

FC Solaris™ Host Utilities 4.3 for Native OS with MPxIO

Installation and Setup Guide

NetApp, Inc.
495 East Java Drive
Sunnyvale, CA 94089 USA
Telephone: +1 (408) 822-6000
Fax: +1 (408) 822-4501
Support telephone: +1 (888) 4-NETAPP
Documentation comments: doccomments@netapp.com
Information Web: <http://www.netapp.com>

Part number 215-03969_A0
June 2008

Copyright and trademark information

Copyright information

Copyright © 1994–2008 NetApp, Inc. All rights reserved. Printed in the U.S.A.

No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP “AS IS” AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S.A. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark information

NetApp, the Network Appliance logo, the bolt design, NetApp—the Network Appliance Company, Cryptainer, Cryptoshred, DataFabric, DataFort, Data ONTAP, Decru, FAServer, FilerView, FlexClone, FlexVol, Manage ONTAP, MultiStore, NearStore, NetCache, NOW NetApp on the Web, SANscreen, SecureShare, SnapDrive, SnapLock, SnapManager, SnapMirror, SnapMover, SnapRestore, SnapValidator, SnapVault, Spinnaker Networks, SpinCluster, SpinFS, SpinHA, SpinMove, SpinServer, StoreVault, SyncMirror, Topio, VFM, and WAFL are registered trademarks of NetApp, Inc. in the U.S.A. and/or other countries. gFiler, Network Appliance, SnapCopy, Snapshot, and The evolution of storage are trademarks of NetApp, Inc. in the U.S.A. and/or other countries and registered trademarks in some other countries. The NetApp arch logo; the StoreVault logo; ApplianceWatch; BareMetal; Camera-to-Viewer; ComplianceClock; ComplianceJournal; ContentDirector; ContentFabric; EdgeFiler; FlexShare; FPolicy; Go Further, Faster; HyperSAN; InfoFabric; Lifetime Key Management, LockVault; NOW; ONTAPI; OpenKey, RAID-DP; ReplicatorX; RoboCache; RoboFiler; SecureAdmin; Serving Data by Design; SharedStorage; Simplicore; Simulate ONTAP; Smart SAN; SnapCache; SnapDirector; SnapFilter; SnapMigrator; SnapSuite; SohoFiler; SpinMirror; SpinRestore; SpinShot; SpinStor; vFiler; VFM Virtual File

Manager; VPolicy; and Web Filer are trademarks of NetApp, Inc. in the U.S.A. and other countries. NetApp Availability Assurance and NetApp ProTech Expert are service marks of NetApp, Inc. in the U.S.A.

IBM, the IBM logo, AIX, and System Storage are trademarks and/or registered trademarks of International Business Machines Corporation.

Apple is a registered trademark and QuickTime is a trademark of Apple, Inc. in the U.S.A. and/or other countries. Microsoft is a registered trademark and Windows Media is a trademark of Microsoft Corporation in the U.S.A. and/or other countries. RealAudio, RealNetworks, RealPlayer, RealSystem, RealText, and RealVideo are registered trademarks and RealMedia, RealProxy, and SureStream are trademarks of RealNetworks, Inc. in the U.S.A. and/or other countries.

All other brands or products are trademarks or registered trademarks of their respective holders and should be treated as such.

NetApp, Inc. is a licensee of the CompactFlash and CF Logo trademarks. NetApp, Inc. NetCache is certified RealSystem compatible.

Table of Contents

	Preface	vii
Chapter 1	Host Utilities Installation and Setup Overview	1
	Host Utilities Overview.	2
	FC Solaris Host Utilities installation overview.	7
	Where to go for more information	10
Chapter 2	Configuring the Solaris Host	13
	Installing the FC Solaris Host Utilities for Native OS	14
	Completing the installation and configuring system parameters.	17
	Upgrading the FC Solaris Host Utilities	22
	Removing an FC Solaris Host Utilities or Attach Kit installation	23
Chapter 3	Completing the Configuration	27
	Overview of completing the configuration	28
	Mapping igroups and LUNs	30
	Configuring the host to discover LUNs	31
	Completing the configuration.	32
Chapter 4	Using sanlun	37
	Displaying host LUN information	38
	Displaying information about paths	40
	Displaying host HBA information	44
Appendix A	Configuring SAN Boot	47
	SAN boot overview.	48
	Configuration overview.	49
	Performing a direct installation.	50

File system dump, restore for a SPARC system without MPxIO	51
File system dump, restore for an x86/x64 system with MPxIO	55
File system dump, restore for an x86/x64 system without MPxIO.	59

Appendix B

Tips and Troubleshooting.	63
Confirming that your system is correctly set up	64
Using Diagnostic Utilities	74
Collecting storage system information	75
Collecting Solaris information	77
Collecting switch information	78
Known issues with the Host Utilities.	80
 Index	 83

Preface

About this guide

This guide describes how to configure a Solaris™ host in a SAN environment. The host accesses data on a NetApp® storage system that runs Data ONTAP® software with the Fibre Channel Protocol (FCP).

See the NetApp Interoperability Matrix, available on the NetApp on the Web™ (NOW) site at <http://now.netapp.com/matrix/mtx/login.do/> for information on the specific Solaris versions supported.

Audience

This guide is for system installers and administrators who:

- ◆ Are familiar with the Sun Solaris operating system
- ◆ Understand how to configure and administer a storage system
- ◆ Understand how to use FC to store and retrieve data on a storage system.

Terminology

This guide uses the following terms:

- ◆ NetApp storage products (controllers, filers, FAS appliances, and NearStore systems) are all storage systems and are also sometimes called *filers* or *storage appliances*.
- ◆ *igroup* refers to a collection of unique identifiers, either FC WWPNs in a SCSI network or iSCSI node names of initiators (hosts) in an IP network, that are given access to LUNs when they are mapped to those LUNs.
- ◆ *LUN* (Logical Unit Number) refers to a logical unit of storage identified by a number.
- ◆ *LUN ID* refers to the numerical identifier for a LUN.
- ◆ *Initiator* refers to the system component that originates an I/O command over an I/O bus or network.
- ◆ *Target* refers to the storage system that receives an FC I/O request and serves the data requested by the initiator.

Command conventions

You can enter storage system commands on the system console or from any client that can obtain access to the storage system using a Telnet session.

Formatting conventions

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

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

Keyboard conventions

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

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

Special messages

This guide contains special messages that are described as follows:

Note

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

Caution

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

How to send your comments

Your feedback is important in helping us to provide the most accurate and high-quality information. If you have comments or suggestions for improving this publication, you can send us comments electronically to doccomments@netapp.com. To help us direct the comments to the correct division, please put FC Solaris in the subject line.

About this chapter

This chapter provides an introduction to the FC Solaris Host Utilities for Native OS. The native OS for this release refers to Sun™ StorEdge™ SAN Foundation Software with Sun StorageTek™ Traffic Manager (MPxIO).

Note

For details on the drivers that are supported, see the NetApp Interoperability Matrix, which is available online at <http://now.netapp.com/matrix/mtx/login.do>.

In addition, this chapter provides a high-level overview of the tasks you need to perform to install the Host Utilities and set up your system. It also includes pointers to other documentation that might be helpful in working with your Host Utilities setup.

Topics covered in this chapter

This chapter includes the following topics:

- ◆ “[Host Utilities Overview](#)” on page 2
- ◆ “[FC Solaris Host Utilities installation overview](#)” on page 7
- ◆ “[Where to go for more information](#)” on page 10

Host Utilities Overview

Important information about Host Utilities and Attach Kits

The Host Utilities enable users to connect Solaris hosts to NetApp storage systems. Previously NetApp provided FC Solaris Attach Kits to provide this support.

Host Utilities both simplify the products and provide more options for the host stacks. A single version of the FC Solaris Host Utilities can contain software tools and documentation packages to support different host configurations.

Because the FC Solaris Host Utilities supply some tools that are common to other NetApp products, component version numbers are not tied to the Host Utilities version number. Individual tools may have separate version numbers. For example, at the time this document was produced, it supported the FC Host Utilities 4.3 and was using version 3.4 of `create_binding.pl`. See the Interoperability Matrix <http://now.netapp.com/matrix/mtx/login.do> for information about supported components.

Overview of the FC Solaris Host Utilities

The Host Utilities consist of the following tools and information:

- ◆ The SAN Toolkit, which contains:
 - ❖ Configuration tools that help you configure host, HBA, and system files and create persistent bindings.

You can configure the Solaris host using the tools provided in the FC Solaris Host Utilities, HBA-provided tools, or a combination FC Solaris Host Utilities and HBA-provided tools.
 - ❖ The `san lun` utility that helps you manage LUNs and the host HBA.
 - ❖ Diagnostic scripts that provide diagnostic information about components in your configuration. Customer Support may ask for output from these scripts.
- ◆ Documentation that describes how to configure the Solaris host. It includes this setup guide, *Release Notes*, the *Host Settings Changed by the Host Utilities* document, and a *Quick Command Reference for FC Solaris Host Utilities for Native OS and Veritas*.
- ◆ The NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do> contains the most current information on the supported stacks. NetApp adds components on an ongoing basis, so this online site is updated frequently.

High-level look at Host Utilities native stack

The FC Solaris Host Utilities for Native OS work with Solaris hosts running Sun StorEdge SAN Foundation Software and components that make up the native stack. The following is a summary of the supported stack at the time this document was produced. Check the NetApp Interoperability Matrix for current information on supported stack.

- ◆ Operating system:
 - ❖ Solaris 10 Update 3
- ◆ Processor:
 - ❖ SPARC processor systems
 - ❖ x86/64 (AMD) processor systems.
- ◆ HBA:
 - ❖ Certain Sun StorageTek Host Bus Adapters (HBAs)
 - ❖ Certain Sun OEM QLogic® HBAs
 - ❖ Certain Sun OEM Emulex® HBAs
- ◆ Drivers:
 - ❖ Bundled Sun StorEdge SAN Foundation Software (SFS) drivers
- ◆ Multipathing
 - ❖ Sun StorageEdge Traffic Manager (the Solaris multiplexed I/O MPxIO)

The FC Solaris Host Utilities for Native OS also support the following:

- ◆ Volume manager
 - ❖ Solaris Volume Manager (SVM)
 - ❖ Veritas™ Volume Manager (VxVM)

Note

To determine which versions of VxVM are supported with MPxIO, see the NetApp Interoperability Matrix, at <http://now.netapp.com/matrix/mtx/login.do/>.

- ◆ Clustering
 - ❖ Sun Clusters. This kit has been certified using the Sun Cluster Automated Test Environment (SCATE).
 - ❖ Veritas Cluster Server (VCS)

Software tools provided by the Host Utilities

The FC Solaris Host Utilities bundle tools into a SAN Toolkit. These tools include scripts and commands you can use to display information about LUNs, add required settings, and troubleshoot your system.

Note

This toolkit is common across all the FC Solaris Host Utilities stacks. As a result, some of its contents apply to one stack, but not another. Having a tool that does not apply to your stack does not affect performance.

The toolkit contains the following components:

- ◆ `basic_config` command line tool. This tool modifies the Fibre Channel tunable variables to set them to values required by the FC driver. It provides the HBA timeout settings for both MPxIO and Veritas DMP configurations.
- ◆ `create_binding.pl` command line tool. This tool enables you to bind the WWPNs of a single storage system's active ports to a target ID. It saves these bindings in the `/kernel/drv/lpfc.conf` file.
- ◆ `filer_info` script. This script collects information about the storage system.
- ◆ `mpxio_set` script. This script lets you clean up the I/O connection if you were running the iSCSI Solaris Support Kit 1.0. (If you were not using the support kit, you should not need to use this script.)
- ◆ `san_version` command. This command displays the version of the SAN Toolkit that you are running.
- ◆ `sanlun` utility. This utility displays information about LUNs on the storage system that are available to this host.
- ◆ `ssd_config.pl` script. This is a helper script that the `basic_config` tool calls to make setting changes for the Fibre Channel and SCSI drivers.
- ◆ `solaris_info` script. This script collects configuration information about your host.
- ◆ Additional diagnostic scripts. The following scripts can also be used to collect troubleshooting information:
 - ❖ `brocade_info` collects information about Brocade switches installed in the network.
 - ❖ `cisco_info` collects information about Cisco switches installed in the network.
 - ❖ `mcdata_info` collects information about McData switches installed in the network.
 - ❖ `qlogic_info` collects information about QLogic switches installed in the network.
 - ❖ `SHsupport.pm` is the support library for the `*info` scripts.
 - ❖ `Telnet.pm` support library for `*info` scripts.
 - ❖ `version` displays the version of the `sanlun` command.
- ◆ The man pages for `sanlun` and the diagnostic scripts.

About the HBAs

The Host Utilities support a number of HBAs. The supported HBAs should be installed before you install the Host Utilities. Normally, they should have the correct firmware and FCode set. To determine the firmware and FCode setting on your system, run the appropriate administration tool for your HBA.

Note

For details on the specific HBAs that are supported and the required firmware and FCode values, see the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do>.

If the Host Utilities setup procedure differs based on the HBA model, this guide will describe the different steps. Unless otherwise noted, the information in this guide applies to all supported versions HBA models.

Multipathing

The FC Solaris Host Utilities for Native OS use Solaris MPxIO to provide multipathing. MPxIO is Sun's native multipathing solution. By using MPxIO you can configure multiple network paths between the Solaris host and storage system. If one path fails, FC traffic continues on the remaining paths. MPxIO is required if the host has multiple paths to a LUN.

MPxIO works by making the underlying paths transparent to the user. It exposes only a consolidated device such as `/dev/rdisk/c7t60A980004334686568343655496C7931d0s2`.

The SAN Toolkit `san lun` command will show you all NetApp consolidated devices to which the host has access to.

Volume managers

The FC Solaris Host Utilities for Native OS work with SVM and VxVM to enable you to have different volume management solutions.

Both volume managers work with MPxIO, which is the only multipathing solution supported by the FC Solaris Host Utilities for Native OS.

Note

To determine which versions of VxVM are supported with MPxIO, see the NetApp Interoperability Matrix, at <http://now.netapp.com/matrix/mtx/login.do/>.

ALUA support

The FC Solaris Host Utilities for Native OS require that you use storage systems that have Asymmetric Logical Unit Access (ALUA) enabled. Check the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/> to see which versions of Data ONTAP support ALUA and are supported by the Host Utilities.

NetApp introduced ALUA support with Data ONTAP 7.2 and Single Image cfmode.

Note

ALUA is also known as Target Port Group Support (TPGS).

ALUA defines a standard set of SCSI commands for discovering and managing multiple paths to LUNs on Fibre Channel and iSCSI SANs. You still need MPxIO to run on the host, but you do not need additional host-specific plug-ins.

FC Solaris Host Utilities installation overview

Overview of Installing the Host Utilities and setting up your system

Installing the FC Solaris Host Utilities and setting up your system involves a number of steps that are performed on both the storage system and the host. The following sections provide information about the tasks you need to perform.

Prerequisites

Before you install the Host Utilities, you must perform the following tasks:

1. Set up your system:

- ❖ Host OS and appropriate updates
- ❖ HBAs
- ❖ Drivers
- ❖ Storage system and Data ONTAP with ALUA supported
- ❖ Switches (if used)
- ❖ Remove any version of the Host Utilities or Host Attach Kit that is currently installed

See the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/> for current information about the system requirements.

2. Verify that your storage system is:

- ❖ Licensed correctly
- ❖ Using the cfmodeset to single image mode
- ❖ Running the FC service
- ❖ Using ALUA
- ❖ Configured to work with the target HBAs (if needed)
- ❖ Set up to work with the Solaris host and the initiator HBAs
- ❖ Set up with working volumes and qtrees (if desired)

3. If you're using a fabric connection, verify that the switch is:

- ❖ Set up correctly

- ❖ Zoned (if appropriate for your system)

Note

For information on supported topologies, see the *iSCSI and Fibre Channel Configuration Guide*, which is online at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/QuickRef/fc_iscsi_config_guide.pdf.

- ❖ Cabled according to the instructions that came with the switch

4. Verify that:

- ❖ The power to the switches, disk shelves, storage systems, and hosts is turned on in the correct order
- ❖ The host and the storage system can communicate

Installation overview

Installing the Host Utilities involves the following tasks:

1. Get a copy of the Host Utilities SAN Toolkit software package.
 - ❖ Get the compressed file containing the software package by either downloading it or copying it from the CD.
 - ❖ Extract the software package from the compressed file.
2. Install the toolkit package:
 - ❖ Go to the directory containing the extracted software package.
 - ❖ Use the `pkgadd -d NTAPSANTool.pkg` command to install the toolkit.
 - ❖ Use the `basic_config` command to set the driver parameters.
3. Configure the LUNs by performing the following tasks:
 - ❖ Create at least one igroup and at least one LUN.
One way to create igroups and LUNs is to use the `lun setup` command.
 - ❖ Enable ALUA, if you haven't already done so.
 - ❖ Map the LUN to the igroup.
 - ❖ Configure the host to discover the LUNs.
You can do this using the `/usr/sbin/cfgadm -c configure cx` command, where *x* is the controller number of the HBA where the LUN is expected to be visible.
 - ❖ Label the LUNs using the Solaris format utility (`/usr/sbin/format`).
 - ❖ Configure the Volume Management software
 - ❖ Display information about the LUNs and HBA.

Use the `san lun` command.

For detailed information on these tasks

The following sections in this document provide more details about setting up your system, verifying your setup before you install the Host Utilities, installing and configuring the Host Utilities, and creating igroups and LUNs:

- ◆ [“Confirming that your system is correctly set up”](#) on page 64
- ◆ [“Installing the FC Solaris Host Utilities for Native OS”](#) on page 14
- ◆ [“Completing the installation and configuring system parameters”](#) on page 17
- ◆ [“Mapping igroups and LUNs”](#) on page 30
- ◆ [“Configuring the host to discover LUNs”](#) on page 31
- ◆ [“Formatting or labeling the new LUN”](#) on page 32
- ◆ [“Configuring volume management”](#) on page 35
- ◆ [“Displaying host LUN information”](#) on page 38
- ◆ [“Displaying information about paths”](#) on page 40
- ◆ [“Displaying host HBA information”](#) on page 44

In addition, the section [“Where to go for more information”](#) on page 10 provides pointers to other documents and Web sites that can help you with your system setup.

Optional procedures

You may wish to perform the following tasks after installation is complete.

Task	Additional information
Configure SAN boot. SAN boot uses a SAN attached disk, like a LUN, as a boot device for a Solaris host	See “Configuring SAN Boot” on page 47
Run diagnostic scripts. Normally, you would only run these scripts if you encountered a problem. These scripts collect information about your system and place it in compressed file that you can send to customer support.	See “Using Diagnostic Utilities” on page 74

Where to go for more information

Where to go for host and storage system information

The following table describes the documents on the NetApp on the Web (NOW) site at the time this guide was written. They provide information about host and storage system requirements, supported configurations, and cabling instructions.

If you need information about...	See the following NetApp product documentation...
Known issues, troubleshooting, operational considerations, and post-release developments	<i>FC Solaris Host Utilities Release Notes</i> at http://now.netapp.com/NOW/knowledge/docs/san/
A summary of some of the commands you might use with the Host Utilities	The <i>Quick Reference</i> for the FC Solaris Host Utilities, which is available from the NOW site
The latest supported configurations	◆ The NetApp Interoperability Matrix at http://now.netapp.com/matrix/mtx/login.do/ ◆ <i>System Configuration Guide</i> at http://now.netapp.com/NOW/knowledge/docs/docs.shtml
Supported Fibre Channel SAN topologies and connecting the storage system to the fabric or switch	◆ Switch documentation at http://now.netapp.com/NOW/knowledge/docs/san/ ◆ <i>iSCSI and Fibre Channel Configuration Guide</i> at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/QuickRef/fc_iscsi_config_guide.pdf
Changes to the host settings that are recommended by the Host Utilities	<i>Host Settings Affected by the Host Utilities</i> at http://now.netapp.com/NOW/knowledge/docs/san/
Configuring the storage system	◆ <i>Best Practices for Reliability: New System Installation</i> at http://now.netapp.com/NOW/knowledge/docs/other/best_practices/index.shtml ◆ <i>Data ONTAP® Software Setup Guide</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml ◆ <i>Data ONTAP® Block Access Management Guide</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml ◆ Index to Data ONTAP documentation at http://now.netapp.com/NOW/knowledge/docs/ontap

If you need information about...	See the following NetApp product documentation...
Enabling ALUA	<i>Data ONTAP® Block Access Management Guide for FCP</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml In particular, see the section “<i>Enabling ALUA for a Fibre Channel igroup.</i>”
Managing SAN storage on the storage system	◆ <i>Data ONTAP® Block Access Management Guide for FCP</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml ◆ <i>Data ONTAP® Release Notes</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml ◆ <i>Command Reference</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml ◆ <i>FilerView® Online Help</i> - available from within the FilerView GUI ◆ <i>Best Practices for Reliability: Ongoing Maintenance</i> at http://now.netapp.com/NOW/knowledge/docs/other/best_practices/newsys/index.htm
Verifying compatibility of a storage system with environmental requirements	<i>Site Requirements</i> at http://now.netapp.com/NOW/knowledge/docs/docs.shtml
Upgrading Data ONTAP	<i>Data ONTAP® Upgrade Guide</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml.
Installing and configuring the HBA	Refer to your HBA vendor documentation.
Your host operating system and using its features, such as SVM or MPxIO	◆ Refer to your operating system documentation. You can download Sun manuals in PDF format from http://docs.sun.com/.
Veritas Volume Manager	Refer to your Veritas documentation.

Chapter overview

This chapter explains how to install the FC Solaris Host Utilities and configure the Solaris host for the Native OS stack.

Topics in this chapter

This chapter includes the following topics:

- ◆ [“Installing the FC Solaris Host Utilities for Native OS”](#) on page 14
- ◆ [“Completing the installation and configuring system parameters”](#) on page 17
- ◆ [“Upgrading the FC Solaris Host Utilities”](#) on page 22
- ◆ [“Upgrading the FC Solaris Host Utilities”](#) on page 22
- ◆ [“Removing an FC Solaris Host Utilities or Attach Kit installation”](#) on page 23

Installing the FC Solaris Host Utilities for Native OS

Before you begin

Before you install the Host Utilities SAN Toolkit software package:

- ◆ Verify that your host system meets requirements and is correctly set up. To determine the current hardware and software requirements for the Host Utilities, search the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/> for the latest hardware and software requirements.
- ◆ If you currently have the FC Solaris Host Utilities or FC Solaris Attach Kit installed, you must remove it. See “[Removing an FC Solaris Host Utilities or Attach Kit installation](#)” on page 23.

Key steps involved in setting up the Host Utilities

Once your host is set up, you must install the Host Utilities SAN Toolkit software package. When you have installed the software, you can use the tools it provides to complete your setup and configure your host parameters. The Host Utilities provide the following configuration tools:

- ◆ `mpxio_set` removes the MPxIO that was set up if you had an earlier version of the Host Utilities or iSCSI Solaris Attach Kit installed.
- ◆ `basic_config` configures the host system parameters
- ◆ `sanlun` displays host and storage system information

Obtaining the software

The software is provided as compressed files on a CD-ROM. These files are also available for downloading from the NOW web site at <http://now.netapp.com/NOW/cgi-bin/software>. There are two software distributions: one for SPARC processor systems, which is also the installation file for the Host Utilities with the Veritas DMP stack, and a compressed file for x86/64 (AMD) processor systems. You only need to install the file that is appropriate for your system.

Note

To prevent you from accidentally installing the wrong file for your processor, the file will only install if it is the right file for your processor. If you have the wrong file, the installation ends with a message saying that it did not install the software.

Installing the SAN Toolkit

To install the FC Solaris Host Utilities software, complete the following steps:

Step	Action
1	Login to the host system as root.
2	Place the compressed file for your processor in a directory on your host and go to that directory. You can either download this software from the NOW site or copy it from the CD-ROM At the time this documentation was prepared, the compressed files were called: ◆ SPARC CPU: <code>netapp_fcp_solaris_host_utilities_4_3_sparc.tar.gz</code> ◆ x86/x64 (AMD) CPU: <code>netapp_fcp_solaris_host_utilities_4_3_amd.tar.gz</code> Note_____ The actual file names for the Host Utilities software may be slightly different from the ones shown in these steps. _____ Example: If you are installing the <code>netapp_fcp_solaris_host_utilities_4_3_sparc.tar.gz</code> file on a SPARC system, you might put it in the <code>/tmp</code> directory on your Solaris host. You can use following command lines to place the file in that directory and then move to the directory: <pre># cp netapp_fcp_solaris_host_utilities_4_3_sparc.tar.gz /tmp # cd /tmp</pre>
3	Unzip the file. Enter: <pre>gunzip netapp_fcp_solaris_host_utilities_4_3_sparc.tar.gz</pre> Result: The software unzips the tar.gz files Example: The following example uses <code>gunzip</code> to unzip the files for a SPARC system. <pre># gunzip netapp_fcp_solaris_host_utilities_4_3_sparc.tar.gz tar -xvf - x ./NTAPSANTool.pkg, 1199616 bytes, 2343 tape blocks</pre>
4	Untar the file. You can use the <code>tar -xvf</code> command to do this. <pre>tar -xvf netapp_fcp_solaris_host_utilities_4_3_sparc.tar</pre> Result: The Host Utilities scripts are extracted to the default directory. Example: The following example uses <code>tar -xvf</code> to extract the Solaris installation package for a SPARC system. <pre># tar -xvf netapp_fcp_solaris_host_utilities_4_3_sparc.tar</pre>

Step	Action
5	Add the packages that you extracted from tar file. Enter: <pre>pkgadd -d NTAPSANTool.pkg</pre> Result: The packages are added to the opt/NTAP/SANToolkit/bin directory.
6	Confirm that the toolkit was successfully installed: <pre># pkginfo NTAPSANTool</pre> Example: You can use the pkginfo command to confirm that the toolkit was successfully installed. <pre># pkginfo NTAPSANTool application NTAPNTAPSANTool Solaris SAN Tool Utility for NetApp filers.</pre> Once the toolkit is installed, you should have the following tools in the installation directory: <pre>\$ ls -al /opt/NTAP/SANToolkit/bin total 1004 drwxrwxr-x 2 root sys 512 Feb 13 15:41 . drwxrwxr-x 3 root sys 512 Feb 13 15:41 .. -r-xr-xr-x 1 root sys 19906 Feb 13 13:06 basic_config -r-xr-xr-x 1 root sys 4018 Feb 13 13:06 brocade_info -r-xr-xr-x 1 root sys 4274 Feb 13 13:06 cisco_info -r-xr-xr-x 1 root sys 51639 Feb 13 13:06 create_binding.pl -r-xr-xr-x 1 root sys 8914 Feb 13 13:06 filer_info -r-xr-xr-x 1 root sys 43123 Feb 13 13:06 FTP.pm -r-xr-xr-x 1 root sys 4558 Feb 13 13:06 mcdata_info -r-xr-xr-x 1 root sys 13270 Feb 13 13:04 mpxio_set -r-xr-xr-x 1 root sys 6172 Feb 13 13:06 qlogic_info -r-xr-xr-x 1 root sys 154942 Feb 13 13:06 sanlun -r-xr-xr-x 1 root sys 1248 Feb 13 13:06 san_version -r-xr-xr-x 1 root sys 14036 Feb 13 13:06 SHsupport.pm -r-xr-xr-x 1 root sys 16671 Feb 13 13:06 solaris_info -r-xr-xr-x 1 root sys 12612 Feb 13 13:06 ssd_config.pl -r-xr-xr-x 1 root sys 130743 Feb 13 13:06 Telnet.pm -r-xr-xr-x 1 root sys 677 Feb 13 13:06 vidpid.dat</pre>

Obtaining documentation

Documentation for the Host Utilities is available on the NOW site and on the FC Solaris Host Utilities 4.3 CD-ROM. The SAN/iSAN Information Library page (<http://now.netapp.com/NOW/knowledge/docs/san/>) contains documentation for all the NetApp Host Utilities.

Completing the installation and configuring system parameters

Completing the configuration

To complete the configuration you must modify the parameters in either `/kernel/drv/ssd.conf` or `/kernel/drv/sd.conf` and set them to the recommended values. To set the recommended values, you can either

- ◆ Manually edit the file for your system.
- ◆ Use the `basic_config` command to automatically make the changes.

Note

For a complete list of the host parameters that NetApp recommends you change and an explanation of why that change is recommended, see the *Host Settings Affected by the Host Utilities* document, which is on the NOW site on the SAN/iSAN Information Library page (<http://now.netapp.com/NOW/knowledge/docs/san/>).

Before you configure the system parameters

Complete the following tasks before you configure system parameters.

- ◆ Create your own backup of the file you are modifying:
 - ❖ `/kernel/drv/ssd.conf` for systems using SPARC processors
 - ❖ `/kernel/drv/sd.conf` for systems using x86/x64 (AMD) processors

The `basic_config` command automatically creates backups for you, but you can only revert to those backups once. By manually creating the backups, you can revert to them as needed.

- ◆ If MPxIO was previously installed using earlier Host Utilities or Host Attach Kit and ALUA was not enabled, you must remove it.

Remove MPxIO installed with a support kit

If you had installed an iSCSI Solaris Support Kit or Host Utilities Kit on the host in the past and were not using it with ALUA, you must remove the MPxIO that was set up with it. Execute the command:

```
# mpxio_set -d
```

Manually changing parameters for systems using MPxIO

You can manually modify the /kernel/drv/ssd.conf file (SPARC processor) or the /kernel/drv/sd.conf file (x86/64 (AMD) processor). The required values are the same for both SPARC processor systems and x86/x64 (AMD) processor systems using MPxIO:

- ◆ throttle_max=64
- ◆ not_ready_retries=300
- ◆ busy_retries=30
- ◆ reset_retries=30
- ◆ throttle_min=8

You must also set the VIP/PID information to “NETAPP LUN”.

Using basic_config to configure system parameters

The basic_config command is a configuration script included in the Host Utilities SAN Toolkit that you can use to automatically set system values to the ones recommended for use with the Host Utilities. This command updates the items in /kernel/drv/ssd.conf or /kernel/drv/sd.conf to the values recommended for NetApp storage systems using Sun native drivers.

The arguments you use with the basic_config command vary depending on whether you are using a SPARC processor system or an x86/x64 (AMD) processor system.

For SPARC processor systems: Run the basic_config -ssd_set command. This command uses a bit mask to modify the /kernel/drv/ssd.conf to add the settings required for your storage system.

```
ssd-config-list="NETAPP LUN", "netapp-ssd-config";  
netapp-ssd-config=1,0x9007,64,300,30,0,0,0,0,0,0,0,0,0,0,30,0,0,8,0,0;
```

For x86/x64 (AMD) processor systems: Run the basic_config -sd_set command. This command uses a bit mask to modify the /kernel/drv/sd.conf to add the settings required for your storage system.

```
sd-config-list="NETAPP LUN", "netapp-sd-config";  
netapp-sd-config=1,0x9c01,64,0,0,0,0,0,0,0,0,0,0,0,300,30,30,0,0,8,0,0;
```

Changing the parameters using basic_config

To change the parameters using the basic_config command system parameters, complete the steps below.

Note—
If you need to remove these changes, run the basic_config -ssd_unset command on SPARC systems and the basic_config -sd_unset command on x86/x64 (AMD) systems.

Step	Action
1	Execute the appropriate basic_config command for your system. The the basic_config command has the following format: ◆ For SPARC systems basic_config [-ssd_set -ssd_unset -ssd_set_force -ssd_unset_force] ◆ For x86/x64 (AMD) systems, execute basic_config [-sd_set -sd_unset -sd_set_force -sd_unset_force] Example: The following example shows the type of output produced by the basic_config -ssd_set command when you execute it on a SPARC system. <pre># /opt/NTAP/SANToolkit/bin/basic_config -ssd_set W A R N I N G This script will modify /kernel/drv/ssd.conf to add settings required for your storage system. Do you wish to continue (y/n)?--->y The original version of /kernel/drv/ssd.conf has been saved to /kernel/drv/ssd.conf.1158267336 Please reboot now</pre>

Step	Action
2	To enable the changes, you must reboot your system. ◆ For SPARC systems, execute the <code>stmsboot -e</code> command and answer the questions that appear: <pre># stmsboot -e</pre> This command sets up MPxIO and forces your system to reboot. Note _____ This command is also available for x86/x64 systems running Solaris 10 update 4. ◆ For x86/x64 (AMD) systems, MPxIO is on by default. You need to manually reboot the host to enable the Fibre Channel parameters.

Options available with `basic_config`

When using Sun native drivers with MPxIO, the `basic_config` command accepts the following options.

Option	Description	Notes
<code>-h</code> , <code>-help</code>	Displays the usage page.	~
<code>-p</code>	Prints out the existing settings.	~
<code>-ssd_set</code>	Adds the required settings to <code>sd.conf</code> or <code>ssd.conf</code> for Sun native drivers.	For SPARC systems using MPxIO.
<code>-ssd_set_force</code>	Performs the same tasks as the <code>-ssd_set</code> option, but suppresses the confirmation prompt.	For SPARC systems using MPxIO.
<code>-ssd_unset</code>	Removes the entries added by the <code>-ssd_set</code> option.	For SPARC systems using MPxIO.
<code>-ssd_unset_force</code>	Performs the same tasks as the <code>-ssd_unset</code> option, but suppresses the confirmation prompt.	For SPARC systems using MPxIO.

Option	Description	Notes
-sd_set	Adds the required settings to sd.conf or sd.conf for Sun native drivers.	For x86/x64 (AMD) systems using MPxIO.
-sd_set_force	Performs the same tasks as the -sd_set option, but suppresses the confirmation prompt.	For x86/x64 (AMD) systems using MPxIO.
-sd_unset	Removes the entries added by the -sd_set option.	For x86/x64 (AMD) systems using MPxIO.
-sd_unset_force	Performs the same tasks as the -sd_unset option, but suppresses the confirmation prompt.	For x86/x64 (AMD) systems using MPxIO.
-sd_help	Displays the sd_config help page.	~
-v	Displays version information for the basic_config script.	~

Upgrading the FC Solaris Host Utilities

Upgrading the Host Utilities or reverting to another version

You can upgrade to a newer version of the Host Utilities or revert to a 4.x or 3.0 version of the Host Utilities without any effect on system I/O.

To upgrade or revert, complete the following steps:

Step	Action
1	Use the Solaris <code>pkgrm</code> command to remove the Host Utilities software package you no longer need. For more information on removing the Host Utilities, see “Removing an FC Solaris Host Utilities or Attach Kit installation” on page 23. Note Removing the software package does not remove or change the system parameter settings for that I/O stack. To remove the settings you added when you configured the Host Utilities, you must perform additional steps. You do not need to remove the settings if you are upgrading the Host Utilities.
2	Use the Solaris <code>pkgadd</code> command to add the appropriate Host Utilities software package. For steps on installing and configuring the Host Utilities, see “Installing the FC Solaris Host Utilities for Native OS” on page 14 and “Completing the installation and configuring system parameters” on page 17.

Removing an FC Solaris Host Utilities or Attach Kit installation

Methods for removing the Host Utilities or Attach Kit

You should never install the Host Utilities on a host that currently has a version of the FC Solaris Host Utilities or Attach Kit installed. You must remove the old version before installing a new version or reverting to a different version.

The method you use for uninstalling the Host Utilities or Attach Kit depends on the version of the kit that you installed.

- ◆ For FC Solaris Host Utilities 4.x, 3.0, use the `pkgrm` command to remove the Host Utilities software package.
- ◆ For FC Solaris Attach Kit 2.0, use the `uninstall` script from the FC Solaris Attach Kit 2.0 software to uninstall the Attach Kit software.

Removing FC Solaris Host Utilities 4.x, 3.0

To remove the FC Solaris Host Utilities 4.x, 3.0, complete the following steps.

Step	Action
1	Use the following command to remove the FC Solaris Host Utilities software from the <code>/opt/NTAP/SANToolkit/bin</code> directory: pkgrm NTAPSANTool Example: The following command line removes the Host Utilities software package. <pre># pkgrm NTAPSANTool</pre>
2	Remove the Fibre Channel parameters that were set when you ran the <code>basic_config</code> command or that you manually set. To restore the values, you can do one of the following: ◆ Replace the system files with the backups you made before changing the values ❖ SPARC systems: <code>/kernel/drv/ssd.conf</code>. ❖ x86/64 (AMD) systems: <code>/kernel/drv/sd.conf</code>. ◆ Use the <code>basic_config</code> command to revert to the saved values (you can only do this once). ❖ SPARC systems: basic_config -ssd_unset ❖ x86/x64 (AMD) systems: basic_config -sd_unset

Step	Action
3	You can disable MPxIO by using the stmsboot command: stmsboot -d This command is only available with the following systems: ◆ SPARC ◆ x86/x64 (AMD) running Solaris 10 Update 4
4	To enable the changes, reboot your system.

Uninstalling the Attach Kit 2.0 software

To uninstall the Attach Kit 2.0 software, complete the following steps.

Step	Action
1	Ensure that you are logged in as root.
2	Locate the FC Solaris Attach Kit 2.0 software. By default, the FC Solaris Attach Kit is installed in /opt/NTAPsanlun/bin.
3	From the /opt/NTAPsanlun/bin directory, enter the following command to remove the existing software: ./uninstall Note _____ The uninstall script automatically creates a backup copy of the /kernel/drv/lpfc.conf and sd.conf files as part of the uninstall procedure. It is a good practice, though, to create a separate backup copy before you begin the uninstall. _____

Step	Action
4	At the prompt “Are you sure you want to uninstall lpfc and sanlun packages?”enter y. Result: The uninstall script creates a backup copy of the /kernel/drv/lpfc.conf and sd.conf files to /usr/tmp. The backup files are named as follows: ◆ lpfc.conf.save ◆ sd.conf.save If a backup copy already exists, the install script prompts you to overwrite the backup copy.
5	Reboot the host with the reconfigure option (reboot -- -r).

About this chapter This chapter describes what you need to do to complete the configuration.

Topics in this chapter

This chapter includes the following topics:

- ◆ [“Overview of completing the configuration”](#) on page 28
- ◆ [“Mapping igroups and LUNs”](#) on page 30
- ◆ [“Configuring the host to discover LUNs”](#) on page 31
- ◆ [“Completing the configuration”](#) on page 32

Overview of completing the configuration

Task overview

Completing the configuration involves the following tasks.

Task	Discussion	Additional information
1. Create and map igroups and LUNs	An igroup is a collection of WWPNs on the storage system that map to one or more host HBAs. After you create the igroup, you must create LUNs on the storage system, and map the LUNs to the igroup.	For complete information, refer to your version of the <i>Data ONTAP® Block Access Management Guide for FCP</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml .
2. Enable ALUA	You must have ALUA set up to work with igroups. To see if ALUA is set up for your igroup, use the <code>igroup show -v</code> command.	Refer to “ Check the ALUA settings on the storage system ” on page 71.
3. Display a list of controllers	Use the <code>cfgadm -al</code> command to display a list of controllers.	Refer to “ Getting the controller number ” on page 31 for additional information.
4. Discover LUNs	To discover LUNs use <code>/usr/sbin/cfgadm -c configure cx</code> <code>x</code> is the controller number of the HBA where the LUN is expected to be visible.	Refer to “ Getting the controller number ” on page 31 for additional information.
5. Label LUNs, if appropriate for your system	Use the Solaris format utility to label the LUNs. Note — LUN misalignment can occur in some cases. For the most current information on the situation and how to avoid it, see the <i>FC Solaris Host Utilities Release Notes</i> .	Refer to Solaris documentation for complete information about the format utility.

Task	Discussion	Additional information
6. Configure volume management software	If your configuration uses either the Solaris Volume Manager or the Veritas Volume Manager, you must configure the LUNs so they are under the volume manager control.	Refer to documentation for your volume manager for additional information.

Mapping igroups and LUNs

Methods for creating igroups and LUNs

You can create igroups and LUNs on the storage system by:

- ◆ Entering the `lun setup` command
This method prompts you through the process of creating a LUN, creating an igroup, and mapping the LUN to the igroup.
- ◆ Entering a series of individual commands (such as `lun create`, `igroup create` and `lun map`).
Use this method to create one or more LUNs and igroups in any order.
- ◆ Using FilerView
This method provides a LUN Wizard that steps you through the process of creating and mapping new LUNs.

Create the igroups and LUNs

For complete information about creating igroups and LUNs, refer to *Data ONTAP™ Block Access Management Guide for FCP* at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml.

Configuring the host to discover LUNs

Getting the controller number

Before you discover the LUNs, you need to determine what the controller number of the HBA is. To do this, complete the following step.

1	Use the <code>cfgadm -al</code> command to determine what the controller number of the HBA is. If you use the <code>/usr/sbin/cfgadm -c configure cx</code> command to discover the LUNs, you need to replace <code>x</code> with the HBA controller number. Example: To determine what the controller number of the HBA is, use the <code>cfgadm -al</code> command. <pre>\$ cfgadm -al Ap_Id Type Receptacle Occupant Condition c0 fc-fabric connected configured unknown c0::500a098187f93622 disk connected configured unknown c0::500a098197f93622 disk connected configured unknown c1 scsi-bus connected configured unknown c1::disk/c1t0d0 disk connected configured unknown c1::disk/c1t1d0 disk connected configured unknown c2 fc-fabric connected configured unknown c2::500a098287f93622 disk connected configured unknown c2::500a098297f93622 disk connected configured unknown</pre>
---	---

Discovering LUNs

To have the host discover new LUNs and validate that they are visible on the host, complete the following step.

Step	Action
1	To discover new LUNs, enter <code>/usr/sbin/cfgadm -c configure cx</code> where <code>x</code> is the controller number of the HBA where the LUN is expected to be visible. If you do not see the HBA in the output, check your driver installation to make sure it is correct. Result: The system probes for new devices. When it finds the new LUNs, it might generate a warning about a corrupt label. This warning means that the host discovered new LUNs that need to be labeled as Solaris disks.

Completing the configuration

**Formatting or
labeling the new
LUN**

The format utility is a menu-driven script that is provided on the Solaris host. Use the format utility to format and label LUNs.

Follow the step below to activate the format utility and configure LUNs.

Step	Action
1	To activate the format utility, enter: 1. <code>/usr/sbin/format</code> 2. Follow screen directions to format or label LUNs. Result: The format script displays available disks and configuration options. The following examples show the type of output you would see on a system using SPARC processors and on a system using x86/64 (AMD) processors.

Step	Action
	Example 1: This example labels disk number 15 on a SPARC system. (Portions of this example have been removed to make it easier to review.) <pre> \$ format Searching for disks...done AVAILABLE DISK SELECTIONS: 0. c1t0d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107> /pci@1f,700000/scsi@2/sd@0,0 1. c1t1d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107> /pci@1f,700000/scsi@2/sd@1,0 2. c1t2d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107> flasharc /pci@1f,700000/scsi@2/sd@2,0 3. c1t3d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107> flasharc /pci@1f,700000/scsi@2/sd@3,0 4. c5t60A9800043346859444A2D36702D6B69d0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128> /scsi_vhci/ssd@g60a9800043346859444a2d36702d6b69 5. c5t60A9800043346859444A2D36702D6D77d0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128> /scsi_vhci/ssd@g60a9800043346859444a2d36702d6d77 ... 10. c5t60A9800043346859444A2D36702D787Ad0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128 /scsi_vhci/ssd@g60a9800043346859444a2d36702d787a 11. c5t60A9800043346859444A2D36702D6956d0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128> /scsi_vhci/ssd@g60a9800043346859444a2d36702d6956 12. c5t60A9800043346859444A2D3670414A6Bd0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128> /scsi_vhci/ssd@g60a9800043346859444a2d3670414a6b 13. c5t60A9800043346859444A2D3670414D30d0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128> /scsi_vhci/ssd@g60a9800043346859444a2d3670414d30 14. c5t60A9800043346859444A2D3670414F48d0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128> /scsi_vhci/ssd@g60a9800043346859444a2d3670414f48 15. c5t60A9800043346859444A2D3670415A70d0 <NETAPP-LUN-0.2 cyl 2046 alt 2 hd 16 sec 128> /scsi_vhci/ssd@g60a9800043346859444a2d3670415a70 Specify disk (enter its number): 15 selecting c5t60A9800043346859444A2D3670415A70d0 [disk formatted] ... Disk not labeled. Label it now? y </pre>

Step	Action
	Example 2: This example runs the fdisk command and then labels disk number 15 on an x86/x64 (AMD) system. You must run the fdisk command before you can label a LUN. <pre> \$Specify disk (enter its number): 15 selecting C4t60A9800043346859444A2D367047492Fd0 [disk formatted] FORMAT MENU: disk - select a disk type - select (define) a disk type partition - select (define) a partition table current - describe the current disk format - format and analyze the disk fdisk - run the fdisk program repair - repair a defective sector label - write label to the disk analyze - surface analysis defect - defect list management backup - search for backup labels verify - read and display labels save - save new disk/partition definitions inquiry - show vendor, product and revision volname - set 8-character volume name !<cmd> - execute <cmd>, then return quit format> label Please run fdisk first. format> fdisk No fdisk table exists. The default partition for the disk is: a 100% "SOLARIS System" partition Type "y" to accept the default partition, otherwise type "n" to edit the partition table. y format> label Ready to label disk, continue? y format> </pre>

Configuring volume management

If your configuration uses either the Solaris Volume Manager or the Veritas Volume Manager, you must configure the LUNs so they are under the volume manager control. See the documentation for the your volume manager for information on doing this.

Note

To determine which versions of VxVM are supported with MPxIO, see the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/>.

About this chapter

This chapter describes how to use the `sanlun` utility to display information about the LUNs, paths to the LUNs, and the Solaris HBA.

Topics in this chapter

Topics in this chapter include the following:

- ◆ [“Displaying host LUN information”](#) on page 38
- ◆ [“Displaying information about paths”](#) on page 40
- ◆ [“Displaying host HBA information”](#) on page 44

Displaying host LUN information

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

Step	Action
1	Ensure that you are logged in as root on the host.
2	Change to the /opt/NTAP/SANToolkit/bin directory: cd /opt/NTAP/SANToolkit/bin
3	Enter the <code>sanlun lun show</code> command to display LUN information. The command has the following format: sanlun lun show [-v] [-d <i>host device filename</i> <i>all</i> <i>storage system name</i> <i>storage system name:storage system pathname</i>] -p -v produces verbose output. -d is the device option and can be one of the following: ❖ <code>host device filename</code> is the special device file name for the disk on Solaris (which might represent a storage system LUN). ❖ <code>all</code> lists all storage system LUNs under /dev/rdsd. ❖ <code>storage system name</code> lists all storage system LUNs under /dev/rdsd on that storage system. ❖ <code>storage system name:storage system pathname</code> lists all storage system LUNs under /dev/rdsd that are connected to the storage system path name LUN on that storage system. -p provides information the target port group information. Result: The requested LUN information is displayed.

Step	Action
	Example: The following is an example of the output you see when you use the sanlun command. <pre># ./sanlun lun show -v -d /dev/rdsd/c7t60A980004334686568343655496C7931d0s2 filer: lun-pathname device filename adapter protocol lun size lun state filerX: /vol/vol0/lun0 /dev/rdsd/c7t60A980004334686568343655496C7931d0s2 qlc1 FCP 20g (21474836480) GOOD Serial number: C4eh46UIly1 Filer FCP nodename:500a098086b7f128 Filer FCP portname:500a098186b7f128 Filer adapter name: 0c Filer IP address: 10.60.236.33 192.168.01.210 Filer volume name:vol0 FSID:0x3407f128 Filer qtree name:/vol/vol0 ID:0x0 Filer snapshot name: ID:0x0 LUN partition table permits multiprotocol access: no why: there can be only one data partition LUN has valid label: yes</pre>

Displaying information about paths

Displaying path information

To display information about paths to the storage system, complete the following steps.

Step	Action
1	Ensure that you are logged in as root on the host.
2	Change to the /opt/NTAP/SANToolkit/bin directory: cd /opt/NTAP/SANToolkit/bin

Step	Action
3	At the host command line, enter the following command to display LUN information: <pre>sanlun lun show -p all -v</pre> -p provides information about the optimized (primary) and non-optimized (secondary) paths available to the LUN when you are using multipathing. Note_____ MPxIO makes the underlying paths transparent to the user. It only exposes a consolidated device such as /dev/rdisk/c7t60A980004334686568343655496C7931d0s2. As a result, sanlun cannot display the underlying multiple paths. Instead it displays the target port group information. _____ all lists all storage system LUNs under /dev/rdisk. -v turns on verbose mode. Because MPxIO provides multiple paths, sanlun selects one of the available paths to display. This is not a fixed path and could vary each time you execute the sanlun command with the -v option. Example: The following example uses the -p option to display information about the paths. <pre># sanlun lun show -p ONTAP_PATH: fas3020-rtp21:/vol/vol0/lun0 LUN: 0 LUN Size: 20g (21474836480) Host Device: /dev/rdisk/c7t60A980004334686568343655496C7931d0s2 LUN State: GOOD Filer_CF_State: Cluster Enabled Multipath_Policy: Native Multipath-provider: Sun Microsystems TPGS flag: 0x10Filer Status: TARGET PORT GROUP SUPPORT ENABLED Target Port Group : 0x1001 Target Port Group State: Active/optimized Vendor unique Identifier : 0x10 (2GB FC) Target Port Count: 0x2 Target Port ID : 0x1 Target Port ID : 0x2 Target Port Group : 0x3002 Target Port Group State: Active/non-optimized Vendor unique Identifier : 0x30 (2GB FC)</pre>

Step	Action
	Target Port Count: 0x2 Target Port ID : 0x101 Target Port ID : 0x102 Target Port Group : 0x3002 Target Port Group State: Active/non-optimized Vendor unique Identifier : 0x30 (2GB FC) Target Port Count: 0x2 Target Port ID : 0x101 Target Port ID : 0x102 ONTAP_PATH: fas3020-rtp21:/vol/vol1/lun1 LUN: 1 LUN Size: 20g (21474836480) Host Device: /dev/rdisk/c7t60A980004334686568343655496D5464d0s2 LUN State: GOOD Filer_CF_State: Cluster Enabled Multipath_Policy: Native Multipath-provider: Sun Microsystems TPGS flag: 0x10Filer Status: TARGET PORT GROUP SUPPORT ENABLED Target Port Group : 0x1001 Target Port Group State: Active/optimized Vendor unique Identifier : 0x10 (2GB FC) Target Port Count: 0x2 Target Port ID : 0x1 Target Port ID : 0x2 Target Port Group : 0x3002 Target Port Group State: Active/non-optimized Vendor unique Identifier : 0x30 (2GB FC) Target Port Count: 0x2 Target Port ID : 0x101 Target Port ID : 0x102

Interpreting `sanlun lun show -p` output

The `sanlun lun show -p` command provides the following information:

- ◆ LUN details, including its device name and size and its state.
- ◆ The host device name (i.e., the special device file name for the disk on Solaris that represents the LUN)
- ◆ The multipathing provider
- ◆ The target port group and its state, count, and ID. See information on ALUA in the *Data ONTAP® Block Access Management Guide for FCP*.
- ◆ The vendor unique identifier

Displaying host HBA information

Displaying host HBA information To manage the host HBA information, complete the following steps.

Step	Action
1	Ensure that you are logged in as root on the host.
2	Change to the /opt/NTAP/SANToolkit/bin directory: <code>cd /opt/NTAP/SANToolkit/bin</code>
3	At the host command line, enter the following command to display host HBA information: <pre>./sanlun fcp show adapter[-c] [-v] [adapter name all]</pre> -c option produces configuration instructions. -v option produces verbose output. all lists information for all FC adapters. adapter name lists information for a specified adapter. Result: The FC adapter information is displayed. Example: The following command line displays information about the adapter. <pre># sanlun fcp show adapter -v</pre> <pre>adapter name: qlc0 WWPN: 21000003ba16dec7 WWNN: 20000003ba16dec7 driver name: 20060630-2.16 model: 2200 model description: 2200 serial number: Not Available hardware version: Not Available driver version: 20060630-2.16 firmware version: 2.1.144 Number of ports: 1 port type: Private Loop port state: Operational supported speed: 1 GBit/sec negotiated speed: 1 GBit/sec OS device name: /dev/cfg/c1</pre>

Step	Action
	adapter name: qlc1 WWPN: 210000e08b88b838 WWNN: 200000e08b88b838 driver name: 20060630-2.16 model: QLA2462 model description: Qlogic PCI-X 2.0 to 4Gb FC, Dual Channel serial number: Not Available hardware version: Not Available driver version: 20060630-2.16 firmware version: 4.0.23 Number of ports: 1 of 2 port type: Fabric port state: Operational supported speed: 1 GBit/sec, 2 GBit/sec, 4 GBit/sec negotiated speed: 4 GBit/sec OS device name: /dev/cfg/c2 adapter name: qlc2 WWPN: 210100e08ba8b838 WWNN: 200100e08ba8b838 driver name: 20060630-2.16 model: QLA2462 model description: Qlogic PCI-X 2.0 to 4Gb FC, Dual Channel serial number: Not Available hardware version: Not Available driver version: 20060630-2.16 firmware version: 4.0.23 Number of ports: 2 of 2 port type: Fabric port state: Operational supported speed: 1 GBit/sec, 2 GBit/sec, 4 GBit/sec negotiated speed: 4 GBit/sec OS device name: /dev/cfg/c3

About this chapter

This appendix describes of what you need to do to configure SAN booting on an Solaris host.

Note

NetApp qualifies solutions and components on an ongoing basis. To verify that SAN booting is supported in your configuration, see the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/>.

Topics in this appendix

Topics in this appendix include the following:

- ◆ “[SAN boot overview](#)” on page 48
- ◆ “[Configuration overview](#)” on page 49
- ◆ “[Performing a direct installation](#)” on page 50
- ◆ “[File system dump, restore for a SPARC system without MPxIO](#)” on page 51
- ◆ “[File system dump, restore for an x86/x64 system with MPxIO](#)” on page 55
- ◆ “[File system dump, restore for an x86/x64 system without MPxIO](#)” on page 59

SAN boot overview

What is SAN boot

SAN boot is using a SAN-attached disk, like a LUN, as a boot device for a Solaris host. Configuring SAN boot allows you to do the following:

- ◆ Remove the hard drives from your servers and use the SAN for your boot needs, thereby eliminating the cost associated with maintaining and servicing hard drives
- ◆ Use the SAN for both storage and boot needs, thereby consolidating and centralizing storage

Contents of this appendix

This appendix provides steps for configuring a SAN boot LUN and installing a new OS image on it. You can apply these steps to most configurations. The example in this appendix uses a Solaris host to configure a SAN boot LUN and install a new OS image onto it. The procedure described here is one method for creating a bootable LUN. You can apply this procedure to most configurations.

This appendix does not describe other examples of bootable LUNs, such as configurations that boot multiple volumes or use diskless servers.

Refer to Solaris documentation for details about additional configuration methods.

Sun documentation for this procedure

For complete details on the procedures that follow, see Sun's document *Sun StorEdge SAN Foundation Software 4.4 Configuration Guide*, which is available in PDF format on the Sun site.

Make sure, though, that you use the FCode specified in the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/>.

Configuration overview

Prerequisites

The procedures and examples in this chapter assume the following:

- ◆ The FC Solaris Host Utilities software has been installed and the host and storage system are configured properly and use software and firmware that is supported by the Host Utilities.
- ◆ The host operating system is installed on a local disk and uses a UFS file system.

For information about host, storage system and firmware versions, refer to the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>.

Special note about device names

To get the correct device name to allow for a successful boot, use the device path as reported by the OpenBoot PROM (OBP). Execute the `show-disks` command to display this name. This is because the OBP name is not always the same as the Solaris driver name.

The examples in this document are from tests performed internally and worked when performed. NetApp, however, has seen cases where you needed to use different device names. For example, where the QLogic device name needed to be `disk@...` instead of `ssd@...`. Using the `show-disks` command produces the device name you need to use when creating a SAN boot LUN.

Note

OpenBoot firmware is downloaded and installed on the HBA. See your HBA documentation.

Examples in this appendix

This appendix provides examples of copying data from an existing, locally booted server. The examples show how to perform this task using:

- ◆ A direct installation
- ◆ A file system dump and restore for a SPARC system with MPxIO disabled
- ◆ A file system dump and restore for an x86/x64 (AMD) system with MPxIO disabled
- ◆ A file system dump and restore for an x86/x64 (AMD) system with MPxIO enabled

Performing a direct installation

Options for setting up SAN booting

There are two ways to set up SAN booting:

- ◆ Copying the data from a locally booted device to a SAN device. Then reconfigure the host to boot to the SAN device. On x86/x64 (AMD) systems, using this method means you do not have to re-setup a currently configured host and its MPxIO settings.
- ◆ Installing the operating system directly on the SAN device. Once you do this, you must configure the SAN boot LUN on the storage system and map it to the host.

Performing a direct install

To perform a direct install, run the Solaris Installer and choose the SAN device as your install device.

File system dump, restore for a SPARC system without MPxIO

**SPARC systems
without MPxIO:
Copying data from
locally booted
server**

The following steps show you how to perform a file system dump and restore for a SPARC system that has MPxIO disabled. If you have a SPARC system and you want to copy data from a locally booted server, complete the following steps.

Step	Action
1	If MPxIO is enabled, disable it: 1. Set the mpxio-disable flag to yes in /kernel/drv/fp.conf. 2. Execute the <code>stmsboot -d</code> command.
2	Use the <code>mount</code> command to identify the current boot device. Example: The following mounts the current boot device. <pre># mount / on /dev/dsk/c0t0d0s0 read/write/setuid/devices/intr/largefiles/logging/xattr/onerror=panic/dev=8000 10 on Tue Jan 2 07:44:48 2007</pre>
3	Configure the LUN for ◆ The root file system ◆ The file systems that will be copied to the bootable LUN. You may want to create slices and place the file systems on the slices. In addition, you might want to set up the swap slice and slices for the metadata database replicas. Use the <code>format</code> command to choose the LUN. Write down the device path for the LUN so you can refer to it later. Example: In this example, you first run the <code>format</code> command. Based on its output, you determine that you want number 34, which has the device path <code>/pci@1f,2000/QLGC,qlc@1/fp@0,0/ssd@w500a09838350b481,20</code>. <pre>34. c1t500A09838350B481d32 <NETAPP-LUN-0.2 cyl 5118 alt 2 hd 16 sec 512> /pci@1f,2000/QLGC,qlc@1/fp@0,0/ssd@w500a09838350b481,20</pre>

Step	Action
4	Install the bootblock on the new bootable LUN by using the <code>installboot</code> command: <pre>installboot /usr/platform/<platform>/lib/fs/ufs/bootblk /dev/rdisk/<boot lun></pre> Example: The following command line installs the bootlock on the boot LUN c1t500A09838350B481d32s0. <pre>installboot /usr/platform/'uname -a'/lib/fs/ufs/bootblk /dev/rdisk/c1t500A09838350B481d32s0</pre>
5	Create the SAN file system that you will dump the current file system to. Example: The following command line creates a new file system. <pre>newfs /dev/dsk/c1t500A09838350B481d32s0</pre>
6	Mount the file system that you will use when you copy the boot data. Example: The following example mounts the SAN file system. <pre>mount /dev/dsk/c1t500A09838350B481d32s0 /mnt/boot lun</pre>
7	Create the required directory structure on the bootable LUN and copy the boot data. Enter: <pre>ufsdump 0f - <source_boot_device> cd/ <mntpoint of bootable_ lun>; ufsrestore rf -)</pre> Note_____ If your configuration boots off more than one device, you must create and configure a bootable LUN that matches each boot device on the host. If you are copying non-root boot partitions, see the Sun's document Sun StorEdge SAN Foundation Software 4.4 Configuration Guide for instructions. _____ Example: The following example copies the information from c0t0d0s0. <pre># ufsdump 0f - /dev/rdisk/c0t0d0s0 (cd /mnt/bootlun; ufsrestore rf -)</pre>

Step	Action																																																																																																		
8	Edit the vfstab file to on the SAN file system. Change the swap, root, and file systems in the vfstab file to show the boot device instead of the local device. One way to do this is to edit the file using vi: <pre>cd /mnt/bootlun/etc/ vi vfstab</pre> Example: The following shows the vfstab entry for the bootable LUN. <table><tr><td>#device</td><td>device</td><td>mount</td><td>FS</td><td>fsck</td><td>mount</td><td>mount</td></tr><tr><td>#to mount</td><td>to fsck</td><td>point</td><td>type</td><td>pass</td><td>at boot</td><td>options</td></tr><tr><td>#</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>fd</td><td>-</td><td>/dev/fd fd</td><td>-</td><td>no</td><td>-</td><td></td></tr><tr><td>/proc</td><td>-</td><td>/proc proc</td><td>-</td><td>no</td><td>-</td><td></td></tr><tr><td>/dev/dsk/c1t500A09838350B481d32s1</td><td></td><td></td><td>-</td><td>-</td><td>swap</td><td>- no</td></tr><tr><td>/dev/dsk/c1t500A09838350B481d32s0</td><td></td><td></td><td>/dev/rdsk/c1t500A09838350B481d32s0</td><td></td><td></td><td></td></tr><tr><td>/</td><td>ufs</td><td>1</td><td>no</td><td>-</td><td></td><td></td></tr><tr><td>/dev/dsk/c1t500A09838350B481d32s6</td><td></td><td></td><td>/dev/rdsk/c1t500A09838350B481d32s6</td><td></td><td></td><td></td></tr><tr><td>/globaldevices</td><td>ufs</td><td>2</td><td>yes</td><td>-</td><td></td><td></td></tr><tr><td>/devices</td><td>-</td><td>/devices</td><td>devfs</td><td>-</td><td>no</td><td>-</td></tr><tr><td>ctfs</td><td>-</td><td>/system/contract</td><td>ctfs</td><td>-</td><td>no</td><td>-</td></tr><tr><td>objfs</td><td>-</td><td>/system/object</td><td>objfs</td><td>-</td><td>no</td><td>-</td></tr><tr><td>swap</td><td>-</td><td>/tmp tmpfs</td><td>-</td><td>yes</td><td>-</td><td></td></tr></table>	#device	device	mount	FS	fsck	mount	mount	#to mount	to fsck	point	type	pass	at boot	options	#							fd	-	/dev/fd fd	-	no	-		/proc	-	/proc proc	-	no	-		/dev/dsk/c1t500A09838350B481d32s1			-	-	swap	- no	/dev/dsk/c1t500A09838350B481d32s0			/dev/rdsk/c1t500A09838350B481d32s0				/	ufs	1	no	-			/dev/dsk/c1t500A09838350B481d32s6			/dev/rdsk/c1t500A09838350B481d32s6				/globaldevices	ufs	2	yes	-			/devices	-	/devices	devfs	-	no	-	ctfs	-	/system/contract	ctfs	-	no	-	objfs	-	/system/object	objfs	-	no	-	swap	-	/tmp tmpfs	-	yes	-	
#device	device	mount	FS	fsck	mount	mount																																																																																													
#to mount	to fsck	point	type	pass	at boot	options																																																																																													
#																																																																																																			
fd	-	/dev/fd fd	-	no	-																																																																																														
/proc	-	/proc proc	-	no	-																																																																																														
/dev/dsk/c1t500A09838350B481d32s1			-	-	swap	- no																																																																																													
/dev/dsk/c1t500A09838350B481d32s0			/dev/rdsk/c1t500A09838350B481d32s0																																																																																																
/	ufs	1	no	-																																																																																															
/dev/dsk/c1t500A09838350B481d32s6			/dev/rdsk/c1t500A09838350B481d32s6																																																																																																
/globaldevices	ufs	2	yes	-																																																																																															
/devices	-	/devices	devfs	-	no	-																																																																																													
ctfs	-	/system/contract	ctfs	-	no	-																																																																																													
objfs	-	/system/object	objfs	-	no	-																																																																																													
swap	-	/tmp tmpfs	-	yes	-																																																																																														
9	Umount the file system on the bootable LUN. <pre>umount /mnt/bootlun</pre>																																																																																																		
10	Using the device name you wrote down in Step 3, boot to the bootable LUN. Two things to keep in mind when you do this: ◆ You can specify the slice of the bootable LUN by using ":a" for slice zero, ":b" for slice 1, and so on. ◆ If you are using Emulex HBAs or StorageTek HBAs based on Emulex technology, replace the "ssd" part of the string with "disk". Examples: The following examples show command lines for QLogic HBAs and Emulex HBAs. Qlogic: <pre># boot /pci@1f,2000/QLGC,qlc@1/fp@0,0/ssd@w500a09838350b481,20:a</pre> Emulex: <pre># boot /pci@1d,700000/SUNW,emlxs@2/fp@0,0/disk@w500a09818350b481,20:a</pre>																																																																																																		

Step	Action
11	Verify that you booted to the correct LUN by using the <code>df -k</code> command. In addition, configure the system crash dump for the new bootable LUN boot device using the <code>dumpadm -d</code> command: <pre>dumpadm -d /dev/rdisk/c1t500A09838350B481d32s1</pre>

File system dump, restore for an x86/x64 system with MPxIO

x86/x64 (AMD) with
MPxIO systems:
Copying data from
locally booted
server

If you have an x86/x64 (AMD) system that is using MPxIO and you want to copy data from a locally booted server, complete the following steps.

Step	Action
1	Use the <code>mount</code> command to identify the current boot device. Example: The following mounts the current boot device. <pre># mount / on /dev/dsk/c1d0s0 read/write/setuid/devices/intr/largefiles/logging/xattr/onerror=panic/dev=1980 000 on Tue Jan 2 12:50:22 2007</pre>
2	Configure the LUN for ◆ The root file system ◆ The file systems that will be copied to the bootable LUN. You may want to create slices and place the file systems on the slices. In addition, you might want to set up the swap slice, <code>/var</code>, and other file systems. Use the <code>format</code> command to choose the LUN. Write down the device path for the LUN so you can refer to it later. Example: In this example, you first run the <code>format</code> command. Based on its output, you determine that you want number 33, which has the device path <code>/scsi_vhci/disk@g60a9800056716436636f393164695969</code>. <pre>33. c4t60A9800056716436636F393164695969d0 <DEFAULT cyl 9787 alt 2 hd 255 sec 63> /scsi_vhci/disk@g60a9800056716436636f393164695969</pre>
3	Create the SAN file system that you will dump the current file system to. Example: The following command line creates a new file system. <pre>newfs /dev/dsk/c4t60A9800056716436636F393164695969d0s0</pre>

Step	Action
4	Mount the file system that you will use when you copy the boot data. Example: The following example mounts the file system. <pre># mount /dev/dsk/c4t60A9800056716436636F393164695969d0s0 /mnt/bootlun</pre>
5	Create the required directory structure on the bootable LUN and copy the boot data. Enter: <pre>ufsdump 0f - <source_boot_device> cd/ <mntpoint of bootable lun>; ufsrestore rf -)</pre> Note_____ If your configuration boots off of more than one device, you must create and configure a bootable LUN that matches each boot device on the host. If you are copying non-root boot partitions, see the Sun's document <i>Sun StorEdge SAN Foundation Software 4.4 Configuration Guide</i> for instructions. _____ Example: The following example copies the information from c1d0s0. <pre># ufsdump 0f - /dev/rdisk/c1d0s0 (cd /mnt/bootlun; ufsrestore rf -)</pre>
6	Edit the vfstab file on the SAN file system. Change the swap, root, and file systems in the vfstab file to show the boot device instead of the local device. One way to do this is to edit the file using vi: <pre>cd /mnt/bootlun/etc/ vi vfstab</pre> Example: The following shows the vfstab entry for the bootable LUN. <pre>#device device mount FS fsck mount mount #to mount to fsck point type pass at boot options # fd - /dev/fd fd - no - /proc - /proc proc - no - /dev/dsk/c4t60A9800056716436636F393164695969d0s1 - - swap - no - /dev/dsk/c4t60A9800056716436636F393164695969d0s0/dev/rdisk/ c4t60A9800056716436636F393164695969d0s0 / ufs 1 no - /dev/dsk/c4t60A9800056716436636F393164695969d0s6/dev/rdisk/c4t60A98000567164366 36F393164695969d0s6 /globaldevices ufs 2 yes - /devices - /devices devfs - no - ctfs - /system/contract ctfs - no - objfs - /system/object objfs - no - swap - /tmp tmpfs - yes -</pre>

Step	Action
7	Modify the /boot/solaris/bootenv.rc file to reflect the new bootpath parameter. Use the device name noted above to replace the bootpath. To identify the boot slices, use "...:a" at the end if your boot slice is slice 0, use "...:b" for slice1, and so on. Note_____ You can also see the device path by executing a list command: <pre>ls -al /dev/rdisk/c4t60A9800056716436636F393164695969d0s2</pre> Example: The following is an example of a modified file. <pre>... setprop bootpath /scsi_vhci/disk@g60a9800056716436636f393164695969:a ... # # Copyright 2005 Sun Microsystems, Inc. All rights reserved. # Use is subject to license terms. # #ident "@(#)bootenv.rc 1.32 05/09/01 SMI" # # bootenv.rc -- boot "environment variables" # setprop kbd-type US-English setprop ata-dma-enabled 1 setprop atapi-cd-dma-enabled 0 setprop ttyb-rtts-dtr-off false setprop ttyb-ignore-cd true setprop ttya-rtts-dtr-off false setprop ttya-ignore-cd true setprop ttyb-mode 9600,8,n,1,- setprop ttya-mode 9600,8,n,1,- setprop lba-access-ok 1 setprop prealloc-chunk-size 0x2000 setprop bootpath /scsi_vhci/disk@g60a9800056716436636f393164695969:a setprop console 'ttya'</pre>
8	Install GRUB on the new file systems. <pre>cd /boot/grub /sbin/installgrub stage1 stage2 /dev/rdisk/c3t500A09818350B481d32s0</pre> Note_____ The GRUB configuration may indicate the wrong partition information for the bootable LUN. It may indicate that the boot slice is slice 1. If that is the case, you may need to change it to slice0 in the menu.lst file.

Step	Action
9	Update the GRUB bootloader: bootadm update-archive -R /mnt/boot lun
10	Umount the file system on the bootable LUN. umount /mnt/boot lun
11	Shut down the system. sync;halt
12	Configure your HBA's bios to boot to the bootable LUN. Then configure your x86/x64 (AMD) system to boot to the HBA. See the documentation for your server and HBA for more details.

File system dump, restore for an x86/x64 system without MPxIO

x86/x64 (AMD) without MPxIO systems: Copying data from locally booted server

If you have an x86/x64 (AMD) system that is not using MPxIO and you want to copy data from a locally booted server, complete the following steps.

Step	Action
1	Use the <code>mount</code> command to identify the current boot device. Example: The following mounts the current boot device. <pre># mount / on /dev/dsk/c1d0s0 read/write/setuid/devices/intr/largefiles/logging/xattr/onerror=panic/dev=1980 000 on Tue Jan 2 12:50:22 2007</pre>
2	Configure the LUN for ◆ The root file system ◆ The file systems that will be copied to the bootable LUN. You may want to create slices and place the file systems on the slices. In addition, you might want to set up the swap slice, <code>/var</code>, and other file systems. Use the <code>format</code> command to choose the LUN. Write down the device path for the LUN so you can refer to it later. Example: This example uses a QLogic HBA. You first run the <code>format</code> command. Based on its output, you determine that you want number 33, which has the device path <code>/pci@0,0/pci10de,5d@e/pci1077,138@0,1/fp@0,0/disk@w500a09818350b481,20</code>. <pre>33. c3t500A09818350B481d32 <DEFAULT cyl 9787 alt 2 hd 255 sec 63> /pci@0,0/pci10de,5d@e/pci1077,138@0,1/fp@0,0/disk@w500a09818350b481,20</pre> Note _____ Emulex HBAs have "fc" in the device name. QLogic HBAs have "fp" in the device name. _____
3	Create the SAN file system that you will dump the current file system to. Example: The following command line creates a new file system. <pre>newfs /dev/dsk/c3t500A09818350B481d32s0</pre>

Step	Action																																																																																																																																																																																						
4	Mount the file system that you will use when you copy the boot data. Example: The following example mounts the file system. <pre>mount /dev/dsk/c3t500A09818350B481d32s0 /mnt/bootlun</pre>																																																																																																																																																																																						
5	Create the required directory structure on the bootable LUN and copy the boot data. Enter: <pre>ufsdump 0f - <source_boot_device> cd/ <mntpoint of bootable_ lun>; ufsrestore rf -)</pre> Note_____ If your configuration boots off of more than one device, you must create and configure a bootable LUN that matches each boot device on the host. If you are copying non-root boot partitions, see the Sun’s document Sun StorEdge SAN Foundation Software 4.4 Configuration Guide for instructions. _____ Example: The following example copies the information from c0t0d0s0. <pre>ufsdump 0f - /dev/rdsk/c0t0d0s0 (cd /mnt/bootlun; ufsrestore rf -)</pre>																																																																																																																																																																																						
6	Edit the vfstab file on the SAN file system. Change the swap, root, and file systems in the vfstab file to show the boot device instead of the local device. One way to do this is to edit the file using vi: <pre># cd /mnt/etc/ # vi vfstab</pre> Example: The following shows the vfstab entry for the bootable LUN. <table><tr><td>#device</td><td></td><td>device</td><td></td><td>mount</td><td></td><td>FS</td><td></td><td>fsck</td><td></td><td>mount</td><td></td><td>mount</td></tr><tr><td>#to mount</td><td></td><td>to fsck</td><td></td><td>point</td><td></td><td>type</td><td></td><td>pass</td><td></td><td>at boot</td><td></td><td>options</td></tr><tr><td>#</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>fd</td><td>-</td><td>/dev/fd fd</td><td>-</td><td>no</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>/proc</td><td>-</td><td>/proc proc</td><td>-</td><td>no</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>/dev/dsk/c3t500A09818350B481d32s1</td><td>-</td><td></td><td>-</td><td></td><td>swap</td><td></td><td>-</td><td></td><td>no</td><td></td><td></td><td>-</td></tr><tr><td>/dev/dsk/c3t500A09818350B481d32s0</td><td></td><td>/dev/rdsk/c3t500A09818350B481d32s0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>/</td><td></td></tr><tr><td>ufs</td><td>1</td><td>no</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>/dev/dsk/c3t500A09818350B481d32s6</td><td></td><td>/dev/rdsk/c3t500A09818350B481d32s6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>/globaldevices</td><td>ufs</td><td>2</td><td>yes</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>/devices</td><td>-</td><td>/devices</td><td></td><td>devfs</td><td>-</td><td></td><td>no</td><td></td><td>-</td><td></td><td></td><td></td></tr><tr><td>ctfs</td><td>-</td><td>/system/contract</td><td></td><td>ctfs</td><td>-</td><td></td><td>no</td><td></td><td>-</td><td></td><td></td><td></td></tr><tr><td>objfs</td><td>-</td><td>/system/object</td><td>objfs</td><td>-</td><td>no</td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>swap</td><td>-</td><td>/tmp tmpfs</td><td>-</td><td>yes</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	#device		device		mount		FS		fsck		mount		mount	#to mount		to fsck		point		type		pass		at boot		options	#													fd	-	/dev/fd fd	-	no	-								/proc	-	/proc proc	-	no	-								/dev/dsk/c3t500A09818350B481d32s1	-		-		swap		-		no			-	/dev/dsk/c3t500A09818350B481d32s0		/dev/rdsk/c3t500A09818350B481d32s0									/		ufs	1	no	-										/dev/dsk/c3t500A09818350B481d32s6		/dev/rdsk/c3t500A09818350B481d32s6											/globaldevices	ufs	2	yes	-									/devices	-	/devices		devfs	-		no		-				ctfs	-	/system/contract		ctfs	-		no		-				objfs	-	/system/object	objfs	-	no		-						swap	-	/tmp tmpfs	-	yes	-							
#device		device		mount		FS		fsck		mount		mount																																																																																																																																																																											
#to mount		to fsck		point		type		pass		at boot		options																																																																																																																																																																											
#																																																																																																																																																																																							
fd	-	/dev/fd fd	-	no	-																																																																																																																																																																																		
/proc	-	/proc proc	-	no	-																																																																																																																																																																																		
/dev/dsk/c3t500A09818350B481d32s1	-		-		swap		-		no			-																																																																																																																																																																											
/dev/dsk/c3t500A09818350B481d32s0		/dev/rdsk/c3t500A09818350B481d32s0									/																																																																																																																																																																												
ufs	1	no	-																																																																																																																																																																																				
/dev/dsk/c3t500A09818350B481d32s6		/dev/rdsk/c3t500A09818350B481d32s6																																																																																																																																																																																					
/globaldevices	ufs	2	yes	-																																																																																																																																																																																			
/devices	-	/devices		devfs	-		no		-																																																																																																																																																																														
ctfs	-	/system/contract		ctfs	-		no		-																																																																																																																																																																														
objfs	-	/system/object	objfs	-	no		-																																																																																																																																																																																
swap	-	/tmp tmpfs	-	yes	-																																																																																																																																																																																		

Step	Action
7	Modify the /boot/solaris/bootenv.rc file to reflect the new bootpath parameter. Use the device name noted above to replace the bootpath. To identify the boot slices, use "...:a" at the end if your boot slice is slice 0, use "...:b" for slice1, and so on. Note_____ You can also see the device path by executing a list command: <pre>ls -al /dev/rdisk/c3t500A09818350B481d32s2</pre> _____ Example: The following sets the bootpath parameter. <pre>... setprop bootpath /pci@0,0/pci10de,5d@e/pci1077,138@0,1/fp@0,0/disk@w500a09818350b481,20:a ...</pre>
8	Install GRUB on the new file systems. <pre>cd /boot/grub /sbin/installgrub stage1 stage2 /dev/rdisk/c3t500A09818350B481d32s2</pre> Note_____ The GRUB configuration may indicate the wrong partition information for the bootable LUN. It may indicate that the boot slice is slice 1. If that is the case, you need to change it to slice0 in the menu.lst file. _____
9	Update the GRUB bootloader: <pre>bootadm update-archive -R /mnt/bootlun</pre>
10	Umount the file system on the bootable LUN. <pre>umount /mnt/bootlun</pre>
11	Shut down the system. <pre>sync;halt</pre>
12	Configure your HBA's bios to boot to the bootable LUN. Then configure your x86/x64 (AMD) system to boot to the HBA.

About this appendix This appendix provides tips and troubleshooting information to help you as you use the FC Solaris Host Utilities. This appendix contains the following:

- ◆ Suggestions for checking your system.
- ◆ Information about possible problems and how to handle them.
- ◆ Diagnostic tools that you can use to gather information about your system.

Topics in this appendix

This chapter discusses the following topics:

- ◆ [“Confirming that your system is correctly set up”](#) on page 64
- ◆ [“Using Diagnostic Utilities”](#) on page 74
- ◆ [“Collecting storage system information”](#) on page 75
- ◆ [“Collecting Solaris information”](#) on page 77
- ◆ [“Collecting switch information”](#) on page 78
- ◆ [“Known issues with the Host Utilities”](#) on page 80

Confirming that your system is correctly set up

About the sections that follow

If you have any problems with the Host Utilities, you should make sure your system setup is correct.

The information in the sections that follow helps you check your system setup. As you go through it, keep the following in mind:

- ◆ As an experienced Solaris user, you may already know these commands. This is just a quick refresher of some of the key areas to check to avoid having problems.
For more information on any of the Solaris commands, see the man pages and operating system documentation.
For more information on the Data ONTAP commands, see the Data ONTAP documentation, in particular, the FC and iSCSI Block Access Guide.
- ◆ You perform some of these checks from the host and others from the storage system. In some cases, you must have the Host Utilities SAN Toolkit installed before you perform the check. For example, the SAN Toolkit contains both the `basic_config` command and the `san lun` command.
- ◆ To make sure you have the current version of the system components, see the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/l>. Support for new components is added on an on-going basis. This online document contains a complete list of supported HBAs, platforms, applications, and drivers. These pages are updated on a regular basis to ensure that they always have information on the most current components.

Note

The examples that follow were accurate at the time this document was produced. They are not intended to show all the options available.

Remove MPxIO from a support installation

If you had installed an iSCSI Solaris Support Kit or earlier version of the Host Utilities on your host, you must run `mpxio_set -d` before you configure the FC Solaris Host Utilities.

```
# mpxio_set -d
```

Check the version of your host operating system

Make sure you have the correct version of the operating system.

Use the `cat /etc/release` command to display information about your operating system.

Example: The following is an example of checking your operating system version on a SPARC system.

```
$ cat /etc/release
Solaris 10 11/06 s10s_u3wos_10 SPARC
Copyright 2006 Sun Microsystems, Inc. All Rights Reserved.
Use is subject to license terms.
Assembled 14 November 2006
```

This example checks the operating system version on an x86/x64 (AMD) system:

```
$ cat /etc/release
Solaris 10 11/06 s10x_u3wos_10 X86
Copyright 2006 Sun Microsystems, Inc. All Rights Reserved.
Use is subject to license terms.
Assembled 14 November 2006
```

Check the HBA

Supported HBAs should be installed before you install the Host Utilities. If you want to confirm that you have the supported HBAs, install the Host Utilities SAN Toolkit software package. Then use its `sanlun` command to display information about HBAs on your system.

You can also use the `fcinfo hba-port` command to get information about the HBA.

Example: The following is an example of checking your HBA. This example uses a QLogic HBA.

```
# sanlun fcp show adapter -v
adapter name:      qlc0
WWPN:              21000003ba16dec7
WWNN:              20000003ba16dec7
driver name:       20060630-2.16
model:             2200
model description: 2200
serial number:     Not Available
hardware version:  Not Available
driver version:    20060630-2.16
firmware version:  2.1.144
Number of ports:   1
port type:         Private Loop
port state:        Operational
supported speed:   1 GBit/sec
negotiated speed:  1 GBit/sec
OS device name:    /dev/cfg/c1
```

```
adapter name:      qlc1
WWPN:              210000e08b88b838
WWNN:              200000e08b88b838
driver name:       20060630-2.16
model:             QLA2462
model description: Qlogic PCI-X 2.0 to 4Gb FC, Dual Channel
serial number:     Not Available
hardware version:  Not Available
driver version:    20060630-2.16
firmware version:  4.0.23
Number of ports:   1 of 2
port type:         Fabric
port state:        Operational
supported speed:   1 GBit/sec, 2 GBit/sec, 4 GBit/sec
negotiated speed:  4 GBit/sec
OS device name:    /dev/cfg/c2
```

```
adapter name:      qlc2
WWPN:              210100e08ba8b838
WWNN:              200100e08ba8b838
driver name:       20060630-2.16
model:             QLA2462
model description: Qlogic PCI-X 2.0 to 4Gb FC, Dual Channel
serial number:     Not Available
hardware version:  Not Available
driver version:    20060630-2.16
firmware version:  4.0.23
Number of ports:   2 of 2
port type:         Fabric
port state:        Operational
supported speed:   1 GBit/sec, 2 GBit/sec, 4 GBit/sec
negotiated speed:  4 GBit/sec
OS device name:    /dev/cfg/c3
```

Enable MPxIO on SPARC systems

You must manually enable MPxIO on SPARC systems. You can use the `stmsboot -e` to enable MPxIO, but keep in mind the command causes a system reboot.

Note

On x86/64 (AMD) systems, MPxIO is enabled by default.

Example: Enter the following command to enable MPxIO:

```
# stmsboot -e
```

Result: This command enables MPxIO by setting the `mpxio_disable=no` option in the `fp.conf` file. It updates `/etc/vfstab` and causes the system to reboot.

Check the Solaris Volume Manager

This version of the Host Utilities supports the Solaris Volume Manager (SVM). To quickly check the condition of SVM volumes, enter the following command:

```
# metastat -a
```

In a Sun Cluster environment, metaset and their volumes are only displayed on the node that is controlling the storage.

See your Solaris documentation for more information on working with the SVM.

Check the Veritas Volume Manager

This version of the Host Utilities supports the Veritas Volume Manager (VxVM).

Note

To determine which versions of VxVM are supported with MPxIO, see the NetApp Interoperability Matrix, at <http://now.netapp.com/matrix/mtx/login.do/>.

To quickly check the VxVM disks, enter the `vxdisk list` command:

```
# vxdisk list
DEVICE          TYPE          DISK    GROUP    STATUS
Disk_0          auto:none     -       -        online invalid
Disk_1          auto:none     -       -        online invalid
FAS30200_0      auto:cdsdisk  disk0   dg       online
FAS30200_1      auto:cdsdisk  disk1   dg       online
FAS30200_2      auto:cdsdisk  disk2   dg       online
FAS30200_3      auto:cdsdisk  disk3   dg       online
```

To view volume information, use the `vxprint` command:

```
# vxprint -g scdg
```

TY	NAME	ASSOC	KSTATE	LENGTH	PLOFFS	STATE	TUTIL0
PUTIL0							
dg	scdg	scdg	-	-	-	-	-
dm	disk00	Disk_49	-	10475520	-	-	-
dm	disk01	Disk_33	-	10475520	-	-	-
dm	disk02	Disk_51	-	10475520	-	-	-
dm	disk03	Disk_54	-	10475520	-	-	-
dm	disk04	Disk_17	-	10475520	-	-	-
dm	disk05	Disk_39	-	10475520	-	-	-
dm	disk06	Disk_58	-	10475520	-	-	-
dm	disk07	Disk_24	-	10475520	-	-	-
dm	disk08	Disk_11	-	10475520	-	-	-
dm	disk09	Disk_34	-	10475520	-	-	-
dm	disk10	Disk_35	-	10475520	-	-	-
dm	disk11	Disk_29	-	10475520	-	-	-
dm	disk12	Disk_53	-	10475520	-	-	-
dm	disk13	Disk_2	-	10475520	-	-	-
dm	disk14	Disk_12	-	10475520	-	-	-
dm	disk15	Disk_5	-	10475520	-	-	-
dm	disk16	Disk_44	-	10475520	-	-	-
dm	disk17	Disk_32	-	10475520	-	-	-
dm	disk18	Disk_10	-	10475520	-	-	-
dm	disk19	Disk_27	-	10475520	-	-	-
v	raw_vol	fsgen	ENABLED	209510400	-	ACTIVE	-
pl	raw_vol-01	raw_vol	ENABLED	209510400	-	ACTIVE	-
sd	disk00-01	raw_vol-01	ENABLED	10475520	0	-	-
sd	disk05-01	raw_vol-01	ENABLED	10475520	10475520	-	-
sd	disk10-01	raw_vol-01	ENABLED	10475520	20951040	-	-
sd	disk15-01	raw_vol-01	ENABLED	10475520	31426560	-	-
sd	disk01-01	raw_vol-01	ENABLED	10475520	0	-	-
sd	disk06-01	raw_vol-01	ENABLED	10475520	10475520	-	-
sd	disk11-01	raw_vol-01	ENABLED	10475520	20951040	-	-
sd	disk16-01	raw_vol-01	ENABLED	10475520	31426560	-	-
sd	disk02-01	raw_vol-01	ENABLED	10475520	0	-	-
sd	disk07-01	raw_vol-01	ENABLED	10475520	10475520	-	-
sd	disk12-01	raw_vol-01	ENABLED	10475520	20951040	-	-
sd	disk17-01	raw_vol-01	ENABLED	10475520	31426560	-	-
sd	disk03-01	raw_vol-01	ENABLED	10475520	0	-	-
sd	disk08-01	raw_vol-01	ENABLED	10475520	10475520	-	-
sd	disk13-01	raw_vol-01	ENABLED	10475520	20951040	-	-
sd	disk18-01	raw_vol-01	ENABLED	10475520	31426560	-	-
sd	disk04-01	raw_vol-01	ENABLED	10475520	0	-	-
sd	disk09-01	raw_vol-01	ENABLED	10475520	10475520	-	-
sd	disk14-01	raw_vol-01	ENABLED	10475520	20951040	-	-
sd	disk19-01	raw_vol-01	ENABLED	10475520	31426560	-	-

See your Veritas documentation for more information on working with the VxVM.

Check settings in `ssd.conf` or `sd.conf`

When you run the `basic_config -ssd_set` command on a SPARC system, it modifies the `/kernel/drv/ssd.conf` file.

On an x86/x64 (AMD) system you run the `basic_config -sd_set` command, which modifies the `sd.conf` file.

See “[Using basic_config to configure system parameters](#)” on page 18 for information on the required settings.

To confirm the file was correctly set up, check it to ensure that it contains the following:

```
ssd-config-list="NETAPP LUN", "netapp-ssd-config";
netapp-ssd-
config=1,0x9007,64,30,30,0,0,0,0,0,0,0,0,30,0,0,8,0,0;
```

Note

On an x86/x64 (AMD) system, the display reads “sd” instead of “ssd”.

Check that MPxIO and ALUA are working on the host

Confirm that you have MPxIO and ALUA working on the host. You can use the `luxadm display` command to check for multipathing and the `sanlun lun show -p` command to check for ALUA.

Note

You must enable ALUA before you map the LUNs. If you do not enable ALUA, MPxIO will not work. For more information on using ALUA, see the *Data ONTAP® Block Access Management Guide for FCP* at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml. In particular, see the section “*Enabling ALUA for a Fibre Channel igroup.*”

Example of checking for MPxIO: If MPxIO and ALUA are correctly set up, you should see some primary and secondary paths when you run the `luxadm display` command and the state of these paths should be listed as online. (To make this information easier to locate in the following example, these lines are shown in bold.)

```
# luxadm display /dev/rdisk/c2t60A98000686F646E4B5A34784A477668d0s2
DEVICE PROPERTIES for disk:
/dev/rdisk/c2t60A98000686F646E4B5A34784A477668d0s2
Vendor:                NETAPP
Product ID:            LUN
```

```

Revision:                0.2
Serial Num:              hodnKZ4xJGvh
Unformatted capacity:    1024.000 MBytes
Read Cache:              Enabled
    Minimum prefetch:    0x0
    Maximum prefetch:    0x0
Device Type:             Disk device
Path(s):
/dev/rdsd/c2t60A98000686F646E4B5A34784A477668d0s2
/devices/scsi_vhci/ssd@g60a98000686f646e4b5a34784a477668:c,raw
Controller               /devices/pci@1d,700000/fibre-
channel@2,1/fp@0,0
    Device Address        500a098185447022,9
    Host controller port WWN 10000000c94be343
    Class                secondary
    State                ONLINE
Controller               /devices/pci@1d,700000/fibre-channel@2/fp@0,0
    Device Address        500a098195447022,9
    Host controller port WWN 10000000c94be342
    Class                primary
    State                ONLINE

```

Example of checking for ALUA on the host: If ALUA is correctly set up, this information should appear when you run the `sanlun lun show -p` command. If ALUA is not set up correctly, this command does not produce any output.

```

# sanlun lun show -p
ONTAP_PATH:shf820-01:/vol/vol1/san_sol1
LUN:0
LUN Size:      20g (21474836480)
Host Device:/dev/rdsd/c4t600A09804F6443496434345435586476d0s2
lun state: GOOD Filer_CF_State: Cluster Enabled
Multipath_Policy: Native Multipath-provider: Sun Microsystems
Filer Status: TARGET PORT GROUP SUPPORT ENABLED
Target Port Group : 0x1
Target Port Group State: Active/optimized
Vendor unique Identifier : 0x0 (Other FC)
Target Port Count: 0x4
    Target Port ID : 0x1
    Target Port ID : 0x2
    Target Port ID : 0x3
    Target Port ID : 0x4
Target Port Group : 0x2
Target Port Group State: Active/non-optimized
Vendor unique Identifier : 0x0 (Other FC)
Target Port Count: 0x4
    Target Port ID : 0x101
    Target Port ID : 0x102

```

Target Port ID : 0x103
Target Port ID : 0x104

Check the storage system setup

You need to have your storage system correctly set up. For information on what needs to be done, see the list of storage system requirements in the section “[Prerequisites](#)” on page 7.

Check the cfmode setting on the storage system

This version of the Host Utilities only supports the cluster failover mode (cfmode) of single image (SSI). To check the cfmode settings on your storage system, enter the `fcv show cfmode` command.

Example: The following command line checks the cfmode on the storage system.

```
filerA# fcv show cfmode  
fcv show cfmode: single_image
```

Check the ALUA settings on the storage system

You must have ALUA set on the storage system to work with igroups. To make sure you have ALUA set for your igroup, use the `igroup show -v` command.

Example: The following command line displays information about the cfmode on the storage system and shows that ALUA is enabled. (To make the information on ALUA easier to locate, it is shown in bold.)

```
filerA# igroup show -v  
shsun07 (FCV):  
  OS Type: solaris  
  Member: 10:00:00:00:c9:4b:e3:42 (logged in on: 0c)  
  Member: 10:00:00:00:c9:4b:e3:43 (logged in on: vtic)  
  ALUA: Yes
```

Note

For more information on ALUA, see the *Data ONTAP® Block Access Management Guide for FCV* at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml. In particular, see the section “*Enabling ALUA for a Fibre Channel igroup.*”

Verify that the switch is installed and configured

If you have a fabric-attached configuration, check that the switch is set up and configured as outlined in the Installation and Setup instructions that shipped with your hardware. You should have completed the following tasks:

- ◆ Installed the switch in a system cabinet or rack.
- ◆ Checked that the switch firmware is supported with this Host Utility. See the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/>.
- ◆ Turned on power to the switch.
- ◆ 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.

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 the host tool `iostat` is easier to read because fewer paths are displayed.

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

It is recommended that your configuration have no more than eight paths per LUN. For more information about zoning, see the NetApp Interoperability Matrix at <http://now.netapp.com/matrix/mtx/login.do/>.

Power up equipment in the correct order

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
- ◆ Storage systems
- ◆ Host

Verify that the host and storage system can communicate

Once your setup is complete, make sure the host and the storage system can communicate.

You can verify that the host can communicate with the storage system by issuing a command from:

- ◆ Storage system's console
- ◆ A remote login that you established from the host

Using Diagnostic Utilities

Diagnostic utilities The SAN Toolkit includes several command-line 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 compressed tar file of that directory. You can send this file to NetApp customer support.

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

- ◆ `filer_info`. See “[Collecting storage system information](#)” on page 75 for more information.
- ◆ `solaris_info`. See “[Collecting Solaris information](#)” on page 77 for more information.
- ◆ `<switch>_info`, where `<switch>` is the brand of switch you are using (for example, `brocade_info`). See “[Collecting switch information](#)” on page 78 for more information.

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	Change to the <code>opt/NTAP/SANToolkit/bin</code> directory: <code>cd /opt/NTAP/SANToolkit/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 compressed file.

Collecting storage system information

When to run the diagnostic script

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

Collecting storage system diagnostics

Complete the steps below to collect storage system information.

Step	Action
1	On the Solaris host, change to the <code>/opt/NTAP/SANToolkit/bin</code> directory: <code>cd /opt/NTAP/SANToolkit/bin</code>

Step	Action
2	At the host command prompt, enter the following command: <pre>filer_info [-d <i>path_and_file_name</i>] [-l <i>passwd</i>] -n <<i>storage_system_name</i>> -f</pre> -d enables you to specify a different path in which to place the resulting output. -l <i>passwd</i> allows you to specify a password to access the storage system. -n <<i>storage_system_name</i>> specifies the target of the command, where <i>storage_system_name</i> is the name of IP address of the storage system accessed. -f automatically overwrites an existing <<i>storage_system_name</i>> file in the default output directory. You might have an existing file in this directory if you previously ran the script. If you do not use the -f option, and you have an existing file, the <code>filer_info</code> script tells you to delete or rename the file. Result: The output of various status commands is placed in the output directory, where <i>storage_system_name</i> is replaced by the storage system name or IP address. The contents of this directory are placed in a tarred and compressed file named storage_system_<<i>storage_system_name</i>>.tar.Z.
3	Send the resulting compressed file to Customer Support for analysis.

Collecting Solaris information

When to run the diagnostic script

If you are having a problem, Customer Support might ask you to run `solaris_info` to collect configuration information about your host. You should only run this utility when requested to do so by Customer Support.

Collecting Solaris diagnostics

To execute `solaris_info`, complete the following steps:

Step	Action
1	On the Solaris host, change to the <code>/opt/NTAP/SANToolkit/bin</code> directory: <code>cd /opt/NTAP/SANToolkit/bin</code>
2	At the command prompt, enter the following command: <code>solaris_info [-d <directory>] [-n <file_name>] -f</code> -d <directory> specifies the location for the file that <code>solaris_info</code> creates. -n <file_name> specifies the name for the output file and directory names. -f automatically overwrites an existing .tar.Z file in the default output directory. You might have an existing file in this directory if you previously ran the script. If you do not use the -f option, and you have an existing file, the script tells you to delete or rename the file. Result: When you run <code>solaris_info</code> , the utility gathers information about your Solaris configuration and places it in a .tar.Z file. It also creates a directory and populates it with files containing output from numerous commands run on the Solaris system and contents of the <code>/var/adm/message</code> file.
3	Send the resulting file to Customer Support for analysis.

Collecting switch information

When to run the diagnostic script

If you are having a problem, Customer Support might ask you to run the switch utility script that is provided when you install the SAN Toolkit software. A utility is provided for each switch that is supported for the FC Solaris Host Utilities. 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 Customer Support.

Collecting switch diagnostics

To execute the utility, complete the following steps.

Step	Action
1	Change to the /opt/NTAP/SANToolkit/bin directory: <code>cd /opt/NTAP/SANToolkit/bin</code>

Step	Action
2	At the command prompt, enter the following command: <pre><switch_brand>_info [-d <i>path_and_file_name</i>] [-l <i>user:password</i>] -n <switchname> -f</pre> <switch_brand> is the type of the switch you are using; for example, brocade for a Brocade switch. The -d <i>path_and_file_name</i> option enables you to specify a different path in which to place the resulting output. The -l <i>user:password</i> 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 for Brocade switches. The target of the command is specified by -n <i>switchname</i>, where <i>switchname</i> is the name or IP address of the switch to be interrogated. -f automatically overwrites an existing output file in the default output directory. You might have an existing file in this directory if you previously ran the script. If you do not use the -f option, and you have an existing file, the script tells you to delete or rename the file. Result: The output of various status commands on the switch is placed in a default directory where <i>switch_brand</i> is the brand of the switch, such as Brocade, and <i>switchname</i> is replaced by the switch name or IP address. The contents of this directory are placed in a file named <switch_brand>_switch_switchname.tar.Z. Example: This example uses the brocade_info tool. The switch brcd1 is connected with the user “john”, who has the password “smith”. <pre>host1> brocade_info -d /opt/NTAP/SANToolkit/bin/ -l john:smith -n brcd1</pre> The information from the switch is placed in the brocade_switch_brcd1.tar.Z file.
3	Send the resulting file to Customer Support for analysis.

Known issues with the Host Utilities

sanlun doesn't show all adapters

Symptom: The `sanlun lun show` command does not display all the adapters.

```

hostA# sanlun lun show
filer:                lun-pathname                device filename
adapter protocol      lun size      lun state
fas3020-rtp22:  /vol/vol14/lun45
/dev/rdsd/c7t60A9800043346859444A36554A4D6E53d0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol13/lun44
/dev/rdsd/c7t60A9800043346859444A36554A4D5765d0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol11/lun42
/dev/rdsd/c7t60A9800043346859444A36554A4C775Ad0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol10/lun41
/dev/rdsd/c7t60A9800043346859444A36554A4C642Fd0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol9/lun40
/dev/rdsd/c7t60A9800043346859444A36554A4C4B75d0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol8/lun39
/dev/rdsd/c7t60A9800043346859444A36554A4B7175d0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol7/lun38
/dev/rdsd/c7t60A9800043346859444A36554A4B6243d0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp2:   /vol/vol6/lun37
/dev/rdsd/c7t60A9800043346859444A36554A4B486Ed0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol4/lun35
/dev/rdsd/c7t60A9800043346859444A36554A4A684Bd0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol2/lun33
/dev/rdsd/c7t60A9800043346859444A36554A4A3736d0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol1/lun32
/dev/rdsd/c7t60A9800043346859444A36554A496B6Bd0s2  qlc1      FCP      20g
(21474836480)    GOOD
fas3020-rtp22:  /vol/vol0/lun31
/dev/rdsd/c7t60A9800043346859444A36554A494662d0s2  qlc1      FCP      20g

```

```

(21474836480)    GOOD
fas3020-rtp21:   /vol/sanboot/sun280r-rtp15boot
/dev/rdsd/c7t60A98000433468656834375172756F78d0s2  qlc1    FCP          23g
(24696061952)    GOOD
fas3020-rtp21:   /vol/vol15/lun15
/dev/rdsd/c7t60A9800043346865683436554971754Ed0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol14/lun14
/dev/rdsd/c7t60A9800043346865683436554971612Fd0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol13/lun13
/dev/rdsd/c7t60A98000433468656834365549714773d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol12/lun12
/dev/rdsd/c7t60A98000433468656834365549707559d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/
vol11/lun11      /dev/rdsd/c7t60A98000433468656834365549706348d0s2  qlc1
FCP              20g (21474836480)    GOOD
fas3020-rtp21:   /vol/vol10/lun10
/dev/rdsd/c7t60A98000433468656834365549704530d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol9/lun9
/dev/rdsd/c7t60A980004334686568343655496F734Fd0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol8/lun8
/dev/rdsd/c7t60A980004334686568343655496F6156d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol7/lun7
/dev/rdsd/c7t60A980004334686568343655496F4850d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol6/lun6
/dev/rdsd/c7t60A980004334686568343655496E7A2Fd0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol5/lun5
/dev/rdsd/c7t60A980004334686568343655496E666d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol4/lun4
/dev/rdsd/c7t60A980004334686568343655496E4E37d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol3/lun3
/dev/rdsd/c7t60A980004334686568343655496E3673d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol2/lun2
/dev/rdsd/c7t60A980004334686568343655496D6F49d0s2  qlc1    FCP          20g
(21474836480)    GOOD
fas3020-rtp21:   /vol/vol1/lun1
/dev/rdsd/c7t60A980004334686568343655496D5464d0s2  qlc1    FCP          20g
(21474836480)    GOOD

```

Explanation: When you use MPxIO, there are multiple paths. MPxIO controls the path over which the `san lun` SCSI commands are sent. This means that the adapter name can vary each time you issue the `san lun lun show` command.

What to do: To display information on all the adapters, issue the `san lun lun show -p` command. Use the `luxadm display -v device_name` command, where *device_name* is the name of the device you are checking.

**Solaris log
message says data
not standards
compliant**

Symptom: The Solaris log contains a message stating:

WARNING: Page83 data not standards compliant

Explanation: This Solaris log message sometimes occurs when you are executing the FC Solaris Host Utilities for Native OS. It is Solaris bug and has been reported to Sun. The Solaris initiator implements an older version of the SCSI Spec.

What to do: The NetApp SCSI target is standards compliant, so ignore this message.

Index

A

ALUA

- also known as TPGS 6
- Asymmetric Logical Unit Access 6
- checking on host 69
- checking on igroup 71
- required for storage system 6

Attach Kits

- previous kits 2

B

basic_config

- configuration script 4
- example 19
- options 20
- parameters 18

boot data

- copying 55, 59

C

cfmode

- check setting 71

checklists

- installation tasks 7

commands

- fcinfo_hba -port 65
- luxadm -display 65
- luxadm -probe 65
- metastat 67
- stmsboot 66

D

device names

- use show-disks 49

diagnostic utilities

- <switch>_info 74
- aix_info 74
- collecting Solaris information 77
- collecting storage system information 75

- collecting switch information 78

- executing 74

- filer_info 74

- switch_info 78

disk shelves

- powering up 72

documentation

- obtaining 16

E

equipment

- powering up 72

examples

- checking ALUA on host 69
- checking ALUA on igroup 71
- checking cfmode 71
- checking MPxIO 69

F

FC Solaris Attach Kit

- removing 23

FC Solaris Host Utilities

- completing installation 28
- contents 2
- defined 2
- documentation 16
- native OS stack 3
- obtaining 14
- SAN Toolkit 3, 14
- software 14

filer_info

- diagnostic script 4

format utility

- using to label LUNs 32

H

HBA

- checking 65

host

- checking ALUA 69

- checking MPxIO 69
- communicating with storage system 73
- powering up 72
- host utilities
 - recommended parameters 18

I

- igroup
 - checking ALUA setting 71
 - definition 28

L

- LUNs
 - labeling 32

M

- MPxIO
 - checking on host 69
 - enable on SPARC systems 66
 - stmsboot 66
 - transparent paths 5
 - using with sanlun 5
- mpxio_set
 - configuration script 4
- multipathing
 - displaying information 40
 - MPxIO 5

N

- native OS
 - stack 3
 - Sun StorEdge SAN Foundation Software 1

P

- parameters
 - recommended 18
- paths
 - not visible 5
- powering up equipment 72

R

- removing
 - attach kit 23
 - FC Solaris Host Utilities 23

S

- SAN boot
 - copying the boot data 55, 59
 - definition 48
 - device names 49
 - direct install 50
 - dump, restore on SPARC 51
 - dump, restore with MPxIO on x86/x64 (AMD) processors 55
 - dump, restore without MPxIO on x86/x64 (AMD) processors 59
 - prerequisites 49
- SAN Toolkit 3
 - components 4
 - obtaining 14
 - san_version command 4
 - sanlun utility 4
- san_version
 - command 4
- sanlun
 - part of SAN Toolkit 4
 - paths not visible 5
 - syntax 43
 - using 37
- scripts
 - basic_config 4
 - filer_info 4
 - mpxio_set 4
- sd_set 21
- Solaris
 - displaying HBA information 44
 - displaying LUN information 38
- Solaris Volume Manager
 - check version 67
 - SVM 67
 - works with MPxIO 5
- SPARC processors
 - basic_config options 20
 - file system dump, restore 51

- ssd_set 20
- storage system
 - communicating with host 73
 - powering up 72
- Sun StorEdge SAN Foundation Software 1
- switch_info
 - executing 78
- switches
 - powering up 72
 - verifying setup 72
 - zoning 72
- system parameters
 - pre-requisites 17

T

- TPGS
 - also known as ALUA 6
 - Target Port Group Support 6

U

- uninstall script 23

V

- Veritas
 - configuring LUNs 35
 - volume manager 5
- volume manager
 - Solaris Volume Manager 5
 - Veritas Volume Manager 5

X

- x86/x64 (AMD) processors
 - basic_config options 21
 - file system dump, restore with MPxIO 55
 - file system dump, restore without MPxIO 59

Z

- zoning 72

