uncompressing the software file you downloaded

To uncompress the software file you downloaded from the NOW site, complete the following steps.

Step	Action
1	Enter the following command to uncompress the file and extract the software: # zcat ntap_aix_fcp_1.0.tar.Z tar -xvf - Result: The extracted software is placed in the /tmp/aix directory. Example: Executing the zcat and tar commands produces output similar to the following. # zcat ntap_aix_fcp_1.0.tar.Z tar xvf - x ./ntap_aix_fcp_1.0/NetApp.fcp_attach_kit, 22528 bytes, 44 media blocks. x ./ntap_aix_fcp_1.0/NetApp.fcp_toolkit, 1005568 bytes, 1964 media blocks. x ./ntap_aix_fcp_1.0/install, 37326 bytes, 73 media blocks. x ./ntap_aix_fcp_1.0/uninstall, 17844 bytes, 35 media blocks. #
2	Go to “Installing the NetApp software package” on page 28.

Getting the software from the CD-ROM

To get the software from the CD-ROM, complete the following steps.

Step	Action
1	Insert the CD-ROM into the CD-ROM drive.
2	Change to the root directory, which contains the install command and the software packages: ◆ NetApp.fcp_attach_kit ◆ NetApp.fcp_toolkit

Step	Action
3	Copy the <code>install</code> shell script from the CD-ROM's root directory to a temporary location on the host. Example: If you mount the CD-ROM on <code>/mnt</code> and want to place the <code>install</code> script in the <code>/tmp</code> directory, you might enter commands similar to the following: <pre># mount -v cdrfs -o ro /dev/cd0 /mnt # cp /mnt/install /tmp # cd /tmp</pre>
4	Go to “Installing the NetApp software package” on page 28.

Installing the NetApp software package

Tasks involved in installing the NetApp software

You follow the same steps whether you are installing the NetApp software package for the first time or upgrading it. Use one of the following methods to install the software:

- ◆ Run the `install` command interactively. The command starts a script that prompts you for the information required to install the software. See “Installing using the command interactively” on page 28.
- ◆ Execute the `install` command with arguments that contain the required information. See “Installing from the command line” on page 33.

What the install command does

When you run the installation command, it performs the following tasks:

- ◆ Checks the operating system version, HBA model, and firmware of your host.
- ◆ If you are using multipathing, installs the SANpath software and enables the Dot Hill license.
- ◆ Installs the NetApp attach kit packages that contains the `san lun` utility and diagnostic utilities.
- ◆ Sets the HBA queue depths.
- ◆ Depending on the installation option you select, changes the host HBA settings to NetApp default values.
- ◆ Runs the `bosboot` command to update the boot image.
- ◆ Logs all command output to a file named `netapp_install_log_yymmddhhMMSS` where `yymmddhhMMSS` represents the date and time that you started the installation. By default this log file is placed in `/tmp` and `/opt/NetApp`.

Installing using the command interactively

To install the software using the command interactively, complete the following steps.

Note

If the installation fails with a message saying you don’t have the prerequisites, correct your system setup and rerun the `install` command. Do not run the `uninstall` command.

Step	Action	
1	If you are ...	Then...
	Using multipathing, which is provided by the SANpath multipathing software	1. Install the software using the NetApp <code>install</code> command without any options. 2. Go to Step 2 to continue the installation.
	Not using the SANpath multipathing software	1. Install the software using the <code>install -n</code> command. <pre># ./install -n</pre> Without this option, the command prompts you for SANpath information. If you don't supply this information, the command displays a warning. 2. Go to step 4 to continue the installation. (Steps 2 through 3 deal with questions you only see if you install SANpath.)

Step	Action
2	If you are using multipathing, specify the location of the SANpath package. Press Enter to accept the default. Please enter the location of the SANpath package: (if you are installing from CD, you may enter the device name, e.g. /dev/cd0) [default: /tmp/aix] > <i>sanpath_location</i> Installing SANpath from <i>sanpath_location</i>... done. <i>sanpath_location</i> is the path to the SANpath package. This location can be the SANpath CD, which comes with the multipathing version of the Host Attach Kit, or the path to the file you downloaded from the NetApp NOW site. If you do not supply a valid path, the install command displays a warning message similar to the following: WARNING: The DotHill.SANpath package was not found in /tmp/aix. Please enter a different location for the <i>sanpath_location</i> package: [default: /tmp/aix] > Example: This example installs the SANpath utility from a directory called /tmp/aix/DotHill. Please enter the location of the SANpath package: (if you are installing from CD, you may enter the device name, e.g. /dev/cd0) [default: /tmp/aix] > /tmp/aix/DotHill Installing SANpath from /tmp/aix/DotHill... done.

Step	Action
3	If you are using multipathing, enter authorization key for the SANpath multipathing software. This key consists of the following data: ◆ Your company name ◆ A serial number ◆ An authorization code You receive this information when you purchase the multipathing software with the attach kit. You can also get this information from the IBM AIX Download Page on the NOW site. Enter these keys exactly as they are given to you. Example: The following example uses Network Appliance to show you the type of information you must enter. <pre>In order to enable SANpath, you must enter your authorization data. Enter your company name: > Network Appliance Enter SANpath serial number: > XXX999999 Enter authorization code: > 999-999-999 SANpath authorization accepted.</pre>

Step	Action
4	Specify the location of the NetApp software package. Press Enter to accept the default. Please enter the location of the NetApp packages: (if you are installing from CD, you may enter the device name, e.g. /dev/cd0) [default: /tmp/aix] > <i>package_location</i> Installing NetApp packages from <i>package_location</i>... done. <i>package_location</i> is the path to NetApp software packages. This location can be the Host Attach Kit CD or the path to the file you uncompressed after downloading it from the NetApp NOW site. If you do not supply a valid path, the command displays a warning message. WARNING: The NetApp packages were not found in <i>package_location</i> Please enter a different location for the packages: [default: /tmp/aix] > Example: This example installs the NetApp packages from a directory called /tmp/aix/sanlun. Please enter the location of the NetApp packages: (if you are installing from CD, you may enter the device name, e.g. /dev/cd0) [default: /tmp/aix/sanlun] > /tmp/aix/sanlun Installing NetApp packages from /tmp/aix/sanlun... done.

Step	Action
5	The installation command asks how you want to handle updating the Object Data Manager (ODM) settings for the HBAs. Note Unless you have specific requirements for tuning your system, NetApp recommends you choose option 1, which updates the settings and saves the old HBA settings to the file <code>/opt/NetApp/fcp_attach_kit/saved_hba_settings</code>. <pre> Installing NetApp packages from /tmp/aix/sanlun... done. The NetApp AIX FCP Attach Kit 1.0 requires changes to device attributes for the Fibre Channel adapter fcs0. This script can update the ODM settings, which will take effect at the next reboot. You can either: 1) Update the ODM settings for all HBAs; 2) Skip update for all HBAs. 3) Update the ODM settings for this HBA; 4) Do not update anything for this HBA, skip to the next one; What would you like to do? [1]: > done. Running bosboot to update the boot image... done. Installation of the NetApp AIX Attach Kit was successful. You MUST reboot the system before accessing your NetApp filer(s). Installation log saved in both /tmp/netapp_install_log_yymmdhMMSS and /opt/NetApp/install_log </pre> Result: The installation command completes by running bosboot to rebuild the boot image. The changes to the ODM settings do not take effect until you reboot the system.
6	When the installation completes, reboot the system. <pre>shutdown -F -r now</pre>

Installing from the command line

You can install the attach kit, the SANpath multipathing software, and configure your system for use with the NetApp filers in a single step. Enter the installation command with the appropriate options from the command line. Using this format tells the install command to update ODM information on all the HBAs.

To install the attach kit and, optionally, SANpath from the command line, perform the following steps.

Step	Action	
1	Enter the appropriate options on the install command line for your installation. <pre>install -f -a <attach_kit_dir> { -s <SANpath_dir> -l <license_file> -n }</pre>	
	Enter ...	To specify ...
	-f	Command line mode, not interactive mode.
	-a <attach_kit_dir>-	The directory containing the NetApp AIX Host Attach Kit file packages.
	s <SANpath_dir>	The directory containing the Dot Hill SANpath package.
	-l <license_file>	The path to a file containing the Dot Hill licensing information. This must be a text file that contains the following authorization data in this order, each item on a separate line: ◆ your company name ◆ a serial number ◆ an authorization code You receive these keys when you purchase the multipathing software with the attach kit. Enter these keys exactly as they are given to you.
	-n	That this is not a multipathing installation. When you include this option, the command does not install SANpath
2	When the installation completes, reboot the system. Result: The command installs the Host Attach Kit using the information you provided on the command line. By default, it updates the ODM settings on all the HBAs and saves the old settings to the file /opt/NetApp/fcp_attach_kit/saved_hba_settings. These settings take effect when you reboot the host.	

Example of output when installing interactively

This example displays the type of output you might see when running the install command interactively and installing a multipathing version of the Host Attach Kit.

```

# ./install
Checking HBAs on the system... done.
Please enter the location of the SANpath package:
(if you are installing from CD, you may enter the device name, e.g.
/dev/cd0)
[default: /tmp/aix]
> /tmp/aix/DotHill
Installing SANpath from /DotHill... done.
In order to enable SANpath, you must enter your authorization data.
Enter your company name: > Network Appliance
Enter SANpath serial number: >xxxxxxxxx
Enter authorization code: >xxx-xxx-xxx
SANpath authorization accepted.
Run sspath -a after installation in order to activate SANpath.
Please enter the location of the NetApp packages:
(if you are installing from CD, you may enter the device name, e.g.
/dev/cd0)
[default: /tmp/aix]
> /tmp/aix
Installing NetApp packages from /tmp/aix... done.
The NetApp AIX FCP Attach Kit 1.0 requires changes to device
attributes for the
Fibre Channel adapter fcs0. This script can update the ODM
settings, which
will take effect at the next reboot.
You can either:
1) Update the ODM settings for all HBAs;
2) Skip update for all HBAs.
3) Update the ODM settings for this HBA;
4) Do not update anything for this HBA, skip to the next one;
What would you like to do? [1]:
> 1
done.
Running bosboot to update the boot image... done.
Installation of the NetApp AIX Attach Kit was successful.
You MUST reboot the system before accessing your NetApp filer(s).
Installation log saved in both /tmp/netapp_install_log_030930120026
and /opt/NetApp/install_log
#

```

Example of output using install on the command line

This example displays the type of output you might see when running the install command from the command line and installing a multipathing version of the Host Attach Kit. The following is true for this example:

- ◆ SANpath is in the /tmp/SANpath directory.
- ◆ The attach kit was extracted from /tmp.
- ◆ /tmp/SANpath_license is a file containing the SANpath license and authorization information.

Note

This example has been shortened.

```
# cd /tmp/ntap_aix_fcp_1.0
# ./install -f -a . -s /tmp/SANpath -l /tmp/SANpath_license
Checking HBAs on the system... done.
Installing SANpath from /tmp/SANpath... done.
SANpath authorization accepted.
Installing NetApp packages from /tmp/ntap_aix_fcp_1.0... done.
Updating HBA settings... done.
Running bosboot to update the boot image... done.
Installation of the NetApp AIX Attach Kit was successful.
You MUST reboot the system before accessing your NetApp filer(s).

Installation log saved in both /tmp/netapp_install_log_031208162044
and /opt/NetApp/install_log
```

Verifying the HBA initiator queue depth

It's a good practice to verify the value of the HBA initiator queue depth. To check the queue depth, enter the following step.

Step	Action
1	Check the HBA queue depth by using the <code>lsattr -El</code> command. Example: For HBA fcs0, you would enter the following command: <pre># lsattr -El fcs0</pre> Note NetApp recommends you use a value of 48 for the queue depth.

Uninstalling the NetApp software

Methods of uninstalling the software

You can uninstall the software by running the `uninstall` command interactively, which prompts you for information, or in command-line mode.

Note

By default, the `uninstall` command is placed in the directory `/opt/NetApp/santools/bin` when you install the NetApp software package.

What the `uninstall` command does

The `uninstall` command performs the following tasks:

- ◆ Removes NetApp devices and, if you were using multipathing, the SANpath devices as well as shutting down the SANpath daemon.
- ◆ If you select the option to do this, restores HBA settings it saved during the installation from the `/opt/NetApp/fcp_attach_kit/saved_hba_settings` file.
- ◆ Uninstalls the NetApp packages.
- ◆ Runs `bosboot` (exactly once) to rebuild the boot image.
- ◆ Logs all command output to a file named `netapp_uninstall_log_yymmddhhMMSS` where `yymmddhhMMSS` represents the date and time that you started the `uninstall`. By default, the log is saved in the `/tmp` directory.

Uninstalling using the `command` interactively

To uninstall the NetApp software using the `command` in interactive mode, complete the following steps.

Note

NetApp recommends that you remove your current installation of the NetApp software before you install a new package.

Step	Action
1	Ensure that you are logged in as root.

Step	Action
2	Go to the directory where you uncompressed the NetApp software file. For example, if you extracted the software to /tmp, you would enter <pre>cd /tmp</pre>
3	Use the <code>uninstall</code> command to remove the NetApp software. Answer <code>y</code> (or yes) when the command asks if you are sure you want to remove the attach kit. If you answer <code>n</code> (or no), the command does not uninstall the attach kit. <pre># ./uninstall</pre> This script will uninstall the NetApp FCP Attach Kit and remove NetApp device definitions from the system. Are you sure? [no] y
4	Specify whether you want to restore your preinstallation HBA settings. ◆ <code>n</code>, which is the default, tells the command to keep the current settings. ◆ <code>y</code> tells the command to restore the previous settings from the file it created during the installation. You must reboot the host after the uninstall finishes for these settings to take effect. This script can restore your saved pre-installation HBA settings. Would you like to do that? [no] y <pre>Restoring pre-installation HBA settings... done. Removing NetApp packages... done.</pre>
5	If you are using a multipathing version of the attach kit, specify whether you want to uninstall SANpath. ◆ <code>y</code>, which the default, tells the command to remove SANpath. ◆ <code>n</code> tells the command to leave SANpath installed. <pre>Would you like to uninstall SANpath from your system? [yes] y Uninstalling SANpath... done.</pre>

Step	Action
6	If you choose to restore the previous HBA settings, you must enable the restoration by rebooting the host once the uninstall completes. Otherwise, it will continue to use the settings specified during the installation. <pre>Running bosboot to update the boot image... done. Uninstallation of the NetApp AIX Attach Kit was successful. You must reboot the system to finish restoring your previous HBA settings. Uninstall log saved in /tmp/netapp_uninstall_log_030930122615</pre>
7	If you want to install the latest software version, go to “Uncompressing the software file you downloaded” on page 26.

Uninstalling from the command line

You can uninstall the attach kit, the SANpath multipathing software, and configure your system for use with the NetApp filers by entering the uninstall command with the appropriate options. To use this command, you must not have any volume groups defined on your NetApp devices. You can use the uninstall command in command line mode to clean up after a failed installation.

Step	Action
1	Log in as root.
2	Enter the appropriate options on the uninstall command line. <pre>uninstall [-f] [-n] [-r]</pre>

Step	Action	
	Enter ...	To specify ...
	-f	Command line mode, not interactive mode. By default this option uninstalls SANpath and does not restore pre-installation HBA settings.
	-n	That you want to keep the SANpath software installed on your system.
	-r	That you want the command to restore the HBA settings it saved during the installation.
3	When the uninstall completes, reboot the system.	

Example of output from an interactive uninstall

The following shows an example of output you might see when you execute the `uninstall` command interactively. This example accepts the default to keep the current HBA settings.

```
# ./uninstall
This script will uninstall the NetApp FCP Attach Kit and remove
NetApp device definitions from the system.
Are you sure? [no] y

This script can restore your saved pre-installation HBA settings.
Would you like to do that? [no] n

HBA settings not restored.
Removing NetApp packages... done.

Would you like to uninstall SANpath from your system? [yes] y

Uninstalling SANpath... done.
Running bosboot to update the boot image... done.
Uninstallation of the NetApp AIX Attach Kit was successful.
Uninstall log saved in /tmp/netapp_uninstall_log_030930105126
#
```

Example of output using `uninstall` on the command line

If you do not want to be prompted for information, you can execute `uninstall` with command line options. When you use the command line format for `uninstall`, the command performs the tasks specified by the options.

This example uses only the `-f` option, which tells the command not to run interactively. Because no other options are included on the command line, the command does not restore the previous HBA settings, but it does remove SANpath (if it has been installed). This example has been shortened.

```
# /opt/NetApp/santools/bin/uninstall -f
HBA settings not restored.
Removing NetApp packages... done.
Uninstalling SANpath... done.
Running bosboot to update the boot image... done.
Uninstallation of the NetApp AIX Attach Kit was successful.
Uninstall log saved in /tmp/netapp_uninstall_log_031208161721
```


About this chapter

This chapter provides the following information:

- ◆ What's involved in adding LUNs to systems with AIX hosts
- ◆ How to create initiator groups (igroups) and LUNs on the filer
- ◆ How to configure LUNs and make them accessible by the host
- ◆ How to use the sanlun utility to manage host LUN and HBA information

Topics in this chapter

This chapter discusses the following topics:

- ◆ “Overview of adding LUNs to AIX” on page 44
- ◆ “Creating LUNs on the filer” on page 47
- ◆ “Configuring the LUNs” on page 59
- ◆ “Displaying LUN and HBA information” on page 68

Overview of adding LUNs to AIX

Tasks you perform on the filer

You must perform the following tasks on the filer when you add a LUN to an AIX host:

1. Prepare the filer for adding AIX LUNs. If you have a clustered filer pair, check the filer FCP cluster failover mode (cfmode). If you have a single filer with a host directly attached to it, set the media type for each filer HBA being used with this Host Attach Kit. You only need to do this once.
2. If you're using a filer in a direct-attached configuration, set the media type to loop.
3. Create an igroup using AIX as the operating system type for the host HBAs.
4. Create a LUN using AIX as the operating system type and map it to the igroup.

Tasks you perform on the host

You must perform the following tasks on the host when you add a LUN to an AIX host:

1. Use `cfgmgr` to get the host to discover the new LUNs.
2. Verify that the LUN is visible to the host using the `sanlun` utility.
3. Verify the value of the queue depths for the disk using the `chdev -l` command.
4. If you are using multipathing, run the SANpath multipathing software to display information about the paths.
5. Create the volume group.
6. Create the file system (if you need any file systems).
7. Display information about the LUN.
8. Display information about the HBA.

Preparing the filer

Tasks required for preparing the filer

Before you create the igroups or LUNs, you must prepare the filer.

- ◆ If you are using clustered filers, you must confirm the FCP cluster failover mode (cfmode) is set correctly. The cfmode value determines how a filer cluster handles a failover.
- ◆ If you are using a filer in direct-attached mode, you must make sure the media type setting is correct.

Correct cfmode settings for clustered filers

For an AIX host that is using clustered filers, you must ensure the following cfmode settings for your filers. These modes should be set by default:

- ◆ FAS2xx filers: dual-fabric mode
- ◆ All other filers and backup storage appliances: partner. (In some circumstances, you might need to use mixed mode. Consult with NetApp if you have any questions about which mode you should use.)

Note

Do not use standby cfmode mode.

Determining the current cfmode

To check the current cfmode settings, enter the following command:

```
fcpx show cfmode
```

Result: The system displays the cfmode setting.

Caution

If the cfmode is not set correctly, contact NetApp.

Tasks required for a direct-attached storage appliance

You can attach your host directly to a storage appliance. When you use a direct-attached configuration instead of a clustered configuration, you must perform the following tasks:

- ◆ Set the media type to loop. You must also do this if you are using a single-head filer or a NearStore Rxxx filer. Use the `fcpx config` command to set the media type.

Note

If you are using clustered filers, the media type setting is disabled.

- ◆ Make sure that you do not have clustering licensed or the Interconnect Card installed. Remove both if they exist on your filer.

Setting the media type

To set the media type to loop, perform the following steps:

Step	Action
1	On the filer command line, stop each adapter used in the direct attach configuration by entering the following command: fcg config <adapter> down <i>adapter</i> is the name of the Fibre Channel target adapter.
2	Set the media type to loop by entering the following command for each adapter: fcg config <adapter> mediatype loop
3	Restart the adapter by entering the following command: fcg config <adapter> up
4	Reboot the filer and the host.
5	Verify the adapter ports are online by entering the following command: fcg show adapter
6	Verify that the media type is now correctly set on each adapter port by entering the following command; fcg config

Creating LUNs on the filer

Tasks needed to create and map LUNs on the filer

Before you can complete the configuration, you must perform the following tasks:

- ◆ Create an igroup on the filer. An igroup is a collection of host WWPNs.
- ◆ Create one or more LUNs on the filer and map the LUNs to an igroup.

Best practices for creating LUNs

The best practices for creating LUNs include the following:

- ◆ Each igroup should map to an application and should include all the initiators used by the application to access its data. (Multiple applications may be using the same initiators.)
- ◆ Do not put LUNs in /vol/vol0 (the root volume).
- ◆ Ensure that the LUNs are at the root of a qtree in a volume in the filer.
- ◆ Enable space reservations.
- ◆ If you have a clustered pair, use different LUN IDs on each filer.
- ◆ Disable scheduled auto snapshots.

For more information about creating and managing LUNs, see *Data ONTAP SAN System Administrator's Guide*.

Creating an igroup on the filer

To create an igroup on the filer, complete the following steps. If you have clustered filers, you must create a separate igroup on each filer.

Note

The examples used in these steps assume that the application is running on a single host, not a cluster. They also assume that you have already attached the host and filers to fabric.

Step	Action
1	Log in as root on the host.

Step	Action
2	Get the WWPN for each of the host's HBAs by entering the following command: <pre>sanlun fcp show adapter -c</pre> The <code>-c</code> option tells the <code>sanlun</code> utility to generate the output the filer needs to create the igroup. You take the resulting command line and run it on the filer to create an igroup containing all the HBAs on your host. Result: An <code>igroup create</code> command with the host's WWPNs appears on the screen when you execute the command. The igroup's name matches the name of the host. Example: Running <code>sanlun fcp show adapter -c</code> produces the following output on an AIX system called <code>hostA</code>. This example uses two WWPNs. <pre># sanlun fcp show adapter -c</pre> Enter this filer command to create an initiator group for this system: <pre>igroup create -f -t aix "hostA" 10000000c930e3bd 10000000c930e2d8 #</pre> Because the name of the host is "hostA," this command line produces an igroup called "hostA."
3	On the host in a different session, use the <code>telnet</code> command to access the filer.
4	Copy the <code>igroup create</code> command from Step 2. Example: If you use the information in Step 2, you would copy the following command line: <pre>igroup create -f -t aix "hostA" 10000000c930e3bd 10000000c930e2d8</pre>

Step	Action
5	Paste the command on the filer's command line and press Enter. The filer executes the command. Result: The filer creates the igroup and gives it the same name as the host name.
6	On the filer command line, verify that the new igroup has been correctly set up with AIX as the operating system by entering the command: <pre>igroup show -v</pre> Result: The filer displays the newly created igroup with the host's WWPNs. Example: The following is an sample of the output from the <code>igroup show</code> command. Note If you change the ostype to aix after you've created the igroup, you must manually set this attribute. See the chapter "Troubleshooting" on page 75 for information about how to do this. <pre>filerX> igroup show -v hostA hostA (FCP): OS Type: aix Member: 10:00:00:00:c9:30:e3:bd Member: 10:00:00:00:c9:30:e2:d8 filerX></pre>

Creating LUNs with the lun setup command

You can use the `lun setup` command to run 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).

Note

If you use an existing igroup, you must still add the WWPNs during the LUN setup.

- ◆ Map the LUN to an igroup.

When a prompt displays a default in brackets [], you can press Enter to accept the default.

You can interrupt the lun setup process 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, you would supply those values as command line options using the following format:

```
lun create -s <size> [-t <type>] [-o noreserve] <lun_path>
```

To create LUNs on the filer using the lun setup command, complete the following steps.

Step	Action
1	On the filer's command line, start the LUN setup by entering the <code>lun setup</code> command. Result: The filer starts a dialog that prompts you for information needed to create the LUN. The steps that follow describe the information you need to enter at each of the prompts displayed by the script. Example: When you enter <code>lun setup</code>, the following output appears. <pre>filerX> lun setup This setup will take you through the steps needed to create LUNs and to make them accessible by initiators. You can type ^C (Control-C) at any time to abort the setup and no unconfirmed changes will be made to the system.</pre>
2	Enter y in response to the prompt: <pre>Do you want to create a LUN? [y]: y</pre>
3	Specify the host operating system. Enter aix: <pre>Multiprotocol type of LUN (image/solaris/windows/hpux/aix/linux) [image]: aix</pre>

Step	Action
4	Enter the LUN path: 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 /vol/vol1/q0, specify the path as "/vol/vol1/q0/lun0" Enter LUN path: <i>lun_path</i> <i>lun_path</i> is the path to the LUN. Note NetApp recommends that you do not put LUNs in /vol/vol0 (the root volume). Result: The name of the LUN is defined. Example: Some examples of a <i>lun_path</i> are /vol/vol1/qtree1/lun_data or /vol/aix/10. This example uses the path /vol/vol1/hostA_0. Enter LUN path: /vol/vol1/hostA_0
5	Enter y to enable space reservations on the LUN or n if you do not want them. Note NetApp 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. Do you want the LUN to be space reserved? [y]: y Result: The LUN you are creating will use space reservations.

Step	Action
6	Enter the LUN size: Size for a LUN is specified in bytes. You can use single-character multiplier suffixes: b(sectors), k(KB), m(MB), g(GB) or t(TB). Enter LUN size: <code>x_x</code> <code>x_x</code> is size you want the LUN to be. Result: A LUN with the specified size of raw disk is created if the configuration information is accepted later in this script. The available disk space varies depending on the host's operating system and the application using the LUN. Example: This example sets the size of the LUN to 10g (that is, 10GB of raw disk). Enter LUN size: 10g
7	Enter a comment string, if desired, 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 <code>na_lun (1)</code> man page on the filer. _____

Step	Action
8	Specify the igroup in one of the following ways: ◆ To use an existing igroup, enter that group's name. You can see the existing igroups by entering <code>?</code> 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 the Enter key. 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 <code>'?'</code> to see existing initiator group names. Name of initiator group [<i>default_igroup</i>]: <i>new_group_name</i> <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 <code>aix_groupB</code> or <code>hostA</code>. Result: The program either creates a new igroup or uses the existing group that you specify. Example 1: This example uses an existing igroup. This example is continued in step 12. <pre>Name of initiator group [hostA]: hostA An initiator group named "hostA" already exists. hostA (FCP) (ostype: aix): 10:00:00:00:ab:cd:ef:23 (logged in on: vtic, 9a) 10:00:00:00:fg:cd:ef:56 (logged in on: vtic, 5a) Do you want to use this existing group? [n]: y</pre> Note In this example, you could also press Enter to accept the default igroup <code>hostA</code> instead of typing in the name. Example 2: This example creates a new igroup called <code>aixB</code>. This example is continued in step 9. <pre>Name of initiator group [hostA]: aixB</pre>

Step	Action
9	If you created an igroup in the previous example, respond to the next prompt by pressing Enter to accept FCP: Type of initiator group <i>new_group_name</i> (FCP/iSCSI) [FCP]: Result: Choosing FCP means that the initiator WWPNs in this igroup are using FCP to access the LUN. Note If you created an igroup as shown in “Creating an igroup on the filer” on page 47, 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 comma-separated port names in response to the next prompt: A Fibre Channel Protocol (FCP) initiator group is a collection of initiator port names. Each port name (WWPN) is 16 hexadecimal digits, separated (only) by optional colon (:) characters. You can separate port names by commas. Enter '?' to display a list of connected initiators. Hit ENTER when you are done adding port names to this group. Enter comma separated portnames:<port_name>, <port_name> <i>port_name</i> is the name of the port you want to include in this igroup. Note Enter ? to see the list of initiator WWPNs connected to the target HBAs and associated igroups (if they exist). The <code>sanlun fcp show adapter</code> command runs on the host and lists the host's initiator HBAs and their WWPNs. You may need to run this <code>sanlun</code> command on the host before completing this step because not all the initiators log in until after the host discovers the LUNs. Example: <pre>Enter comma separated portnames: ? Initiators connected on adapter 5a: Portname Group 10:00:00:00:AA:22:BB:33 10:00:00:00:AA:33:BB:44 10:00:00:00:AA:55:BB:66 Initiators connected on adapter 5b: None connected. Initiators connected on adapter 7a: None connected. Initiators connected on adapter 7b: None connected.</pre> Enter comma separated portnames:10:00:00:00:AA:55:BB:66 Enter comma separated portnames: In this example, the initiator HBA with WWPN 10:00:00:00:AA:55:BB:66 is added to the igroup you are creating (<i>new_group_name</i>).

Step	Action
11	Enter aix in response to the next prompt: <pre>OS type of initiator group "new_group_name" (default/solaris/windows/hpux/aix/linux):aix</pre> Result: The operating system for the igroup is defined.

Step	Action
12	Enter the LUN ID for the LUN that is mapped to the igroup in response to the next prompt. You can also enter ? to display the LUNs already in use by one or more initiators in the specified igroup. Note This is where you record the LUN ID associated with the <i>lun_path</i> and the igroup name (<i>new_group_name</i>). The program supplies the next available LUN ID. 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 displays the output you might see if you had used an existing igroup, such as hostA in Step 8. 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 "hostA". LUN ID at which initiator group "aixA" sees "/vol/aix/10" [1]: <pre> LUN Path : /vol/aix/10 OS Type : aix Size : 10g (10737418240) Initiator Group : aixA Initiator Group Type : FCP Initiator Group Members : 10:00:00:00:c9:30:e3:bd : 10:00:00:00:c9:30:e2:d8 Mapped to LUN-ID : 1 </pre> Note It is a good practice to use a different LUN ID on each filer pair.

Step	Action
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 or continue creating LUNs by responding to the final prompt: 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 filer's command line, use the <code>lun show</code> command to display information on the mapped LUN. <pre>lun show -v lun-path</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 verifies the LUN at vol/aix/10. <pre>filerX> lun show -v vol/aix/10 /vol/aix/10 10g (10737418240) (r/w, online, mapped) filerX></pre>

Configuring the LUNs

Getting the host to discover the new LUNs

To get the host to discover the new LUNs, complete the following steps.

Note _____
You do not need to reboot the host to discover the LUNs.

Step	Action
1	Log in as root on the host.
2	Execute the <code>cfgmgr</code> command on the AIX host to discover the newly created LUNs: <pre># cfgmgr</pre> Result: This command causes the initiators to log into the fabric, the system to check for new devices, and the system to create new device entries. If you are using SANpath, this command causes the SANpath to perform the following actions: ◆ Detect the new drives as if you had entered <code>sppath -v</code>. ◆ Create a new configuration file as if you had entered <code>setsp -g</code>. ◆ Start the new devices as if you had entered <code>setsp -S -l all</code>.

Step	Action
3	Verify that the host has discovered the LUNs. ◆ For a non-multipathing configuration, use the <code>sanlun lun show</code> command. This command displays the LUNs. ◆ For a multipathing configuration, use the <code>sanlun lun show -p</code> command. In addition to displaying the LUNs, the output from this command tells you which paths are primary and which are secondary. Write down which paths are primary, so that you will have a copy of that information. (You can also use the SANpath to get information about the host paths. See “Use SANpath commands when working with multipathing” on page 84 for more information.) Example 1 (non-multipathing configuration): This example shows the type of output you would see if you executed <code>sanlun lun show</code> on a direct-attached configuration. <pre># sanlun lun show filer: lun-pathname device filename adapter lun size lun state filerX: /vol/aix/hostA-filerX-lun0 hdisk2 fcs0 200m (209715200) GOOD filerX: /vol/aix/hostA-filerX-lun1 hdisk3 fcs0 1.2g (1258291200) GOOD filerX: /vol/aix/hostA-filerX-lun2 hdisk4 fcs0 2.1g (2306867200) GOOD filerX: /vol/aix/hostA-filerX-lun3 hdisk5 fcs0 3.1g (3355443200) GOOD filerY: /vol/aix/hostA-filerY-lun4 hdisk6 fcs1 500m (524288000) GOOD filerY: /vol/aix/hostA-filerY-lun5 hdisk7 fcs1 2g (2147483648) GOOD filerY: /vol/aix/hostA-filerY-lun6 hdisk8 fcs1 1g (1073741824) GOOD filerY: /vol/aix/hostA-filerY-lun7 hdisk9 fcs1 3g (3221225472) GOOD filerY: /vol/aix/hostA-filerY-lun8 hdisk10 fcs1 4g (4294967296) GOOD</pre>

Step	Action																																																																																																									
	Example 2 (multipathing configuration): This example shows you the type of output you would see if you executed the <code>sanlun lun show -p</code> in a multipathing environment. (This example has been shortened.) <pre># sanlun lun show -p filerX:/vol/aix/hostA-lun0 (LUN 0) spd0 = hdisk2 500m (524288000) lun state: GOOD</pre> <table><tr><th>path state</th><th>path type</th><th>device filename</th><th>host HBA</th><th>target port</th><th>partner port</th><th>SANpath priority</th></tr><tr><td>up</td><td>primary</td><td>hdisk2</td><td>fcs0</td><td>9a</td><td></td><td>primary</td></tr><tr><td>up</td><td>primary</td><td>hdisk22</td><td>fcs1</td><td>5a</td><td></td><td>failover</td></tr><tr><td>up</td><td>secondary</td><td>hdisk17</td><td>fcs0</td><td></td><td>9b</td><td>failover</td></tr><tr><td>up</td><td>secondary</td><td>hdisk27</td><td>fcs1</td><td></td><td>5b</td><td>failover</td></tr></table> <pre>filerY:/vol/aix/hostA-lun1 (LUN 1) spd1 = hdisk7 200m (209715200) lun state: GOOD</pre> <table><tr><th>path state</th><th>path type</th><th>device filename</th><th>host HBA</th><th>target port</th><th>partner port</th><th>SANpath priority</th></tr><tr><td>up</td><td>primary</td><td>hdisk12</td><td>fcs0</td><td>9a</td><td></td><td>failover</td></tr><tr><td>up</td><td>primary</td><td>hdisk32</td><td>fcs1</td><td>5a</td><td></td><td>primary</td></tr><tr><td>up</td><td>secondary</td><td>hdisk7</td><td>fcs0</td><td></td><td>9b</td><td>failover</td></tr><tr><td>up</td><td>secondary</td><td>hdisk37</td><td>fcs1</td><td></td><td>5b</td><td>failover</td></tr></table> <pre>filerX:/vol/aix/hostA-lun2 (LUN 2) spd2 = hdisk4 1g (1073741824) lun state: GOOD</pre> <table><tr><th>path state</th><th>path type</th><th>device filename</th><th>host HBA</th><th>target port</th><th>partner port</th><th>SANpath priority</th></tr><tr><td>up</td><td>primary</td><td>hdisk4</td><td>fcs0</td><td>9a</td><td></td><td>primary</td></tr><tr><td>up</td><td>primary</td><td>hdisk24</td><td>fcs1</td><td>5a</td><td></td><td>failover</td></tr><tr><td>up</td><td>secondary</td><td>hdisk19</td><td>fcs0</td><td></td><td>9b</td><td>failover</td></tr><tr><td>up</td><td>secondary</td><td>hdisk29</td><td>fcs1</td><td></td><td>5b</td><td>failover</td></tr></table>	path state	path type	device filename	host HBA	target port	partner port	SANpath priority	up	primary	hdisk2	fcs0	9a		primary	up	primary	hdisk22	fcs1	5a		failover	up	secondary	hdisk17	fcs0		9b	failover	up	secondary	hdisk27	fcs1		5b	failover	path state	path type	device filename	host HBA	target port	partner port	SANpath priority	up	primary	hdisk12	fcs0	9a		failover	up	primary	hdisk32	fcs1	5a		primary	up	secondary	hdisk7	fcs0		9b	failover	up	secondary	hdisk37	fcs1		5b	failover	path state	path type	device filename	host HBA	target port	partner port	SANpath priority	up	primary	hdisk4	fcs0	9a		primary	up	primary	hdisk24	fcs1	5a		failover	up	secondary	hdisk19	fcs0		9b	failover	up	secondary	hdisk29	fcs1		5b	failover
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Determine which device to use as the physical volume

If you are using multipathing, you must determine which device to use as the physical volume for the Logical Volume Manager (LVM) before you can create a volume group. You can use either NetApp's `sanlun lun show -p`

command or SANpath's `setsp -a` command to determine which host disk device SANpath uses as the I/O access device for the logical drive.

Note

For each LUN, SANpath selects one of the path devices and presents it as the single I/O access device for the LUN. This access device does not change, which means it is not necessarily the primary path. You should use this device as a physical volume in LVM. LVM uses it to perform operations on the LUN, and SANpath inhibits access to all the other path devices for this LUN.

To determine this access device for the LUN, look for the line that shows the SANpath device mapping to the device in the output from either NetApp's `sanlun lun show -p` command or SANpath's `setsp -a` command. The line should have the following format:

```
spdX = hdiskN
```

X is the number for the SANpath device.

N is the number for the access device.

Finding the access device with `sanlun lun show -p`: In Example 2 in Step 3 of the previous section, “Getting the host to discover the new LUNs” on page 59, the output shows the SANpath device pointing to `hdisk2` (`sp0 = hdisk2`) as the access device for the first LUN on `filerX`. Each LUN has a different access device.

Finding the access device with `setsp -a`: In section “Example of SANpath's `setsp -a` output” on page 85, the output shows the SANpath device pointing to `hdisk6` (`sp1 = hdisk6`) as the access device for the LUN.

Creating a volume group

You need to create a volume group. You can use whichever tool you normally use to create volume groups. The following steps use SMIT.

Note

See the IBM documentation for information on managing file systems.

Step	Action
1	(Multipathing) Determine which device to use as the physical volume for the LVM. See the previous section, “Determine which device to use as the physical volume” on page 61, to determine the device to which the SANpath device is mapping.

Step	Action																																							
2	Use the AIX System Management Interface Tool (SMIT) to create a volume group by entering the following command: <pre>smit vg</pre>																																							
3	Enter the information to set up the volume group at the SMIT Add a Volume Group screen. You need to specify the following parameters: ◆ A volume group name ◆ The physical partition size in megabytes. ◆ Whether to activate the volume group automatically or wait until you restart the system. Add a Volume Group Type or select values in entry fields. Press Enter AFTER making all desired changes. <table><tr><td>VOLUME GROUP name</td><td>[Entry Fields]</td><td></td></tr><tr><td>Physical partition SIZE in megabytes</td><td>[newvg]</td><td></td></tr><tr><td>* PHYSICAL VOLUME names</td><td>4</td><td>+</td></tr><tr><td>Activate volume group AUTOMATICALLY at system restart?</td><td>[hdisk6]</td><td>+</td></tr><tr><td>Volume Group MAJOR NUMBER</td><td>yes</td><td>+</td></tr><tr><td>Create VG Concurrent Capable?</td><td>[]</td><td>+#</td></tr><tr><td>Auto-varyon in Concurrent Mode?</td><td>no</td><td>+</td></tr><tr><td>LTG Size in kbytes</td><td>no</td><td>+</td></tr><tr><td></td><td>128</td><td>+</td></tr></table> LTG Size in kbytes 128 =Help <table><tr><td>F2=Refresh</td><td>F3=Cancel</td><td>F4=List</td><td></td></tr><tr><td>F5=Reset</td><td>F6=Command</td><td>F7=Edit</td><td>F8=Image</td></tr><tr><td>F9=Shell</td><td>F10=Exit</td><td>Enter=Do</td><td></td></tr></table> ----- Note_____ At this time concurrent capable volume groups are not supported. _____	VOLUME GROUP name	[Entry Fields]		Physical partition SIZE in megabytes	[newvg]		* PHYSICAL VOLUME names	4	+	Activate volume group AUTOMATICALLY at system restart?	[hdisk6]	+	Volume Group MAJOR NUMBER	yes	+	Create VG Concurrent Capable?	[]	+#	Auto-varyon in Concurrent Mode?	no	+	LTG Size in kbytes	no	+		128	+	F2=Refresh	F3=Cancel	F4=List		F5=Reset	F6=Command	F7=Edit	F8=Image	F9=Shell	F10=Exit	Enter=Do	
VOLUME GROUP name	[Entry Fields]																																							
Physical partition SIZE in megabytes	[newvg]																																							
* PHYSICAL VOLUME names	4	+																																						
Activate volume group AUTOMATICALLY at system restart?	[hdisk6]	+																																						
Volume Group MAJOR NUMBER	yes	+																																						
Create VG Concurrent Capable?	[]	+#																																						
Auto-varyon in Concurrent Mode?	no	+																																						
LTG Size in kbytes	no	+																																						
	128	+																																						
F2=Refresh	F3=Cancel	F4=List																																						
F5=Reset	F6=Command	F7=Edit	F8=Image																																					
F9=Shell	F10=Exit	Enter=Do																																						

Step	Action
4	Press enter. ----- COMMAND STATUS Command: OK stdout: yes stderr: no Before command completion, additional instructions may appear below. 0516-1254 mkvg: Changing the PVID in the ODM. newvg F1=Help F2=Refresh F3=Cancel F6=Command F8=Image F9=Shell F10=Exit /=Find n=Find Next <F10 exits smit> -----
5	Press F10 to exit SMIT.
6	Check the information on the new volume group. <pre># lsvg newvg VOLUME GROUP: newvg VG IDENTIFIER: 000f3bca00004c00000000f8267ba452 VG STATE: active PP SIZE: 16 megabyte(s) VG PERMISSION: read/write TOTAL PPs: 639 (10224 megabytes) MAX LVs: 256 FREE PPs: 639 (10224 megabytes) LVs: 0 USED PPs: 0 (0 megabytes) OPEN LVs: 0 QUORUM: 2 TOTAL PVs: 1 VG DESCRIPTORS: 2 STALE PVs: 0 STALE PPs: 0 ACTIVE PVs: 1 AUTO ON: yes MAX PPs per PV: 1016 MAX PVs: 32 LTG size: 128 kilobyte(s) AUTO SYNC: no HOT SPARE: no</pre>

Access storage on a volume group

You can access storage space on a volume group using any of the methods you normally use. These can include using a raw logical volume, jfs, or jfs2.

Create a file system You can use whichever tool you normally use to create file system, if you need one. The following steps use SMIT.

Note_____

See the IBM documentation for information on managing file systems.

Step	Action
1	To use SMIT to set up a file system, enter the following command: smit fs
2	Enter the information to set up the file system at the SMIT Add a Journaled File System screen. ----- -->Add / Change / Show / Delete File Systems-->Journaled File Systems--> Add a - --> Journaled File System -->Add a Standard Journaled File System Add a Journaled File System Move cursor to desired item and press Enter. Add a Standard Journaled File System Add a Compressed Journaled File System Add a Large File Enabled Journaled File System +-----+ Volume Group Name Move cursor to desired item and press Enter. rootvg newvg F1=Help F2=Refresh F3=Cancel F8=Image F10=Exit Enter=Do F1=H /=Find n=Find Next F9=S +-----+

Step	Action																														
3	Select the volume group you created in the section “Creating a volume group” on page 62. ----- Add a Standard Journaled File System Type or select values in entry fields. Press Enter AFTER making all desired changes. [Entry Fields] <table><tr><td>Volume group name</td><td>newvg</td><td></td></tr><tr><td>* SIZE of file system (in 512-byte blocks)</td><td>[2140000]</td><td>#</td></tr><tr><td>* MOUNT POINT</td><td>[/newfs]</td><td></td></tr><tr><td>Mount AUTOMATICALLY at system restart?</td><td>yes</td><td>+</td></tr><tr><td>PERMISSIONS</td><td>read/write</td><td>+</td></tr><tr><td>Mount OPTIONS</td><td>[]</td><td>+</td></tr><tr><td>Start Disk Accounting?</td><td>no</td><td>+</td></tr><tr><td>Fragment Size (bytes)</td><td>4096</td><td>+</td></tr><tr><td>Number of bytes per inode</td><td>4096</td><td>+</td></tr><tr><td>Allocation Group Size (MBytes)</td><td>8</td><td>+</td></tr></table> F1=HelpF2=RefreshF3=CancelF4=List F5=ResetF6=CommandF7=EditF8=Image F9=ShellF10=ExitEnter=Do -----	Volume group name	newvg		* SIZE of file system (in 512-byte blocks)	[2140000]	#	* MOUNT POINT	[/newfs]		Mount AUTOMATICALLY at system restart?	yes	+	PERMISSIONS	read/write	+	Mount OPTIONS	[]	+	Start Disk Accounting?	no	+	Fragment Size (bytes)	4096	+	Number of bytes per inode	4096	+	Allocation Group Size (MBytes)	8	+
Volume group name	newvg																														
* SIZE of file system (in 512-byte blocks)	[2140000]	#																													
* MOUNT POINT	[/newfs]																														
Mount AUTOMATICALLY at system restart?	yes	+																													
PERMISSIONS	read/write	+																													
Mount OPTIONS	[]	+																													
Start Disk Accounting?	no	+																													
Fragment Size (bytes)	4096	+																													
Number of bytes per inode	4096	+																													
Allocation Group Size (MBytes)	8	+																													
4	Press enter. ----- COMMAND STATUS Command: OKstdout: yesstderr: no Before command completion, additional instructions may appear below. Based on the parameters chosen, the new /newfs JFS file system is limited to a maximum size of 134217728 (512 byte blocks) New File System size is 2162688 F1=HelpF2=RefreshF3=CancelF6=Command F8=ImageF9=ShellF10=Exit/=Find n=Find Next -----																														

Step	Action														
5	Press F10 to exit SMIT.														
6	Mount the new file system. # mount /newfs # df -k /newfs <table><tr><td>Filesystem</td><td>1024-blocks</td><td>Free</td><td>%Used</td><td>Iused</td><td>%Iused</td><td>Mounted on</td></tr><tr><td>/dev/lv01</td><td>1081344</td><td>1047356</td><td>4%</td><td>17</td><td>1%</td><td>/newfs</td></tr></table>	Filesystem	1024-blocks	Free	%Used	Iused	%Iused	Mounted on	/dev/lv01	1081344	1047356	4%	17	1%	/newfs
Filesystem	1024-blocks	Free	%Used	Iused	%Iused	Mounted on									
/dev/lv01	1081344	1047356	4%	17	1%	/newfs									

Displaying LUN and HBA information

Utility for displaying information

The `sanlun` utility is a NetApp AIX host configuration tool that aids in collecting and reporting information when configuring hosts to use FCP for SCSI to communicate with filers. For example, you can use the `sanlun` utility to show the mapping between filer LUNs and host devices. You can also use this command to display information about the host HBA.

For detailed information

For detailed information, see the following topics:

- ◆ “Displaying host LUN information” on page 69
- ◆ “Displaying host HBA information” on page 72

Displaying LUN and HBA information

Displaying host LUN information

Displaying host LUN information

To display 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: <pre>sanlun lun show [-v] [-d host device filename all filer name filer name:filer pathname]</pre> <code>-v</code> option produces verbose output. <code>-d</code> is the device option and can be one of the following: ◆ <code>host device filename</code> specifies the special device file on the host. ◆ <code>all</code> lists all filer LUNs attached to the host. ◆ <code>filer name</code> is the host name of the filer. ◆ <code>filer pathname</code> is the path name of the LUN on the filer. (Multipathing only) If you want to see information about the primary and secondary paths, use the version of <code>sanlun lun show</code> with the <code>-p</code> option (you cannot use the <code>-d</code> option if you use <code>-p</code>): <pre>sanlun lun show -p [-v] [filer name:filer pathname filer name all]</pre> <code>-p</code> provides information about the primary and secondary paths available to the LUN when you are using multipathing. 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 the <code>all</code> parameter.

Step	Action
	So you might enter: ◆ <code>sanlun lun show -p</code> to display a listing of all the paths associated with the LUN. This information is useful if you need to set up path ordering or troubleshoot a problem with path ordering. ◆ <code>sanlun lun show -d /dev/hdisk<x></code> to display the summary listing of the filer LUN(s) associated with the host device /dev/hdisk<x> (x is the number of the hdisk; for example, you might have hdisk1 or hdisk4). ◆ <code>sanlun lun show -v all</code> to display verbose output for all the LUN(s) currently available on the host. ◆ <code>sanlun lun show toaster</code> to display a summary listing of all the LUNs available to the host served by the filer called toaster. ◆ <code>sanlun lun show toaster:/vol/vol0/lun0</code> to display a summary listing of all the LUNs available to the host served by lun0 on the filer toaster. Note_____ When you specify either the <code>sanlun lun show <filer name></code> or the <code>sanlun lun show <filer name:filer pathname></code> command, the utility displays only the LUNs that have been discovered by the host. LUNs that have been created on the filer and have not been discovered by the host are not displayed. _____

Step	Action																																			
	Example 1: This abbreviated example displays the type of output you might see if you executed the <code>sanlun lun show</code> command with the <code>-p</code> option. Keep in mind as you look at the output that the following is true: ◆ A path type of primary indicates a direct path to the filer (filerA). ◆ A path type of secondary indicates a proxy path through a second filer (filerB) ◆ The target port column always refers to the port on the filer (filerA) on which the LUN resides. It always represents a primary path. ◆ Partner port column always refers to the port on the partner filer (filerA). It always represents a secondary path. <pre># sanlun lun show -p filerA:/vol/aix/10</pre> <pre># sanlun lun show -p filerY:/vol/aix/hostA-lun1</pre> <pre>filerY:/vol/aix/hostA-lun1 (LUN 1) spdl = hdisk7 10g (10737418240) lun state: GOOD</pre> <table><tr><th>path state</th><th>path type</th><th>device filename</th><th>host HBA</th><th>target port</th><th>partner port</th><th>SANpath priority</th></tr><tr><td>up</td><td>primary</td><td>hdisk12</td><td>fcs0</td><td>9a</td><td></td><td>failover</td></tr><tr><td>up</td><td>primary</td><td>hdisk32</td><td>fcs1</td><td>5a</td><td></td><td>primary</td></tr><tr><td>up</td><td>secondary</td><td>hdisk7</td><td>fcs0</td><td></td><td>9b</td><td>failover</td></tr><tr><td>up</td><td>secondary</td><td>hdisk37</td><td>fcs1</td><td></td><td>5b</td><td>failover</td></tr></table>	path state	path type	device filename	host HBA	target port	partner port	SANpath priority	up	primary	hdisk12	fcs0	9a		failover	up	primary	hdisk32	fcs1	5a		primary	up	secondary	hdisk7	fcs0		9b	failover	up	secondary	hdisk37	fcs1		5b	failover
path state	path type	device filename	host HBA	target port	partner port	SANpath priority																														
up	primary	hdisk12	fcs0	9a		failover																														
up	primary	hdisk32	fcs1	5a		primary																														
up	secondary	hdisk7	fcs0		9b	failover																														
up	secondary	hdisk37	fcs1		5b	failover																														

Displaying LUN and HBA information

Displaying host HBA information

Displaying host HBA information To manage the host HBA 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</code> command to display host HBA information: <pre>sanlun fcp show adapter [-c [-v] [adapter name all]]</pre> <code>-v</code> option produces verbose output. <code>-c</code> gives configuration information that you can use to create igroups. <code>all</code> lists information for all FCP adapters. <i>adapter name</i> lists adapter information for the adapter you specify . Example 1: The following example displays the type of output you see with the <code>sanlun fcp show adapter</code> command line. This example simply displays information on the adapters. The next one includes the <code>-v</code> option, which provides more information on the adapter. <pre># sanlun fcp show adapter fcs0 WWPN:10000000abcde123 fcs1 WWPN:10000000abcde456 #</pre>

Step	Action
	Example 2: This example adds the <code>-v</code> option to the <code>sanlun fcp show adapter</code> command line. The <code>-v</code> option provides more information on the adapter. <pre># sanlun fcp show adapter -v fcs0 WWPN:10000000abcde123 WWNN: 20000000c936268b driver name: /usr/lib/drivers/pci/efcdd model: df1000f9 model description: FC Adapter serial number: 1E32909972 hardware version: driver version: 5.1.0.50 firmware version: CD382A1 Number of ports: 1 port type: Fabric port state: Operational supported speed: 2 GBit/sec negotiated speed: 1 GBit/sec OS device name: fcs0 fcs1 WWPN:10000000c9362687 WWNN: 20000000c9362687 driver name: /usr/lib/drivers/pci/efcdd model: df1000f9 model description: FC Adapter serial number: 1E32909970 hardware version: driver version: 5.1.0.50 firmware version: CD382A1 Number of ports: 1 port type: Fabric port state: Operational supported speed: 2 GBit/sec negotiated speed: 1 GBit/sec OS device name: fcs1 #</pre>

About this chapter This chapter describes how to troubleshoot software installation problems and HBA and LUN management problems.

Topics covered in this chapter This chapter discusses the following topics:

- ◆ “Troubleshooting checklists” on page 76
- ◆ “Installation fails because system does not meet requirements” on page 78
- ◆ “Commands you can use to troubleshoot problems” on page 82
- ◆ “Use SANpath commands when working with multipathing” on page 84
- ◆ “NetApp’s diagnostic utilities” on page 86
- ◆ “Change the FCP HBA’s attributes” on page 92
- ◆ “Change the HBA queue depth with no LUNs mapped” on page 97
- ◆ “Change the value for the queue depths on the disk” on page 98
- ◆ “General troubleshooting” on page 99

Troubleshooting checklists

Connectivity problems

On AIX systems, applications don't generally see I/O errors. Instead, I/O retries continue uninterrupted even if connectivity is lost. It takes a while before the retries stop. If you have a situation where I/O retries appear to be continuing without succeeding, check the following areas for connectivity problems:

- ◆ Filer setup
- ◆ Filer connectivity to the Fibre Channel switch
- ◆ Fibre Channel switch setup
- ◆ Fibre Channel connectivity to the host
- ◆ Host setup

Filer setup checklist

The following is a checklist of items that pertain to the filer setup. You should make sure that the following situations are true:

- ◆ The filer FCP cfmode is set to one of the following options:
 - ❖ Mixed
 - ❖ Partner
 - ❖ Dual-fabric (applies only to FAS2xx NetApp storage appliances).
- ◆ FCP is running and all the target ports are in a good state.
- ◆ The igroups have the ostype set to AIX.
- ◆ The LUNs are
 - ❖ mapped to host igroups
 - ❖ in a good state as indicated by the output from the `sanlun lun show -p` command or the `setsp -a` command.
 - ❖ use AIX as their operating system type

Host setup checklist

The following is a checklist of items that pertain to the host setup. You should make sure that the following is true:

- ◆ The system meets the Host Attach Kit requirements.

The installation fails if your system does not meet the requirements.
- ◆ The HBAs are working.

Check the output from the `sanlun fcp show adapter -v` command.

- ◆ The host is seeing all of the LUNs it should.
You can confirm this by running the `lsdev` command or, if you have multipathing, `sanlun lun show -p`.
- ◆ The software states reported by SANpath are in a good state.
- ◆ The `sanlun lun show -p` command is not reporting problems such as
 - ❖ downed paths
 - ❖ missing paths
 - ❖ out of order paths

Installation fails because system does not meet requirements

Install command checks for system requirements

The install command checks your system to ensure it meets the minimum system requirements. If it finds a problem with your system requirements, the installation fails.

Rerunning the installation script

If the installation fails because your system does not meet the system requirements, complete the following steps.

Step	Action
1	Check the installation logs to determine why the install failed. The most common problems include missing the required filesets, such as devices.common.IBM.fc.hba-api fileset version 5.1.0.0
2	Correct the problem described in the log.
3	Rerun the install script. Result: The script normally resumes at the point where it failed and runs until completion. Caution _____ Do not use the uninstall command to remove the Host Attach Kit software. _____

Example of a failed installation

This example shows an installation that fails because the package was not present. For this example, the following is true:

- ◆ The NetApp software was downloaded to /tmp.
- ◆ The SANpath package was downloaded and copied to the /tmp/SANpath directory.
- ◆ The install script is extracting files to /tmp/ntap_aix_fcp_1.0.
- ◆ The installation fails because the HBA API is missing.

Note

This output has been shortened.

```
# cd /tmp/ntap_aix_fcp_1.0
# ./install
Checking HBAs on the system... done.

Please enter the location of the SANpath package:
(if you are installing from CD, you may enter the device name, e.g.
/dev/cd0)
[default: /tmp/ntap_aix_fcp_1.0]

> /tmp/SANpath

Installing SANpath from /tmp/SANpath... done.

In order to enable SANpath, you must enter your authorization data.
Enter your company name: > NetApp
Enter SANpath serial number: > XXXX
Enter authorization code: > XXXX

SANpath authorization accepted.

Please enter the location of the NetApp packages:
(if you are installing from CD, you may enter the device name, e.g.
/dev/cd0)
[default: /tmp/ntap_aix_fcp_1.0]
>

Installing NetApp packages from /tmp/ntap_aix_fcp_1.0... failed!
ERROR: NetApp packages failed to install due to missing
prerequisites.
Install the prerequisites and run this script again to resume
installation.
See your documentation and the installation log for details.

Installation log saved in /tmp/netapp_install_log_031208151114

To confirm which prerequisite is missing, check the log file
/tmp/netapp_install_log_031208151114. The following is the section of the log
file that tells you which prerequisite is missing.

...
Verifying requisites...done
Results...
```

FAILURES

Filesets listed in this section failed pre-installation verification and will not be installed.

Requisite Failures

SELECTED FILESETS: The following is a list of filesets that you asked to install. They cannot be installed until all of their requisite filesets are also installed. See subsequent lists for details of requisites.

```
#1 NetApp.fcp_toolkit.sanlun 1.0.5.0 # Network Appliance FCP
Toolki...
```

MISSING REQUISITES: The following filesets are required by one or more of the selected filesets listed above. They are not currently installed and could not be found on the installation media. (Selected filesets which depend upon these requisites are referenced in parentheses.)

```
devices.common.IBM.fc.hba-api 5.1.0.0      # Base Level Fileset
(dep #s: 1)
```

...

Example of restarting the installation

Once you install the missing fileset, restart the installation. It resumes where it left off. If there are no other problems, it completes successfully.

Caution

Do not run the uninstall script before you complete the installation.

The following is an example of the output you would see if you corrected the problem in the previous example and then restarted the installation.

Note

This output has been shortened.

```
# ./install
Checking HBAs on the system... done.
SANpath is already installed.
```

Please enter the location of the NetApp packages:

```
(if you are installing from CD, you may enter the device name, e.g.  
/dev/cd0)  
[default: /tmp/ntap_aix_fcp_1.0]  
  
>  
  
Installing NetApp packages from /tmp/ntap_aix_fcp_1.0... done.  
HBA settings update successful.  
Running bosboot to update the boot image... done.  
Installation of the NetApp AIX Attach Kit was successful.  
You MUST reboot the system before accessing your NetApp filer(s).  
  
Installation log saved in both /tmp/netapp_install_log_031208161356  
and /opt/NetApp/install_log
```

Commands you can use to troubleshoot problems

Tools you can use

There are several commands you can use to check out your system and look for problems. The following commands are especially useful in tracking down problems:

- ◆ The NetApp `sanlun` utility
- ◆ The AIX `lsdev` command
- ◆ SANpath commands `sppath -a` and `setsp -a` (see “Use SANpath commands when working with multipathing” on page 84)

Using `sanlun`

You can use the `sanlun` utility to perform the following tasks:

- ◆ Check the status of the
 - ❖ HBA
 - ❖ LUN
 - ❖ paths to the LUN
- ◆ Discover whether a path is up or down

When you have a direct-attached configuration, use the `sanlun lun show` command to get information on your system.

With a multipathing configuration, use `sanlun lun show -p` command, which includes information on the paths to LUNs.

Examples of the `sanlun` commands are in the section “Getting the host to discover the new LUNs” on page 59.

Note

You can use both NetApp’s `sanlun` and Dot Hill’s SANpath to check your configuration. By comparing the output from `sanlun` and SANpath, you can verify that both of these utilities are working correctly.

Using the lsdev command

The `lsdev -C -c disk` command provides information about the devices and LUNs in your configuration. The following example shows the type of output displayed when you run this command. (This example has been shortened.)

```
# lsdev -C -c disk
hdisk0 Available 1S-08-00-8,0 16 Bit LVD SCSI Disk Drive
hdisk1 Available 1S-08-00-9,0 16 Bit LVD SCSI Disk Drive
hdisk2 Available 1n-08-01 NetApp LUN
hdisk3 Available 1n-08-01 NetApp LUN
hdisk4 Available 1n-08-01 NetApp LUN
hdisk5 Available 1n-08-01 NetApp LUN
hdisk6 Available 1n-08-01 NetApp LUN
hdisk7 Available 1n-08-01 NetApp LUN
hdisk8 Available 1n-08-01 NetApp LUN
hdisk9 Available 1n-08-01 NetApp LUN
hdisk10 Available 1n-08-01 NetApp LUN
hdisk11 Available 1n-08-01 NetApp LUN
hdisk12 Available 1n-08-01 NetApp LUN
hdisk13 Available 1n-08-01 NetApp LUN
hdisk14 Available 1n-08-01 NetApp LUN
hdisk15 Available 1n-08-01 NetApp LUN
hdisk16 Available 1n-08-01 NetApp LUN
hdisk17 Available 1n-08-01 NetApp LUN
hdisk18 Available 1n-08-01 NetApp LUN
hdisk19 Available 1n-08-01 NetApp LUN
hdisk20 Available 1n-08-01 NetApp LUN
hdisk21 Available 1n-08-01 NetApp LUN
...
hdisk80 Available 11-08-01 NetApp LUN
hdisk81 Available 11-08-01 NetApp LUN
hdisk82 Available 11-08-01 NetApp LUN
hdisk83 Available 11-08-01 NetApp LUN
hdisk84 Available 11-08-01 NetApp LUN
hdisk85 Available 11-08-01 NetApp LUN
hdisk86 Available 11-08-01 NetApp LUN
hdisk87 Available 11-08-01 NetApp LUN
hdisk88 Available 11-08-01 NetApp LUN
hdisk89 Available 11-08-01 NetApp LUN
hdisk90 Available 11-08-01 NetApp LUN
hdisk91 Available 11-08-01 NetApp LUN
hdisk92 Available 11-08-01 NetApp LUN
hdisk93 Available 11-08-01 NetApp LUN
hdisk94 Available 11-08-01 NetApp LUN
hdisk95 Available 11-08-01 NetApp LUN
hdisk96 Available 11-08-01 NetApp LUN
hdisk97 Available 11-08-01 NetApp LUN
```

Use SANpath commands when working with multipathing

Use SANpath to check paths for multipathing

If you have a multipathing configuration, you can use SANpath to display information about the paths to the devices and data.

This information is important because the order of the paths you use when you set up the LUNs can affect performance. In general, secondary paths are slower than primary paths. So, to get the best performance, you must set up your paths with the primary paths first and then follow them with the secondary paths.

Use the SANpath `sppath -a` and `setsp -a` commands to see the path ordering for your system and correct it, if necessary.

For detailed information on what you can do with SANpath and how to use its commands, see the *SANpath User's Guide for IBM AIX Operating Systems* that comes with the multipathing version of the NetApp Host Attach. A description of this document is in the section "Where to go for more information" on page 21.

Path information available from the `setsp -a` command

SANpath's `setsp -a` command displays columns with the following information:

- ◆ `spd` is the drive's SANpath device number.
- ◆ `Path/disk` lists the device names and disk numbers for each of the redundant physical paths to the device. The disk number is appended to "hdisk."
- ◆ `Status` tells you whether the path is primary (P) or secondary (S) and whether it is functioning normally (Good) or has failed (Bad)
- ◆ `Pri` is the Primary field. It indicates the one primary path that is the highest primary path used when load balancing is disabled. There is always only one path selected in this field.
- ◆ `Buf` is the number of buffer pointers (or buffer structures) pre-allocated for each logical device.
- ◆ `Balance` indicates whether dynamic load balancing is enabled for the device (0 indicates disabled; 1 indicates enabled).
- ◆ `RtrCnt` is the number of times SANpath retries the I/O operation on an arbitrary secondary path after an I/O operation has failed on all of the paths. When the specified number of retries has failed, the I/O fails.
- ◆ `RtrDly` is the time interval, in milliseconds, between the retry attempts described in the `RtrCnt`.

- ◆ Failback indicates whether failback is enabled for the logical device. If so, SANpath keeps testing a path that has failed until it can be returned to service.

Example of SANpath's setsp -a output

When you enter SANpath's `setsp -a` command, it displays the following information

```
# setsp -a
=====
  spd   Path/disk           Status   Pri Exc Buf Balance RtrCnt  RtrDly FailBack
=====
    1   hdisk6(38,4)       P Good           32    1    9    1000    1
        hdisk8(38,5)       P Good      X
        hdisk7(38,6)       S Good
        hdisk9(38,7)       S Good
  spd1 = hdisk6                                ID = "NETAPP LUN Vqi5S3mKMsyD"
=====
```

setsp -v provides information on system limits

SANpath permits up to 128 LUNs and a maximum of 32 paths to each LUN. If your system configuration exceeds these limits, the following warning appears at the end of the `setsp -v` output.

```
setsp: WARNING: SANpath detected more than 128 SANpath-compatible
devices (LUNs), or more than 32 paths to a LUN. SANpath cannot
protect more than 128 LUNs or more than 32 paths to a LUN. Please
modify your configuration so that no more than 128 LUNs are
available to this host, and no more than 32 paths are available to
any given LUN. "setsp -g" will show the detailed configuration
error.
```

If you receive this warning, you must correct your system configuration to ensure that it is within the SANpath limits.

NetApp's diagnostic utilities

NetApp's diagnostic utilities NetApp provides several utilities that provide diagnostic information you can use for troubleshooting.

When you run these utilities, they gather configuration information about different aspects of your system. They automatically collect information and place it in a directory. Then they create a gzipped .tar file of that directory. You can send this file to NetApp.

Normally, you only use these utilities when requested to do so by NetApp's Customer Support. The utilities are

- ◆ filer_info. See "Collecting filer information" on page 87 for more information.
- ◆ aix_info. See "Using the AIX data-collection tool" on page 88.
- ◆ <switch>_info, where <switch> is the brand of switch you are using (for example, brocade_info). See "Collecting switch information" on page 89.

General steps for executing the programs Although some of the scripts have arguments that you may want to use, the general steps for executing these scripts are the same.

Step	Action
1	Go to the directory /opt/NetApp/santools/bin: <code>cd /opt/NetApp/santools/bin</code>
2	Enter the utility name. If the utility you are using includes arguments, you can enter them as well. Result: The configuration information that the utility gathers is placed in a gzipped .tar file.

Collecting filer information

If you are having a problem, NetApp Customer Support might ask you to run `filer_info` to collect filer configuration information. You should only run this utility when requested to do so by NetApp. To execute `filer_info`, complete the following steps.

Note_____

This utility runs in command-line mode only. Double-clicking the utility name to run it does not work.

Step	Action
1	Go to the directory <code>/opt/NetApp/santools/bin</code> : <code>cd /opt/NetApp/santools/bin</code>

Step	Action
2	At the host command prompt, enter the following command: <pre>filer_info [-d path_and_file_name] [-l user] -n <filer_name></pre> The <code>-d</code> option enables you to specify a different path in which to place the resulting output. The default path is <code>/tmp/NetApp/ntap_filer_<filer_name></code>. The <code>-l</code> user option allows the choice of a user name and password on the switch. If you have a Brocade switch and this option is not specified, the Brocade default settings of <code>admin:password</code> are used. The target of the command is specified by <code>-n <filer_name></code>, where <i>filer_name</i> is the name of IP address of the filer to be interrogated. Result: The output of various status commands are placed in the output directory named <code>netapp_filer_<filer_name></code>, where <i>filer_name</i> is replaced by the filer name or IP address. The contents of this directory are placed in a tarred and gzipped file named <code>filer_<filer_name>.tar.gz</code>. Example: The following command line checks filer1, logging on to it as the user root. <pre>host1> filer_info -d /opt/NetApp/santools -l root -n filer1</pre> The information from filer1 is placed in a gzipped file with the following directory path: <code>/opt/NetApp/santools/filer_filer1.tar.gz</code> as its name.
3	Send the resulting gzipped file to NetApp for analysis.

Using the AIX data-collection tool

If you are having a problem, NetApp Customer Support might ask you to run `aix_info` to collect configuration information on your AIX system. You should only run this utility when requested to do so by NetApp.

To execute `aix_info`, complete the following steps:

Step	Action
1	Change to the /opt/NetApp/santools/bin directory: cd /opt/NetApp/santools/bin
2	At the command prompt, enter the following command: aix_info [-d <directory>] [-n <file_name>] -d <directory> specifies the location for the gzipped file that aix_info creates. The default location is /tmp/netapp. -n <file_name> specifies the name for the output file and directory names. The default pathname is /tmp/netapp/ntap_aix_info.tar.gz. Result: When you run aix_info, the utility gathers information about your AIX configuration and places it in a tarred, gzipped file. It also creates a directory and populates it with files containing output from numerous commands run on the AIX system and copies of logs such as the output of the errpt command. Example: Depending on the options you specify, you see output similar to the following when you run this utility: <pre># aix_info AIX system info is in directory /tmp/netapp/ntap_aix_info Compressed file is /tmp/netapp/ntap_aix_info.tar.gz Please send this file to Network Appliance for analysis</pre>
3	Send the resulting gzipped file to NetApp for analysis.

Collecting switch information

If you are having a problem, NetApp Customer Support might ask you to run the switch utility NetApp supplies when you install the Host Attach Kit software. NetApp provides a utility for each switch it supports for this Host Attach Kit. The utility name is <switch>_info, where *switch* is the brand of the switch (for example, if you have a McDATA switch, the file name would be mcdata_info). This utility collects switch configuration information. You should only run this utility when requested to do so by NetApp.

To execute the utility, complete the following steps.

Note

This utility runs in command-line mode only. Double-clicking the utility name to run it does not work.

Step	Action
1	Go to the directory /opt/NetApp/santools/bin: <code>cd /opt/NetApp/santools/bin</code>

Step	Action
2	At the host command prompt, enter the following command: <pre><switch_brand>_info [-d path_and_file_name] [-l user:password] -n <switchname></pre> <switch_brand> is the name of the switch you are using; for example, brocade for a Brocade switch. The -d path_and_file_name option enables you to specify a different path in which to place the resulting output. The default path is /tmp/NetApp/<switch_brand>_switch_<switch_name>. The -l user:password option allows the choice of a user name and password on the switch. If this option is not specified, the Brocade default settings of admin:password are used. The target of the command is specified by -n switchname, where switchname is the name or IP address of the switch to be interrogated. Result: The output of various status commands on the switch are placed in a directory named <switch_brand>_switch_switchname, where switch_brand is the brand of the switch, such as Brocade, and switchname is replaced by the switch name or IP address. The contents of this directory are placed in a tarred and gzipped file named <switch_brand>_switch_switchname.tar.gz. Example: This example uses the brocade_info file. The switch brcd1 is connected with the user "john", who has the password "smith". <pre>host1> brocade_info -d /opt/NetApp/santools -l john:smith -n brcd1</pre> The information from filer1 is placed in a tarred, gzipped file that has the pathname /tmp/netapp/brocade_switch_brcd1.tar.gz .
3	Send the resulting gzipped file to NetApp for analysis.

Change the FCP HBA's attributes

Methods for changing the FCP HBA's attributes

If you want to change information, such as the queue depth on the HBA, you must change the HBA's attributes. If you have LUNs mapped to the host, there are two methods you can use to change these attributes. One method requires you to reboot the host for the change to take effect. The other method does not require a reboot, but you must temporarily unload all the HBA's child devices.

Note

You must unload the child devices even if you are using SMIT. SMIT does not unload these devices automatically.

If you don't have any LUNs mapped to the host, you can use a shorter way to change such attributes as the HBA queue depth (see "Change the HBA queue depth with no LUNs mapped" on page 97).

Changing the FCP HBA's attributes and rebooting

If you only change the FCP HBA's attributes in the ODM, you must reboot your host. To change the attributes this way, complete the following steps.

Step	Action
1	Enter the following command: <pre># chdev -P -l <i>adapter_name</i> -a num_cmd_elems=<i>val</i></pre> <i>adapter_name</i> is the name of the HBA whose values you want to change. <i>val</i> is the value to which you want to set the queue depth. Example: The following example sets the queue depth on the FCP HBA device named fcs1 to 400. <pre># chdev -P -l fcs1 -a num_cmd_elems=400</pre>
2	Reboot the host.

Changing the FCP
HBA's attributes
without rebooting

If you don't want to reboot the host, you can change the HBA attributes by temporarily unloading all the HBA child devices. To use this method to change the attributes, complete the following steps.

Note_____

The commands in these steps provide an example of changing the attribute. Depending on how your system is set up, you would probably see different output if you executed these commands on your system.

Step	Action
1	Use the <code>lsdev</code> command to find the HBA's child device. This is a device instance of SCSI over the FCP driver. If this command does not return any child devices, go to step 11. In this case, you will stop at step 12. Example: In this example, the <code>lsdev</code> command reports one FCP device. <pre># lsdev -C -F "name parent" awk '\$2~/^fcs1\$/ { print \$1 }'</pre> fscsi1
2	Now that you have a name for the FCP device, use the <code>lsdev</code> command to locate that device's child devices. These devices are among the NetApp LUN disk devices. If this command doesn't display any child devices, go to step 10 and stop after step 13. Example: In this example, the <code>lsdev</code> command displays four child devices. <pre># lsdev -C -F "name parent" awk '\$2~/^fscsi1\$/ { print \$1 }'</pre> hdisk2 hdisk3 hdisk6 hdisk7
3	If you have SANpath installed, you must get the SPD numbers for all SANpath devices where at least one path is a child device of the FCP device. Use either SANpath's <code>setsp -v</code> command or NetApp's <code>sanlun lun show -p</code> to get this information.

Step	Action
4	Use the <code>lspv</code> command to find all the volume groups that contain at least one disk device that is a child of the FCP device. If the command does not report any volume groups, skip to step 8 and stop after step 14.
5	Find all the mounted file systems that belong to those volume groups and the applications that are currently accessing logical volumes in those volume groups. If there aren't any, skip to step 7 and stop after step 15.
6	Disable any applications that are accessing logical volumes in the volume groups.
7	Vary off all the volume groups and unmount any file systems. Example: To vary off the volume group called <code>my_vg</code>, you would enter the following command. <pre># varyoffvg my_vg</pre>
8	If you have SANpath installed, stop the SPD devices you found in step 3. Example: This example halts the <code>sp0</code> device. <pre># setsp -T -l0 spd0: stop device OK.</pre>
9	Unload all the protocol's child devices. You need to keep the definition of these devices. Example: This example unloads the child devices that were discovered in step 2. <pre># rmdev -l hdisk2 hdisk2 Defined # rmdev -l hdisk3 hdisk3 Defined # rmdev -l hdisk6 hdisk6 Defined # rmdev -l hdisk7 hdisk7 Defined</pre>

Step	Action
10	Unload the FCP device that you discovered in step 1. Example: This example unloads the FCP device fscsi1. <pre># rmdev -l fscsi1 fscsi1 Defined</pre>
11	Change the value of the attribute. Example: This example changes the queue depth value to 400. <pre># chdev -l fcs1 -a num_cmd_elems=400 fcs1 changed</pre>
12	Reload the HBA device to enable the new setting. Example: This example reloads the FCP device fscsi1. <pre># mkdev -l fcs1 fcs1 Available</pre>
13	If necessary, reload the FCP device fscsi1. Example: The following command line reloads the FCP device fscsi1. <pre># mkdev -l fscsi1 fscsi1 Available</pre>
14	If necessary, reload the child devices of the FCP device. Example: The following command line reloads the child device that you unloaded in step 9. <pre># mkdev -l hdisk2 hdisk2 Available # mkdev -l hdisk3 hdisk3 Available # mkdev -l hdisk6 hdisk6 Available # mkdev -l hdisk7 hdisk7 Available</pre>

Step	Action
15	Vary on any volume groups that you varied off in step 7. Example: To vary on the volume group called my_vg, you would enter the following command. <pre># varyonvg my_vg</pre>
16	Remount any file systems that you unmounted.
17	Restart any applications that you halted.

Change the HBA queue depth with no LUNs mapped

Changing the HBA queue depth

If you need to change the HBA queue depth, and you don't have any LUNs mapped to the host, complete the following steps.

Note

If you have LUNs mapped to the host, you must perform the steps listed in “Changing the FCP HBA’s attributes without rebooting” on page 93.

Step	Action
1	Unload the child FCP device by using the <code>rmdev -l</code> command. Example: For HBA <code>fscsi0</code>, you would enter the following command: <pre># rmdev -l fscsi0</pre>
2	Change the value of the queue depth using the <code>chdev -l</code> command, which has the following format: <pre># chdev -l fcs0 -a num_cmd_elems=val</pre> <i>val</i> is the value to which you want to set the queue depth. Example: To change the value to 48, you would enter the following command. <pre># chdev -l fcs0 -a num_cmd_elems=48</pre>
3	Reload the HBA device using the <code>mkdev -l</code> command. Example: The following command line reloads the <code>fcs0</code> HBA. <pre># mkdev -l fcs0</pre>
4	Reload the child FCP device using the <code>mkdev -l</code> command. Example: The following command line reloads the child FCP device. <pre># mkdev -l fscsi0</pre>

Change the value for the queue depths on the disk

Setting the value of the queue depths

The install script automatically sets the queue depths for the disk to 12, which is the value NetApp recommends. If your system needs to use a different queue depth, change this value using the `chdev -l` command. This command has the following format:

```
# chdev -l hdiskx -a queue_depth=val
```

`hdiskx` is the device for which you want to change the depth. The *x* specifies the number for this device.

val is the value to which you want to set the queue depth.

Note

You should only change the queue depth if you are familiar with performance tuning on your system.

Example of changing the queue depth

This example sets the queue depth for the device from 6 to 12.

```
# chdev -l hdisk6 -a queue_depth=12
```

General troubleshooting

Basic operations take a long time

Problem: There are no errors and everything appears to be correctly connected, but basic operations are taking exceptionally long times; in some cases, hours instead of minutes.

Explanation: If there are no other problems, this could mean that one of the connectors is not firmly attached. This can be the case even when it has a link and is reporting information such as the correct speed.

What to do: Disconnect the connector and reconnect it.

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