StorTools™ 4.1 User's Guide

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Contents

Figures

Tables

Preface

The *StorTools 4.1 User's Guide* describes the StorTools™ 4.1 diagnostic package, which provides diagnostics for the following Sun™ products:

- Sun StorEdge™ A5*x*00 array
- Sun StorEdge A3500FC disk tray
- Sun StorEdge T3 array
- Internal Fibre Channel disk
- Sun StorEdge Network FC Switch-8 and Switch-16

This document describes the Sun StorEdge StorTools graphical user interface (GUI) and command-line utilities and provides procedures for using the tools.

This guide is written for system administrators and support personnel who are already familiar with Sun's disk array products.

How This Book Is Organized

This book contains the following topics:

Chapter 1 provides an overview of the StorTools diagnostic package and identifies the tasks you can perform using the tools in the package.

Chapter 2 explains how to install and configure the StorTools software.

Chapter 3 discusses the uses of the `ifptest`(1M) to test the functionality of the Sun StorEdge PCI FC-100 Host Adapter card.

Chapter 4 details instructions for using the `socaltest`(1M) to validate and perform fault isolation on the Sun StorEdge SBus FC-100 Host Adapter card.

Chapter 5 gives information about using the `qlctest`(1M) to test the functions of the Sun StorEdge PCI Dual Fibre Channel Host Adapter board.

Chapter 6 provides instructions for using the `a5ksestest`(1M) to provide configuration verification, fault isolation, and repair validation of Sun StorEdge A5*x*00 array.

Chapter 7 describes how to use the `a5ktest`(1M) to verify the functionality of Sun StorEdge A5x00 array.

Chapter 8 provides details about using the `t3test`(1M) to verify the functionality of the Sun StorEdge T3 array.

Chapter 9 details how to use the `a3500fctest`(1M) to verify the functionality of Sun STorEdge A3500 array using the two subtests provided.

Chapter 10 shows how to use the `fcdisktest`(1M) to locate problems with the internal Fibre Channel disks.

Chapter 11 provides details about using the `fctapetest`(1M) to test the Fibre Channel tape drive.

Chapter 12 describes the use of the `switchtest`(1M) to diagnose the Sun StorEdge network FC switch-8 and switch-16 switches.

Chapter 13 details the use of `stexpert`(1M), a program that isolates failing Fibre Channel Arbitrated Loops (FC-ALs) and field-replaceable units (FRUs).

Chapter 14 explains how to create a system `snapshot`(1M).

Chapter 15 discusses the differences between versions 3.*x* and 4.1 of the StorTools software.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

Typographic Conventions

Typeface	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide.* These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename.*

Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

Product	Title	Part Number
Late-breaking StorTools news	• *StorTools 4.1 Release Notes*	816-1180-10
Sun StorEdge T3 array	• *Sun StorEdge T3 Administration Guide*	806-1063-11
	• *Sun StorEdge T3 Disk Tray Cabinet Installation Guide*	806-7979-10
	• *Sun StorEdge T3 Disk Tray Site Preparation Guide*	806-4212-11
	• *Sun StorEdge T3 Disk Tray Configuration Guide*	806-4210-11
	• *Sun StorEdge T3 Disk Tray Release Note*	806-1497-12
Sun StorEdge PCI FC-100 host adapter	• *Sun StorEdge PCI FC-100 Host Adapter Installation Manual*	805-3682-10
Sun StorEdge SBus FC-100 host adapter	• *Sun StorEdge SBus FC-100 Host Adapter Installation and Service Manual*	802-7572-11
Sun StorEdge PCI Dual Fibre Channel	• *Sun StorEdge PCI Dual Fibre Channel Host Adapter Product Notes*	806-5857-10
	• *Sun StorEdge PCI Dual Fibre Channel Host Adapter Installation Guide*	806-5600-10
Sun StorEdge A5*x*00 array	• *Sun StorEdge A5x00 User's Guide*	806-1946-10
	• *Sun StorEdge A5x00 Release Notes*	806-1947-10
	• *Sun StorEdge A5000 Product Note*	805-1018-13
	• *Sun StorEdge A5000 Configuration Guide*	805-0264-15
	• *Sun StorEdge A5000 Installation and Documentation Guide*	805-1903-15
Sun StorEdge A3500/ A3500FC disk tray	• *Sun StorEdge A3500/A3500FC Configuration Guide*	805-4981-13
	• *Sun StorEdge A3500/A3500FC Controller Module Guide*	805-4980-11
	• *Sun StorEdge A3500/A3500FC Task Map*	805-4982-11
SunVTS™	• *SunVTS 4.1 User's Guide*	806-4985-10
	• *SunVTS 4.1 Test Reference Manual*	806-4986-10
Sun Network Storage Agent	• *Sun Network Storage Agent 2.1 User's Guide*	816-0769-11
	• *Sun Network Storage Agent 2.1 Release Notes*	806-7520-11
Sun StorEdge network FC switch-8 and switch-16	• *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide*	806-6922-10
	• *Sun StorEdge network FC switch-8 and switch-16 Field Troubleshooting Guide*	816-0252-10
RAID Manager 6.22	• *RAID Manager 6.22 User's Guide*	806-0478-10
	• *RAID Manager 6.22 Release Notes*	806-3721-10

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CHAPTER 1

Introduction

This chapter provides an overview of the StorTools 4.1 diagnostic software. This product is designed for offline use only, which means user applications should not be in production use while running these tests.

This chapter is organized as follows:

Sun StorEdge StorTools Overview

This book covers the individual test options and requirements for StorTools 4.1 software. Because the StorTools software is based on the SunVTS™ framework, you can refer to the *SunVTS 4.1 User's Guide* for overall test configuration information.

Important information to keep in mind about StorTools 4.1 includes the following.

- SunVTS is a comprehensive diagnostic package that tests and validates Sun hardware by verifying the connectivity and functionality of most hardware controllers, devices, and platforms.
- The StorTools Expert program (`stexpert`(1M)), which is part of StorTools 4.1, uses rule-based methods to intelligently isolate failing Sun StorEdge components.
- The Sun Network Storage Agent 2.0 package (`SUNWrasag`) should be installed when using the StorTools software to enable remote monitoring and online fault detection.

- When an error occurs in testing, the test message window displays the error number, the error description, the probable cause of the error, and the recommended actions.
- The default installation directory for StorTools software is `/opt/SUNWvtsst`.

FIGURE 1-1 shows a logical view of the StorTools system tests.

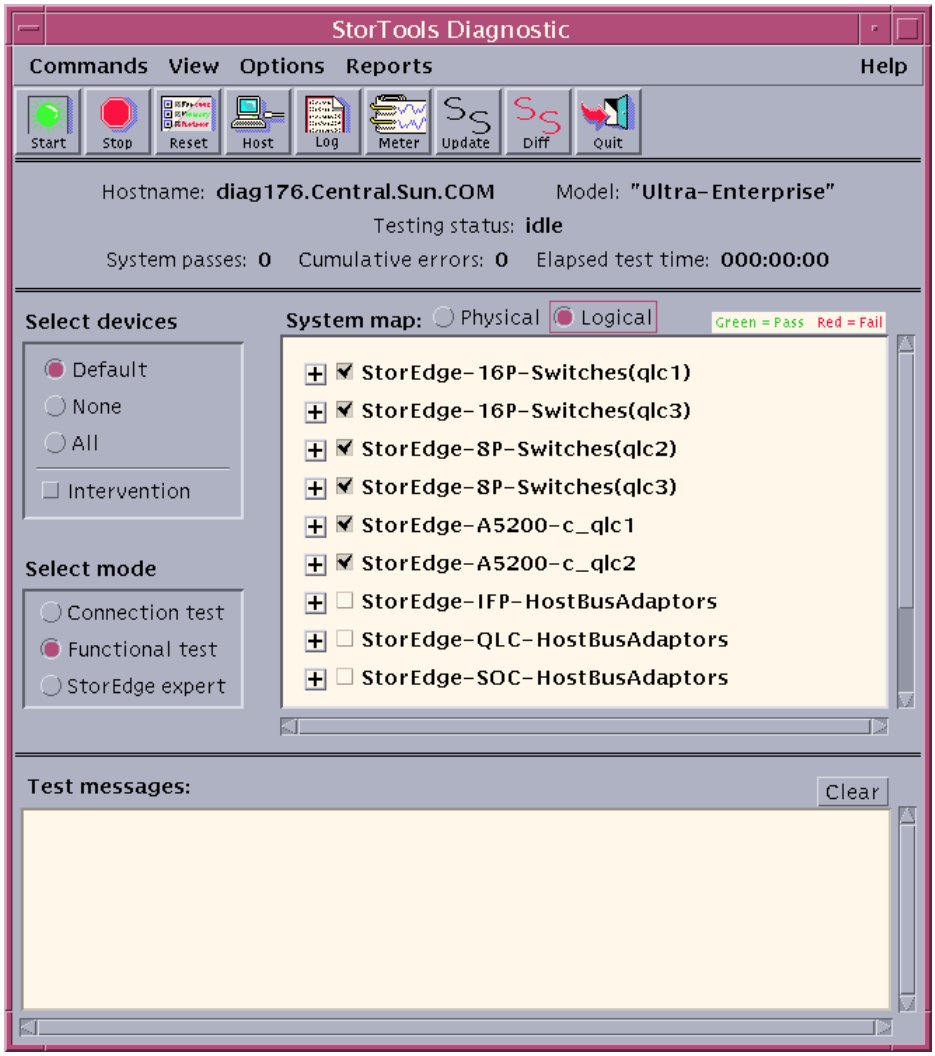

FIGURE 1-1 Logical View of the StorTools Diagnostic GUI

FIGURE 1-2 shows a physical view of the StorTools GUI.

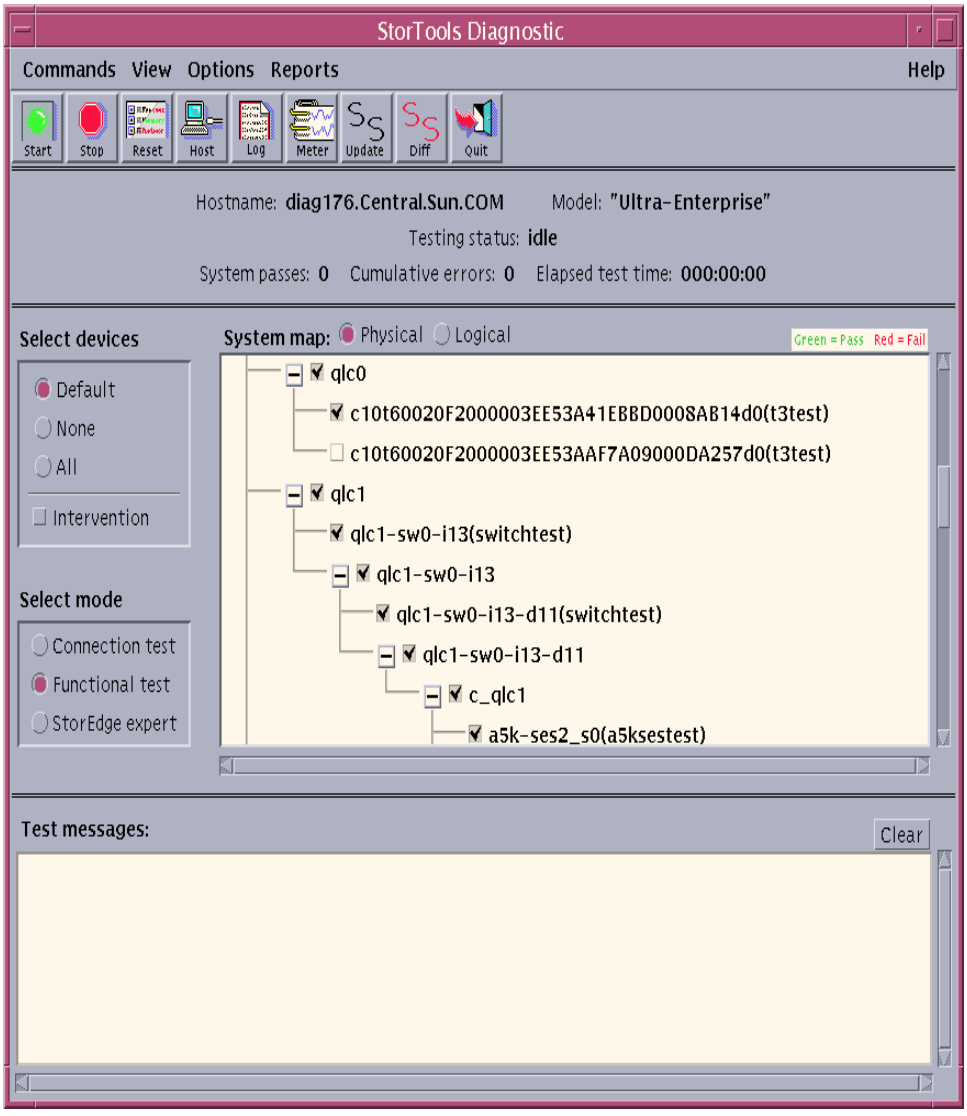

FIGURE 1-2 Physical View of the StorTools GUI

System Requirements

The system software and hardware requirements are given in the following subsections.

Hardware

The StorTools software provides diagnostics for the following Sun sysems:

- Sun StorEdge T3 array
- Sun StorEdge PCI FC-100 host adapter
- Sun StorEdge SBus FC-100 host adapter
- Sun StorEdge PCI Dual Fibre Channel
- Sun StorEdge A5*x*00 array
- un StorEdge A3500/A3500FC disk tray
- Sun StorEdge network FC switch-8 and switch-16

Software

Verify that an operating environment that supports the StorTools software is installed on your system. The first release that supports the StorTools 4.1 softwae is the Solaris 8 10/00 operating environment.

The operating system kernel must be configured to support all peripherals that are to be tested.

You may have to perform special tasks in order to run some StorTools tests. These tasks include making loopback connections, installing test media, or checking for available disk space. The special requirements for each test are listed in the chapter for that test.

StorTools Test Operation

Many individual tests comprise the collection of tests in the StorTools application. Each test is a separate process from the StorTools kernel. Each test can be run individually from the command line or from the StorTools graphical user interface.

When you start the StorTools software, the StorTools kernel automatically probes the system kernel to determine which hardware devices are connected to the system. The StorTools daemon (`stdiscover`) stores the device information, and the devices are displayed on the StorTools control panel with the appropriate tests and test options.

During testing, the hardware tests send the test status and messages to the StorTools kernel. The kernel passes the status to the user interface and logs the messages.

The StorTools application has a shared object library that contains test-specific probing routines. At runtime, the StorTools kernel dynamically links in and calls these probing routines to initialize its data structure with test-specific information. This enables you to select new tests to run in the StorTools environment without having to recompile the StorTools source code.

32-Bit and 64-Bit Tests

The StorTools kernel and most tests support both 32-bit and 64-bit operating environments. When you start the StorTools GUI diagnostics using the `stortools`(1M) command, the appropriate tests (32-bit or 64-bit) are invoked.

Because each test is a separate program, you can run individual tests directly from the command line. However, ensure that you run the appropriate test (32-bit or 64-bit) that corresponds to the operating system that is running. You can do this by running tests from the following specific directories.

- 32-bit tests—`/opt/SUNWvtsst/bin/`*testname*
- 64-bit tests—`/opt/SUNWvtsst/bin/sparcv9/`*testname*
  - If *testname* is a binary file, this test is an actual 64-bit binary test.
  - If *testname* is a symbolic link, this test is a 32-bit test capable of running in the 64-bit environment.

If you use the `stortools` command to run the StorTools diagnostics, the program automatically allocates 32-bit or 64-bit tests based on the 32-bit or 64-bit Solaris operating environment that is running. Therefore you only need to distinguish between the 32-bit or 64-bit operation when running the StorTools tests from the command line.

If you are not sure which operating system is running, refer to the *Solaris 8 System Administration* manual, which are available online at `http://docs.sun.com`. In the Solaris 8 operating environment, you can use the `isainfo`(1) command to identify the application support of your system. The `-b` option specifies the number of bits in the address space of the native instruction set. For example:

```
% isainfo -b
64
%
```

StorTools Test Modes

A StorTools test session runs in one of three test modes:

- Connection test mode
- Functional test mode
- Sun StorEdge Expert test mode

TABLE 1-1 describes how test modes differ in these states. All system resources must be available for the test sessions.

TABLE 1-1 StorTools Test Modes

Test Mode	Description
Connection	Performs a low-stress, quick test to verify the availability and connectivity of the tested device. This mode is nonintrusive in offline and online states.
Functional	Performs robust testing that uses whatever system resources are required for thorough offline testing. All test options are modifiable for optimum test configurations.
Expert	The Expert mode is an offline FRU isolation test. The Expert mode may take Sun StorEdge storage components offline.

When you select the Expert test mode, the `stexpert`(1M) command runs on the selected storage devices. See Chapter 13 and the `stexpert`(1M) man page for additional information.

Selecting a StorTools User Interface

You can run the StorTools tests either from the Common Desktop Environment (CDE) graphical user interface (GUI) or from the command line. When running the Sun StorEdge StorTools tests individually from the command line refer to “Running StorTools Tests From the Command Line” on page 9. TABLE 1-2 describes the basic differences between the StorTools user interfaces.

TABLE 1-2 StorTools User Interface Differences

StorTools User Interfaces	Description
GUI Window	You can select tests and test options by pointing and clicking with a mouse button in a GUI window.
Command-line	You run each test individually from a Shell Tool command line. Each test description in this book contains the corresponding command-line syntax.

Running StorTools Tests From a GUI Window

If you run the StorTools test from the GUI window, you can easily access test configuration, control, and results using the buttons in the dialog boxes. The instructions for using most of the GUI controls are detailed in the *SunVTS 4.1 User’s Guide*.

The test parameter options, however, are unique for each test and are illustrated in the individual chapters with each test in this manual.

Test Parameter Options Dialog Box

The options displayed in this dialog box differ for each test, but the buttons at the bottom of the window are generic and are described below.

To display the individual test parameters from the dialog box shown in FIGURE 1-3, you must expand the branch and click the right mouse button.

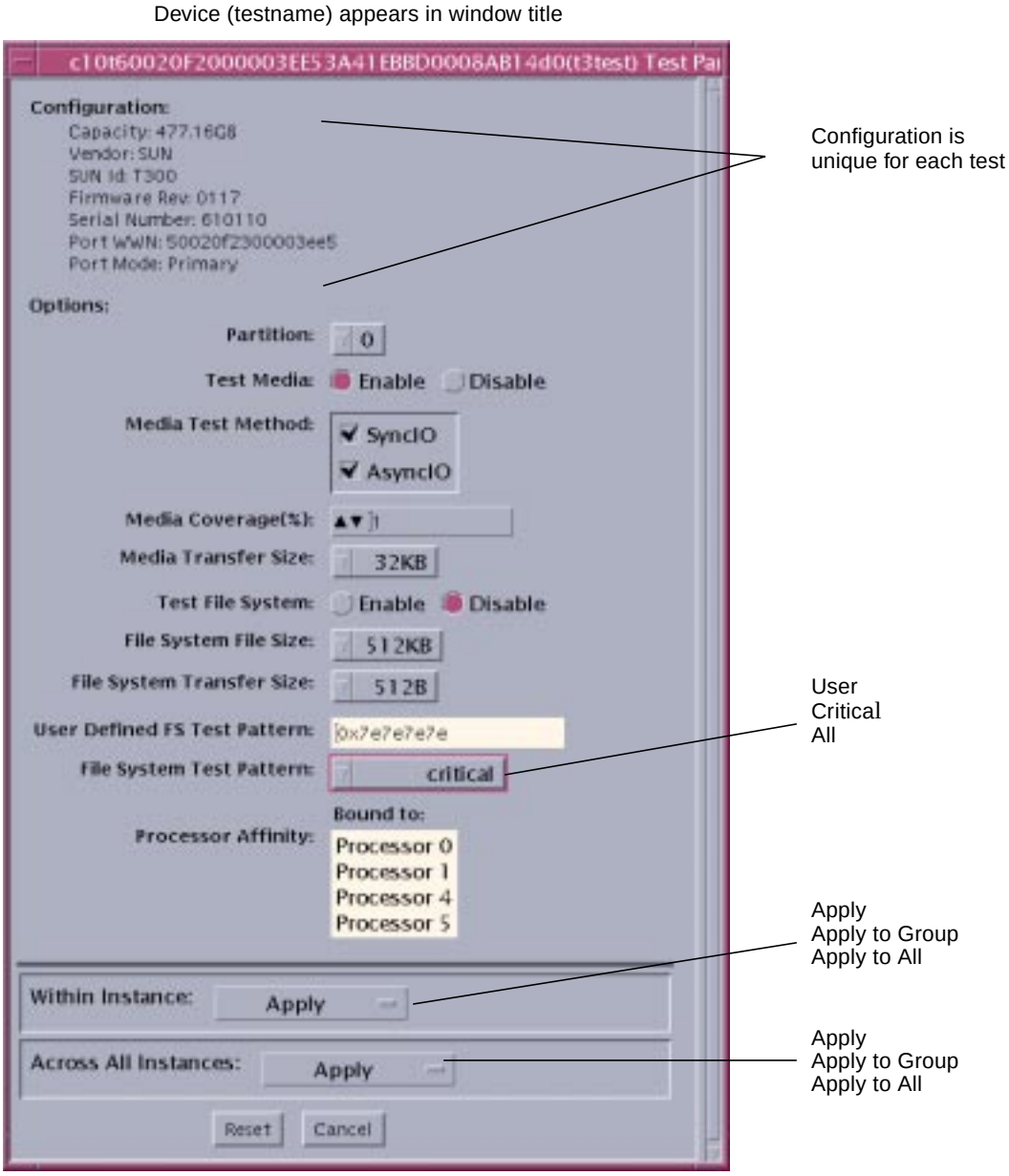

FIGURE 1-3 Test Parameter Options Dialog Box (CDE)

TABLE 1-3 describes the Test Parameters Options dialog box.

TABLE 1-3 Test Parameter Options Dialog Box Sections

Item	Description
Configuration	Displays information such as the device type, capacity, revision, and serial numbers for the selected device. This information cannot be changed in this window.
Options	These are the test options you use to customize the testing of the selected device, group, or all devices. The options are specific for each test and are covered in the test specific-chapters in this manual.
Within Instance	Choose how to apply the settings: • Apply - Applies settings to this device only. • Apply to Group - Applies settings to all devices within this group. • Apply to All - Applies settings to all devices of the same device type for all controllers. The option settings are applied to only one instance of the test.
Across All Instances	Choose how to apply the settings globally: • Apply - Applies settings to this device only. • Apply to Group - Applies settings to all devices within this group. • Apply to All - Applies settings to all devices of the same device type for all controllers. The option settings are applied to all instances of the test.
Reset	Returns the option values to their default settings and closes the Test Parameter Option dialog box.
Cancel	Ignores any changes made to option values and closes the Test Parameter Option dialog box.

Running StorTools Tests From the Command Line

In some cases it is more convenient to run a single Sun StorEdge StorTools test from the command line rather than through a StorTools user interface.

Unless specified, the test runs without the Sun StorEdge StorTools kernel (`vtsk`). All events and errors are sent to the screen. The errors are not logged in the log files; however, you can direct the kernel to log information to the error logs in `/var/opt/SUNWvtsst/logs`.

When running a test in this way, you must specify all test options in the form of command-line arguments. There are two types of command-line arguments:

- **Standard arguments** are common to all tests. Refer to TABLE 1-4 for details.

- **Test specific arguments** are unique to a specific test. Refer to the test-specific chapters in this book for details.

The standard syntax for all StorTools tests is as follows :

% *testname* [**-scruvdtelnf**] [**-i** *number*] [**-w** *number*][**-o** *test-specific-arguments*]

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/`*testname*. For more information, refer to "32-Bit and 64-Bit Tests" on page 5.

Standard Command-Line Arguments

TABLE 1-4 describes the standard StorTools command-line arguments.

TABLE 1-4 Standard Command-Line Arguments

Argument	Description
-s	Runs the test as though it were invoked from the StorTools kernel (`vtsk`). The default is to send the output to `stdout` or `stderr`.
-c	Creates a core image of the test process in the current working directory upon receipt of certain signals, otherwise those signals are caught and handled to prevent a core from being generated. The default is to disable the creation of a core image.
-r	Enables run-on error so that when an error occurs, the test continues with the next test sequence instead of exiting. The default is False.
-u	Displays command-line usage information.
-v	Runs the test in verbose mode and displays messages with more detailed information about the testing process. The default is False.
-d	Runs the test in debug mode and displays messages to help programmers debug their test code. The default is False.
-t	Runs the test in trace mode and displays messages that track function calls and sequences currently in use by the test code. The default is False.
-e	Runs the test in stress mode by increasing the system load. The default is False.
-l	Runs the test in Online Functional mode. This is the same mode that tests run in when executed with the `vtsui.online` command. It is a nonintrusive version that does not significantly affect other applications. The default is True.

TABLE 1-4 Standard Command-Line Arguments *(Continued)*

Argument	Description
-n	Runs the test in connection test mode. The default is False.
-f	Runs the test in full Functional test mode. This mode assumes that the test has complete control of the device under test. The default is False.
-i *number*	Defines the number of instances for scalable tests. The default *number* is one.
-w *number*	For scalable tests, defines to which instance the test is assigned. The default *number* is zero.
-x	Runs the Sun StorEdge Expert against the target device to diagnose the targeted FRU and all the FRUs in the targeted device's data path.
-o	Indicate that the options and arguments that follow are test-specific.

Note – If you choose to specify a test mode with the `-l`, `-n`, `-x`, or `-f` option, specify only one option at a time, because only one test mode can be selected at a time.

Test-Specific Command-Line Argument

TABLE 1-5 describes the test-specific argument. Test-specific arguments follow the format specified in the `getsubopt`(3C) man page. For information about test-specific arguments refer to the specific test chapter in this book.

Note – Separate each test-specific argument by commas, with no space after each comma.

TABLE 1-5 Test-Specific Arguments

Argument	Description
-o	Separate each test-specific argument by commas, with no space after each comma. For example: `#./a5ktest -v -o dev=c3t3d1s2-f6,partition=2` The test option format is specified by the man page `getsubopt`.

CHAPTER 2

Installation and Configuration

This chapter presents detailed instructions for installing and configuring the Sun StorEdge StorTools software on your system.

This chapter is organized as follows:

Installing the StorTools Software

This section contains a sample installation of the StorTools software using the pkgadd(1M) command.

Note – For a complete listing of the media contents refer to the StorTools 4.1 Release Notes.

1. **Type the following to begin the installation.**

```
# pkgadd -d .
```

You will be prompted for responses as the installation progresses.

2. **When you are prompted to select the package you want to process, type 1.**

```
Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: 1
```

3. **Type “y” when prompted to continue the installation of** `<SUNWvtssst>`**.**

```
Do you want to continue with the installation of <SUNWvtsst>
[y,n,?] y
```

4. **When installation is complete, type “q” to exit the** `pkgadd` **program.**

```
The following packages are available:
  1  SUNWvtsst     StorTools Diagnostic Package Prototype
                   (sparc) 4.1a2

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: q
#
```

▼ To Verify the StorTools Installation

- **Use the** `pkginfo`**(1M) command to verify the installation.**

```
# pkginfo -l SUNWvtsst
   PKGINST:  SUNWvtsst
      NAME:  StorTools Diagnostic Package Prototype
  CATEGORY:  Diagnostics
      ARCH:  sparc
   VERSION:  4.1
   BASEDIR:  /opt
    VENDOR:  Sun Microsystems Computer Corporation
    PSTAMP:  Built by buildst@diag240.Central.Sun.COM on 05/21/01 15:39:30
  INSTDATE:  May 25 2001 08:35
    STATUS:  completely installed
     FILES:    364 installed pathnames
                 8 shared pathnames
                24 directories
               254 executables
            145577 blocks used (approx)
#
```

▼ To Remove the StorTools Package

- **To remove the StorTools package, use the** `pkgrm`**(1M) command. For instance:**

```
# pkgrm SUNWvtsst
```

▼ To Set Up Fibre Channel Switches

When you install the StorTools software , a sample switch configuration file `/etc/fcswitch.conf` is created (unless one already exists in which case the existing file is left unchanged).

In the following example switch configuration , the pound sign character (#) indicates a commented line. To IP address shown in the file are for example purposes only. Make sure that the IP addresses you enter do not have a pound sign character in front of them.

To configure the file for your configuration, remove the pound sign character and enter the IP address and name for each locally installed switch.

Note – If you do put in the IP address of the remote switch, pseudo switches may show up in the GUI.

Below is the sample `/etc/fcswitch.conf` file placed in the `/etc` directory:

```
#
# Sample configuration file for switches
#
# Enter switch IP address and name
# Note: The name is optional
#
# 192.9.200.0 example_switch1
# 192.9.201.0 example_switch2
```

For additional information, refer to the Sun StorEdge network FC switch-8 and switch-16 documentation, which is listed in the Preface of this manual.

▼ To Start the StorTools Software

You can run the StorTools software from the local system or from a remote system. If you are running from a remote system, you must export your display. The StorTools GUI is a standard Motif X-Windows CDE environment application.

- **To start the StorTools GUI, type:**

```
# cd /opt/SUNWvtsst/bin
# ./stortools
```

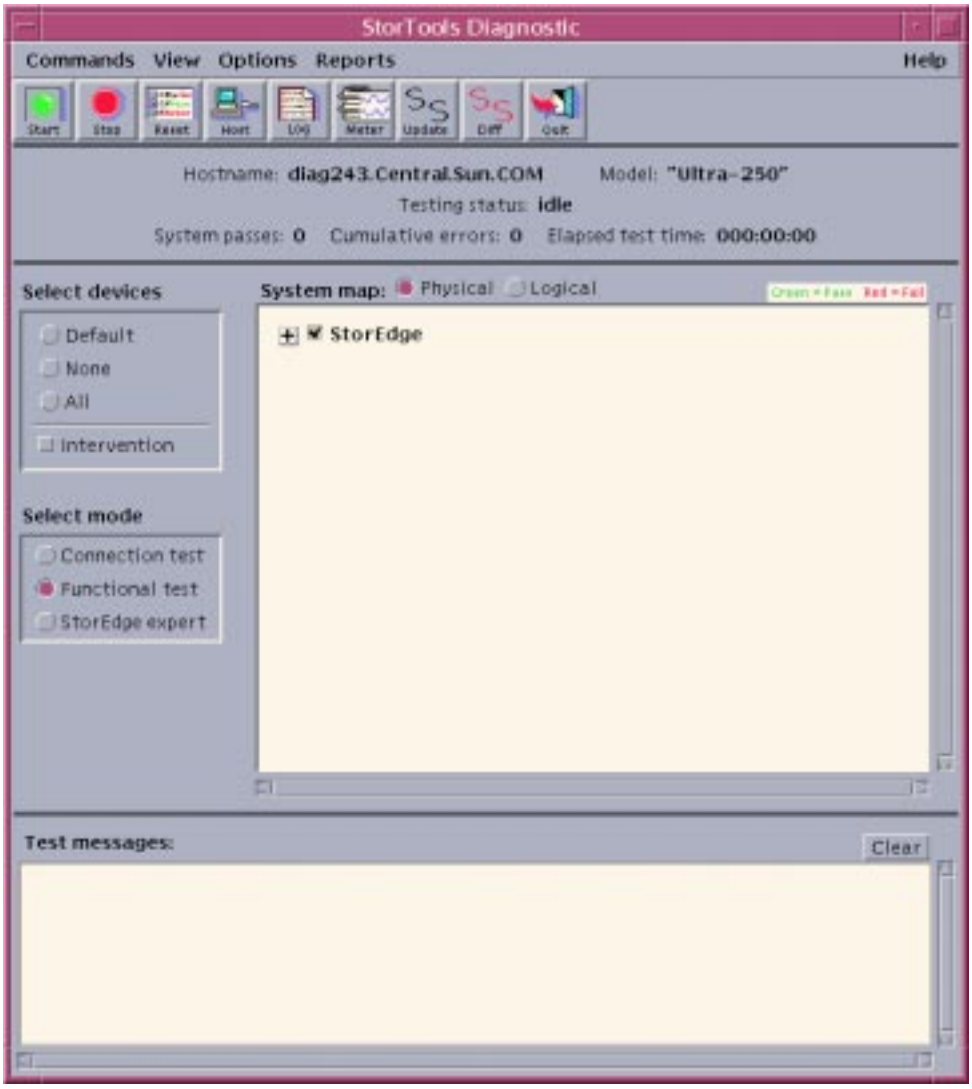

FIGURE 2-1 StorTools Physical View

Differences Between Standard SunVTS Tests

The StorTools test environment GUI is different from the SunVTS GUI in the following ways:

- The new Select mode StorEdge expert radio button appears on the left side of the window. Refer to “StorTools Expert (`stexpert`)” on page 95 for additional information.
- New entries in the device selection window appear for Sun StorEdge products.
- The physical view shows the Physical Storage configuration.

Storage Devices in Physical View Window

Sun StorEdge devices appear in the selection window using the StorTools register name. This name is unique for every device.

For example, the Fibre Channel switches in the physical view use the naming convention:

```
qlc0-sw0-fl13-e16
```

This represents a Fibre Channel 16-port switch.

```
qlc  = Sun StorEdge PCI Dual Fibre Channel Network Controller HBA 0
sw0  = Connected to switch instance 0 (instance number can be
       in the range 0-n)
fl13 = Fabric loop port 13.
e16  = Connected to port 16 which is eport number 16.
```

▼ To Recognize New Devices

In order for the StorTools software to recognize the devices on the system, you can either reboot the system or use the following procedure.

1. **Exit the StorTools GUI, using the “Quit GUI and Kernel” option.**
2. **Use standard Solaris utilities to add new components.**
3. **Restart the StorTools GUI.**
4. **Select “Update.” The new devices are displayed.**

▼ To Set the Environment Path Variables

After installing the StorTools diagnostic package you must , set the environment variables PATH and MANPATH to include the StorTools directories /opt/SUNWvtsst/bin and /opt/SUNWvtsst/man.

- **For the Korn or Bourne shell, add the following to your** .profile **file:**

```
$ PATH=/opt/SUNWvtsst/bin:$PATH
$ MANPATH=/opt/SUNWvtsst/man:$MANPATH
$ export PATH MANPATH
```

- **For the C shell, add the following to the** .cshrc **file:**

```
% setenv PATH /opt/SUNWvtsst/bin:$PATH
% setenv MANPATH /opt/SUNWvtsst/man:$MANPATH
```

▼ To Remove the StorTools Package

- **To remove the StorTools package, use the** pkgrm**(1M) command. For instance:**

```
# pkgrm SUNWvtsst
```

CHAPTER 3

Sun StorEdge PCI FC-100 Host Adapter Test (`ifptest`)

The `ifptest`(1M) test verifies the functionality of the Sun StorEdge PCI FC-100 host adapter, which is a single-loop Fibre Channel card with an on board Gigabit Interface Converter (GBIC).

The ifptest tests the functionality when there are no devices attached to the loop. The driver checks for devices on the fibre loop. If any devices are detected, the driver blocks any diagnostic commands. An error message is displayed if the device is attached to storage.

If devices are attached to the loop, do not run ifptest. Instead, run the t3test(1M), a3500fctest(1M), a5ktest(1M), or fctapetest(1M) tests on the individual devices.

The ifptest test uses the “mailbox” interface to the card, which enables certain firmware operations to be performed that normally would not be available to the application layer.

This chapter is organized as follows:

`ifptest` Subtests

This test runs four subtests in functional mode:

- Mailbox Loopback Test

  Loads a series of registers into the input mailboxes on the card and then reads the output mailboxes and compares the results. This verifies that the system side of the card is operating correctly and that the internal data paths are ok.

- Firmware Revision Check

  Reads the firmware revision from the firmware and compares it to a revision loaded by the driver. This test does not check to ensure that the driver is up-to-date.

- Firmware Checksum Test

  Runs an internal checksum test on the installed firmware. This verifies that the RISC RAM on the card is fully functional and that the installed firmware is still intact. This test also serves as a quick RAM check of the RISC RAM.

- Check Module Revisions

  Extracts the hardware and firmware revision levels of different modules on the card.

`ifptest` Test Options

To display the `ifptest` Test Parameters Options dialog box shown in FIGURE 3-1, right-click on the test name in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

FIGURE 3-1 `ifptest` Test Parameter Options Dialog Box

TABLE 3-1 describes the `ifptest` Test Parameter Options dialog box for different test modes.

TABLE 3-1 `ifptest` Options

Option	Description
Mailbox Loopback Test	Enables or disables the mailbox loopback command. This test writes data patterns into the mailboxes and then reads them back from the output mailboxes and verifies the data is correct. It is run by default, but it can be deselected.
Firmware Revision Check	Enables or disables the firmware revision check command. This test extracts the firmware revision from the RISC firmware code and verifies it against expected values. It is run by default, but it can be deselected.
Firmware Checksum Test	Enables or disables the firmware checksum command. This command instructs the interface's RISC processor to calculate the checksum on the current microcode and then compare it to the checksum that was loaded in with the microcode. It is run by default, but it can be deselected.
Check Module Revisions	Enables or disables the firmware check module command. This command returns the revision level of several modules on the interface card. Although this test is executed when enabled, the module revision levels are displayed only in verbose mode. It is run by default, but it can be deselected.

`ifptest` Test Modes

The `ifptest` test modes are listed in TABLE 3-2.

TABLE 3-2 `ifptest` Test Modes

Test Mode	Supported?	Description
Connection	Yes	Performs only an open/close operation. Can be run when attached to storage.
Functional (Offline)	Yes	Runs the full set of mailbox tests.
Expert (Offline)	No	Expert is supported only when an end device is selected (that is, disk).

Note – Connection test mode only opens the controller to verify that the path is still viable.

`ifptest` Command-Line Syntax

The `ifptest` command-line syntax is as follows:

```
/opt/SUNWvtsst/bin/ifptest standard-arguments -o dev=RegisterName,\
     mbox=enable|disable,fwrevcheck=enable|disable,\
     checksum=enable|disable,modrevcheck=enable|disable
```

TABLE 3-3 describes the arguments associated with the `ifptest` test. All options are enabled by default.

TABLE 3-3 `ifptest` Command-Line Syntax

Argument	Description
dev=*RegisterName*	The name of the device that is shown in `discman`(1M) output.
mbox= `enable|disable`	Enables or disables the mailbox loopback command. This test writes data patterns into the mailboxes and then reads them back from the output mailboxes and verifies the data is correct.
fwrevcheck= `enable|disable`	Enables or disables the firmware revision check command. This test extracts the firmware revision from the RISC firmware code and verifies against expected values.
checksum= `enable|disable`	Enables or disables the firmware checksum command. This command instructs the interface's RISC processor to calculate the checksum on the current microcode and then compare it to the checksum that was loaded in with the microcode.
modrevcheck= `enable|disable`	Enables or disables the firmware checksum command. This command returns the revision level of several sub-modules on the interface card. Although this test is executed when enabled, the module revision levels are displayed in verbose mode.

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/`*testname*. For more information, refer to "32-Bit and 64-Bit Tests" on page 5.

CHAPTER 4

Sun StorEdge SBus FC-100 Host Adapter Board Test (socaltest)

The socaltest(1M) test aids the validation and fault isolation of the Sun StorEdge SBus FC-100 host adapter board. In the case of a faulty board, the test tries to isolate the fault to the card, the GBIC module, or the direct memory access (DMA) between the host adapter card and the host memory.

Note – Do not run socaltest and a5ksestest at the same time, otherwise test failures might occur. Do not run socaltest with a high system load. Running this test with a large number of instances and concurrency might result in resource limitations that cause this test to fail.

This chapter is organized as follows:

socaltest Test Options

To display the socaltest Test Parameter Options dialog box shown in FIGURE 4-1, right-click on the test name in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

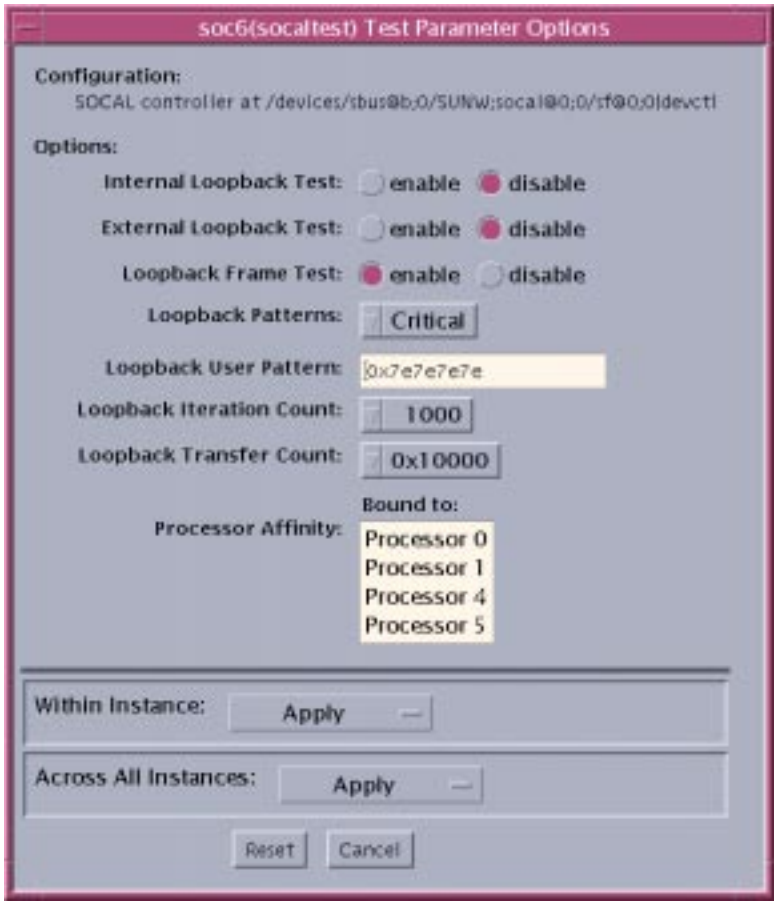

FIGURE 4-1 `socaltest` Test Parameter Options Dialog Box

TABLE 4-1 describes the `a5ktest` Test Parameter Options dialog box for different test modes.

TABLE 4-1 `socaltest` Options

`socaltest` **Options**	**Description**
Internal Loopback Test (with no storage attached)	Checks the host adapter card and the DMA with the host system, as follows: 1. A frame is created in the host adapter local memory, sent out through the SOC+ transmitter, and internally looped back to the SOC+ receiver. The received data is compared to the original data. 2. A frame is created in the host adapter local memory, sent out through the SOC+ transmitter, and looped back through the SERDES (serializer-deserializer) chip on the host adapter card. The received data is compared to the original data. 3. A frame is created in the host main memory, transferred through the DMA to the host adapter transmitter, looped back within the SOC+ chip, and transferred from the receiver to the host main memory through the DMA. The received frame is compared to the original transmitted frame, which tests the host memory to the host adapter DMA path.If the board is not connected to storage, the Internal loopback test is selected by default. External and Loopback Frame tests are disabled.
External Loopback Test (with no storage attached)	Verifies the proper functioning of the GBIC module. A frame is created in the host adapter local memory and is sent out and looped back through the external loopback connector attached to the port. If the external loopback test is run together with the internal loopback test, the DMA path is also tested by creating a frame in host main memory, transferring it to the host adapter through the DMA, looping it back through the external loopback connector, and transferring the received frame back to the host main memory by DMA. By default, this is always disabled.
Loopback Frame Test (with storage attached)	Sends out a buffer initialized with the selected pattern and compares it to the looped-back frame. It passes if the two match and fails if they do not. If the board is connected to storage, the Loopback Frame test is selected by default. Internal and external loopback tests are disabled.
Loopback Patterns	Applies only to Loopback Frame test. `user` uses the pattern entered by `user`. `critical` runs the 10 most critical patterns for fault detection. `all` runs the complete list of hexadecimal patterns for fault detection. The `all` pattern includes the `critical` pattern. The default is `critical`, which applies only to Loopback Frame Pattern.
Loopback User Pattern	User specified pattern in hexadecimal. The default is `0x7e7e7e7e`.

TABLE 4-1 `socaltest` Options

`socaltest` **Options**	**Description**
Loopback Frame Pattern	List the selectable patterns for the Loopback Frame test.
Loopback Iteration Count	Sets the number of times to loop the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `10`.
Loopback Transfer Count	Controls the packet size used in the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `0x10000`.

In addition to the tests described above, the `socaltest` test also tests the basic functions of the SOC+ chip, the on-board XRAM, and the host control buffer by invoking the appropriate tests implemented in firmware.

Note – You cannot run the Internal or External Loopback tests if the port is connected to a disk array.

`socaltest` Test Modes

The `socaltest` test modes are listed in TABLE 4-2.

TABLE 4-2 `socaltest` Test Modes

Test Mode	**Supported?**	**Description**
Connection	Yes	Performs an open/close on the device.
Functional (Offline)	Yes	Runs the full set of tests.
Expert (Offline)	No	Supported only when an end device (such as a disk) is selected.

socaltest Command-Line Syntax

The socaltest command-line syntax as follows:

```
/opt/SUNWvtsst/bin/socaltest standard-arguments -o dev=RegisterName,\
     elb=enable|disable,ilb=enable|disable,lbf=enable|disable,\
     ptn=pattern,run_all={user|critical|all},trans_count=transfer_count
```

TABLE 4-3 describes the arguments associated with the socaltest test.

TABLE 4-3 socaltest Command-Line Syntax

Argument	Description
dev=*RegisterName*	The name of the device that is shown in discman(1M) output.
elb=enable|disable	Enables or disables the External Loopback test.
ilb=enable|disable	Enables or disables the Internal Loopback test.
lbf=enable|disable	Enables or disables the Loopback Frame test.
run_all= **{**user|critical|all**}**	Choice of pattern to run. User is the one pattern entered above. critical is the I/O pattern causing device failure. all is a complete list of patterns. critical is the default pattern.
trans_count= *transfer-count*	Buffer sizes of the pattern buffer.
ptn=*pattern*	Specifies the pattern in hexadecimal, for example: ptn=0x7e7e7e7e.

Note – 64-bit tests are located in the sparcv9 subdirectory: /opt/SUNWvtsst/bin/sparcv9/*testname*. For more information, refer to “32-Bit and 64-Bit Tests” on page 5.

CHAPTER 5

Sun StorEdge PCI Dual Fibre Channel Host Adapter Board Test (`qlctest`)

The `qlctest`(1M) test comprises several subtests that test the functions of the Sun StorEdge PCI dual Fibre Channel host adapter board. The PCI dual fibre board is an HBA that has diagnostic support. This diagnostic test is not scalable.

Note – Do not run customer applications while running `qlctest`, as the test will take priority over customer data requests. Data cannot be accessed while the `qlctest` test is running.

Do not run other tests while the `qlctest` test is running. The `qlctest` test might cause other tests to fail.

The `qlctest` test is an intervention mode test. No subtests can be selected unless intervention is set.

Running the `qlctest` test can affect the switch counters along with the operation of Sun Network Storage Agent.

This chapter is organized as follows:

qlctest Subtests

The seven subtests that run in both intervention and functional modes are as follows:

- Test if connected to storage
- Online Self Test
- Mailbox Loopback Test
- Firmware Checksum Test
- External Loopback Test
- Internal Loopback Test 1 Bit
- Internal Loopback Test 10 Bit

The External Loopback test is an intervention test. To test the fibre loop, leave the HBA port attached to the storage. In the Test Parameters Options dialog box, set the "Test if Connected to Storage" option to "Yes." To test the PCI FC-100 FC-AL board alone, connect a loopback cable to the FC-AL port. This cable can be made by taking a regular cable and splitting it apart. Then loop the transmitter side of the port to the receiver side of the port.

▼ To Create a Loopback Cable

1. **Obtain the following tools:**
   - Small standard flat-head screwdriver
   - Snips
   - Sun cable part number X973A (two-meter cable) Quantity 1
2. **Insert the screwdriver between the tabs holding the casing together and pop the casing apart.**
3. **Remove the black shrinkwrap from the cable.**
4. **Pull the cables apart.**

5. **To loop back the signal insert one end of the cable into the transmitter side and insert the other end into the receiver side.**

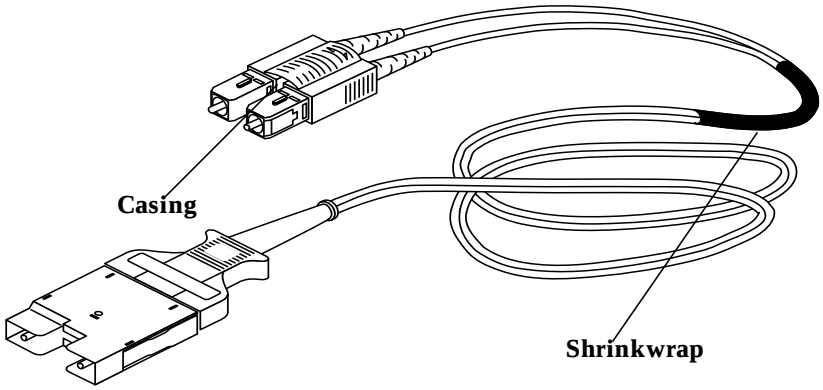

FIGURE 5-1 Creating a Loopback Cable

`qlctest` Options

To display the dialog box shown in FIGURE 5-2, right-click on the test name in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

To run the `qlctest` when connected to storage, you must enable the "Test if Connected to Storage" button in the `qlctest`, command Test Parameter Options dialog box as shown in FIGURE 5-2.

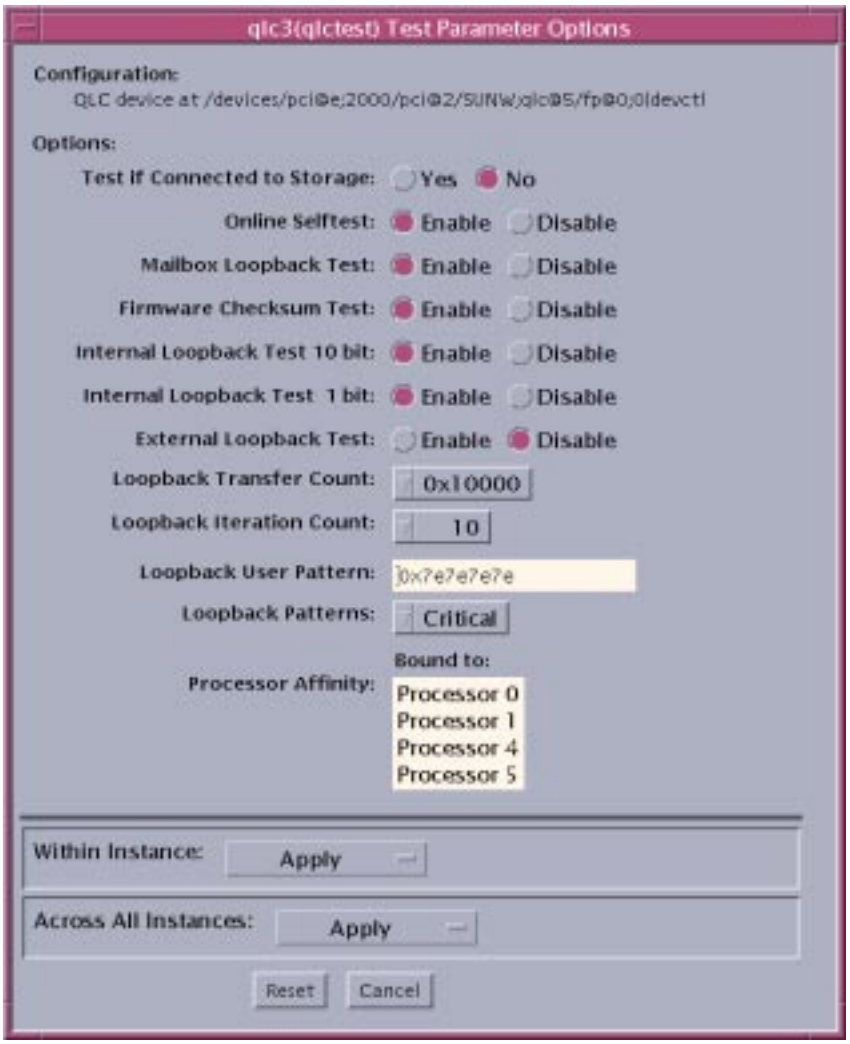

FIGURE 5-2 `qlctest` Test Parameter Options Dialog Box

TABLE 5-1 describes the `a5ktest` Test Parameter Options dialog box for different test modes.

TABLE 5-1 `qlctest` Options

Option	Description
Test if Connected to Storage	Runs `qlctest` while connected to storage.
Online Selftest	Evaluates the functionality of ISP hardware by performing the following tests: • Transmit FIFO test • Receive FIFO test • SRAM test • Miscellaneous Register tests It runs by default, but it can be deselected.
Mailbox Loopback Test	Loads a series of registers into the input mailboxes on the card and then reads the output mailboxes and compares the results. Verifies that the system side of the card is operating correctly and that the internal data paths are correct. It runs by default, but it can be deselected.
Firmware Checksum Test	Runs an internal checksum test on the installed firmware. This test verifies that the RISC RAM on the card is fully functional and that the installed firmware is still intact. This test also serves as a quick RAM check of the RISC RAM. It runs by default, but it can be deselected.
Internal Loopback Test 10-bit	Performs an internal loopback test within the host adapter ISP hardware at the 10-bit interface. This test is done with data sourcing from the system memory. You select the desired data pattern, transfer length, and iteration count from the Test Parameter Options dialog box. It runs by default, but it can be deselected.
Internal Loopback Test 1-bit	Performs an internal loopback test within the host adapter ISP hardware at the 1-bit interface. This test is done with data sourcing from the system memory. You select the data pattern, transfer length, and iteration count from the Test Parameter Options dialog box. It runs by default, but it can be deselected.
External Loopback Test	Performs an external loopback test. This test is done with data sourcing from the system memory and going to the system memory. You select the data pattern, transfer length, and iteration count from the Test Parameter Options dialog box. This is an intervention test, because a loopback cable from the transceiver to the QLC receiver of the QLC port must be inserted when testing this port by itself. This subtest can also test the entire Fibre Channel loop when the loop is connected to the storage to be tested. It does not run by default, but it can be selected.

TABLE 5-1 `qlctest` Options *(Continued)*

Option *(Continued)*	Description
Loopback Transfer Count	Controls the packet size used in the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `0x10000`.
Loopback Iteration Count	Sets the number of times to loop the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `10`.
Loopback User Pattern	Uses the user-entered data pattern to loop for the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `0x7e7e7e7e`.
Loopback Patterns	Selects the data pattern to loop for the internal 10-bit, internal 1-bit, and external loopback tests. The default value is, `0x7e7e7e7e`.

`qlctest` Test Modes

The `qlctest` test modes are listed in TABLE 5-2.

TABLE 5-2 `qlctest` Test Modes

Test Mode	Supported?	Description
Connection	Yes	Opens and closes the QLC port
Functional (Offline)	Yes	Runs the full set of tests
Expert	No	Expert is supported only when an end device (such as a disk) is selected.

qlctest Command-Line Syntax

The qlctest command-line syntax is as follows:

```
/opt/SUNWvtsst/bin/qlctest standard-arguments -o dev=RegisterName,\
     run_connect=yes|no,checksum=enable|disable,\
     selftest=enable|disable,mbox=enable|disable,\
     ilb_10=enable|disable,ilb=enable|disable,\
     elb=enable|disable,xcnt=0xtransfer-count,\
     icnt=iteration-count,lbfpattern=0xpattern,\
     run_all=user|critical|all
```

TABLE 5-3 describes the arguments associated with the qlctest test.

TABLE 5-3 qlctest Command-Line Syntax

Argument	Description
dev=*RegisterName*	The name of the device that is returned by discman.
run_connect=yes|no	If **run_connect** is set to yes, qlctest runs when the tested port is connected to storage. If the port being tested is not connected to storage, this option has no effect.
checksum= enable|disable	Enables or disables the checksum command. Runs an internal checksum test on the installed firmware. This verifies that the RISC RAM on the card is fully functional and that the installed firmware is still intact. This test also serves as a quick RAM check of the RISC RAM.
selftest= enable|disable	Enables or disables the selftest command. Evaluates the functionality of the ISP hardware.
mbox= enable|disable	Enables or disables the mailbox loopback command. This test writes data patterns into the mailboxes and then reads them back from the output mailboxes and verifies the data is correct.
ilb_10= enable|disable	Enables or disables the internal 10-bit test. Performs internal loopback test within the host adapter ISP hardware at the 10-bit interface.
ilb=enable|disable	Enables or disables the internal 1-bit test. Performs internal loopback test within the host adapter ISP hardware at the 1-bit interface.

TABLE 5-3 `qlctest` Command-Line Syntax

Argument	Description
`elb=``enable|disable`	Enables or disables the external loopback test. The desired data pattern, transfer length, and iteration count can be selected via the Test Parameter Options dialog box. Requires a cable for this intervention test.
`xcnt=`*0xtransfer-count*	Controls the packet size to be transferred, for example, `0x1000`.
`icnt=`*iteration-count*	Controls the number of times the loopback test will run, for example, `100`.
`lbfpattern=`*0xpattern*	Lists the data pattern to loop, for example, `0x7e7e7e7e`.
`run_all=` {`user|critical|all`}	Choice of pattern to run. user is the one pattern entered above. `critical` is the I/O pattern causing device failure. `all` is a complete list of patterns. `critical` is the default pattern.

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/`*testname*. For more information, refer to “32-Bit and 64-Bit Tests” on page 5.

CHAPTER 6

Sun StorEdge A5*x*00 Array Enclosure Test (a5ksestest)

The a5ksestest(1M) test provides configuration verification, fault isolation, and repair validation of the disks in the Sun StorEdge A5*x*00 array. The a5ksestest tests both Sun StorEdge A5*x*00 14- and 22-slot disk enclosures.

This chapter is organized as follows:

a5ksestest Subtests

The Sun StorEdge A5*x*00 array is a high-availability, mass storage subsystem consisting of the following components:

- SCSI Fibre Channel protocol host adapters with dual 100-Mbyte FC-AL ports
- A disk enclosure
- A front panel display for configuration information
- Up to two interface boards, that provide FC-AL connections to the enclosure and provide status information and control of the conditions within the enclosure
- Other field-replaceable units (FRUs) within the enclosure that include power supply units, fan trays, and a backplane

The StorTools software attaches an instance of a5ksestest whenever a Sun StorEdge A5*x*00 SCSI enclosure services (SES) device is found. Normally, two instances occur for each path to a Sun StorEdge A5*x*00 array.

Note – Do not run the `a5ksestest` and `socaltest` tests at the same time, otherwise test failures might occur.

Note – The Sun StorEdge A5*x*00 array was formally known as the Sun Enterprise Network Array™. The `a5ksestest` test tests both of these disk array subsystems.

The `a5ksestest` test detects all Sun StorEdge A5*x*00 arrays that are connected to the HBA and collects relevant configuration information. FIGURE 6-1 shows the Test

Parameter Options dialog box, which contains a sample configuration listing and test parameters.

FIGURE 6-1 `a5ksestest` Test Parameter Options Dialog Box

TABLE 6-1 describes the extent of the test coverage and provides samples of the configuration information that is displayed.

TABLE 6-1 `a5ksestest` Coverage

Test Coverage	Description
HBA Connections	The `a5ksestest` test searches for all active and inactive connections between the host and the enclosure and reports the number of existing active connections. If verbose mode is enabled, the port on the host side and the GBIC port on the enclosure side are reported for each active connection. The test also diagnoses any inactive connection(s) and reports the possible causes for failure. The test fails if there are one or more inactive connections.
Disk Access	During testing, each disk is accessed through each active connection leading to that disk. The `a5ksestest` test opens partition 2 on the disk and reads 512 bytes of raw data.
Enclosure Status	The status of the enclosure is obtained by querying the SCSI Enclosure Services (SES) device in the enclosure. Detailed information regarding the status of the elements within the enclosure is reported. The test fails if a critical condition is detected in the enclosure. TABLE 6-2 shows how the status information is reported.

The following provides sample output for an enclosure attached to an SBus Socal board .

CODE EXAMPLE 6-1 SBus Socal Board Output Example

```
StorTools.a5ksestest.1010 12/05/2000 13:48:53 a5ksestest ses0 VERBOSE:
“MYBOX: Lower-Right GBIC connected to host via
/devices/sbus@1f,0/SUNW,socal@0,0:1”
StprTools.a5ksestest.1006 06/05/97 13:48:53 a5ksestest ses0 VERBOSE:
“MYBOX: Interface Board (Bottom one in the enclosure) detected to be installed
and OK”
StorTools.a5ksestest.6023 06/05/97 13:48:53 a5ksestest ses0
ERROR: “MYBOX: Cannot communicate with the enclosure via
/devices/sbus@1f,0/SUNW,socal@0,0:0; possibly connected to Lower-Left
GBIC in the enclosure”
Probable_Cause(s):
    (1)Signal too low at the GBIC module in the enclosure
    (2)Faulty cable or cable disconnected
    (3)Faulty GBIC module on the host side
Recommended_Action(s):
    (1)Ensure the cables are properly connected
    (2)Please contact your service representative
StorTools.a5ksestest.2006 06/05/97 13:48:53 a5ksestest ses0 INFO:
“MYBOX: Number of connections to the host: 1"
```

TABLE 6-2 lists the element enclosure status.

TABLE 6-2 Element Enclosure Status

Enclosure Element	Status Measured	Status Options
Disk	• Fault Sensed • Status of ports A and B	• Yes / No • Connected / Bypassed
Power Supply	• Status • Temperature • AC Input • DC Output	• On / Off • OK / Cricical / Overtemp / Abnormal • OK / Not OK • OK / Not OK
Fan	• Status • Speed	• On / Off • High / Low / Stopped
Backplane	• Status • Status of ports A and B	• OK / Failed • Connected / Byupassed
Interface Board	• Temperature • Loop A Status • Loop B Status	• OK / Critical / Overtemp • OK / Failed • OK / Failed
GBIC	• Status • Signal Level • Transmitter	• Disabled / Enabled • OK / Too low • OK / Failed

a5ksestest Test Options

To display the a5ksestest Test Parameter Options dialog box shown in FIGURE 6-1, right-click on the test name in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

a5ksestest Test Modes

The a5ksestest test modes are listed in TABLE 6-3.

TABLE 6-3 a5ksestest Test Modes

Test Mode	Supported?	Description
Connection test	Yes	In this mode, the host connections and the status of the enclosure are checked. The test fails if there are any broken connections or if a critical enclosure condition is detected. Noncritical conditions result in a warning.
Functional (Offline)	Yes	All test options are allowed in this mode.
Expert	No	Expert is supported only when an end device (such as a disk) is selected.

A sample output of the connection test is shown in CODE EXAMPLE 6-2

CODE EXAMPLE 6-2 ConnectionTest

```
02/28/01 18:09:54 diag176.Central.Sun.COM StorTools 4.1: VTSID 2013
a5ksestest.INFO : Connected <Enclosure Name=c, Enclosure Status=OK>
Connection test complete
```

a5ksestest Command-Line Syntax

The a5ksestest command-line syntax is as follows:

```
/opt/SUNWvtsst/bin/a5ksestest standard-arguments\
     -o dev=RegisterName,delay=delay-in-seconds
```

TABLE 6-4 describes the arguments associated with the a5ksestest test.

TABLE 6-4 a5ksestest Command-Line Syntax

Argument	Description
dev=*RegisterName*	The name of the device that is shown in discman(1M) output.
delay=*delay-in-seconds*	Sets the minimum delay (in seconds) between successive iterations of the test.

Note – 64-bit tests are located in the sparcv9 subdirectory: /opt/SUNWvtsst/bin/sparcv9/*testname*. For more information, refer to “32-Bit and 64-Bit Tests” on page 5.

CHAPTER 7

Sun StorEdge A5*x*00 Array Test (a5ktest)

The a5ktest(1M) test verifies the functionality of Sun StorEdge A5*x*00 array using five subtests: Media, File System, Asynchronous I/O, Write/Read Buffer, and Self Test.

The a5ktestTest Parameter Options dialog box shows all the partitions that are available for testing. The file System subtest can be run only if the selected partition is mounted (described in TABLE 7-2).

An instance of a5ktest is present for each disk in a Sun StorEdge A5*x*00 array.

This chapter is organized as follows:

a5ktest Test Options

To reach the dialog box below, right-click on the a5ktest Test Parameter Options in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

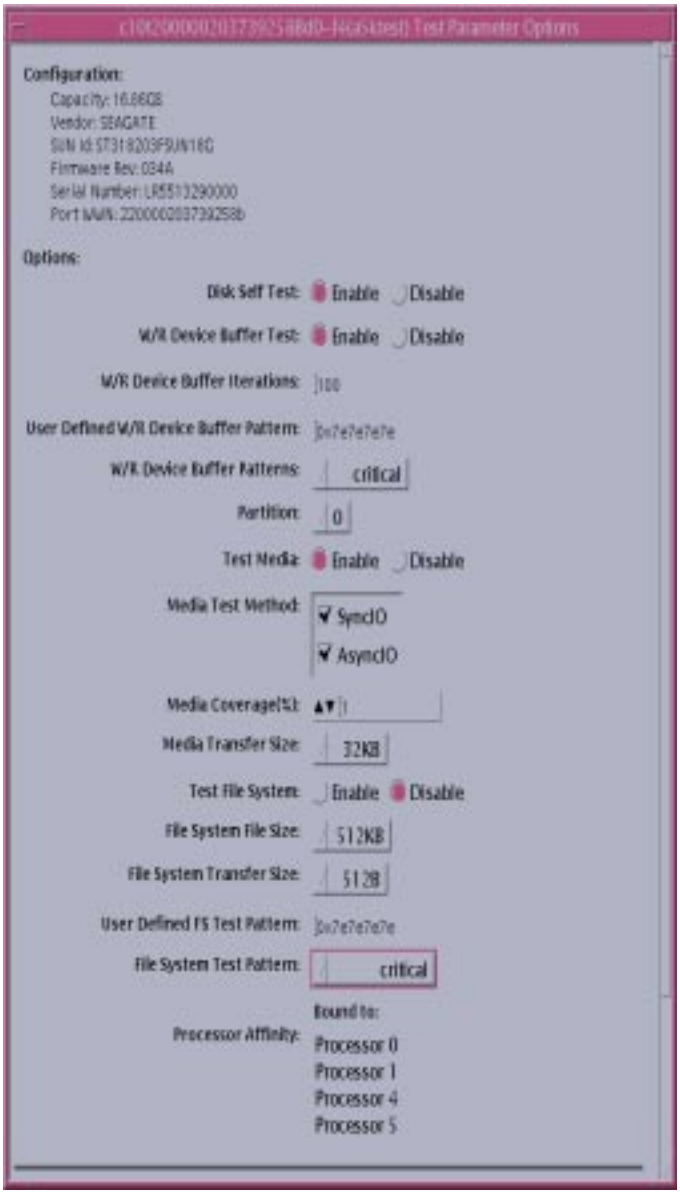

FIGURE 7-1 `a5ktest` Test Parameter Options Dialog Box

TABLE 7-3 describes the test mode options for the `a5ktest` test.

TABLE 7-1 `a5ktest` Options

Options	Description
Disk Self Test	Enables or disables the disk self test.
W/R Buffer Test	Enables or disables the W/R Device Buffer Test.
W/R Device Buffer Iterations	Enables users to specify the buffer W/R iterations.
User Defined W/R Device Buffer Pattern	Test pattern options for the W/R Device Buffer Test. This option is valid only when the user option is chosen in the W/R Device Buffer Patterns.
W/R Device Buffer Patterns	Enables you to choose user, critical, and allpattern options.
Partition	The partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number, and `/usr` is the mount point.
Test Media	Enables or disables the Media subtest.
Media Test Method	Enables or disables the Media Test Methods (SyncIO and AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System File Size	Creates a file twice the size of what is specified.
File System Transfer Size	Displays the transfer size of the File System subtest.
User Defined FS Test Pattern	Enables you to choose an (input) test pattern for a file system subtest. This option is valid only when the user option is chosen in File System Test Patterns.
File System Test Pattern	Enables you to choose the test pattern of the File System subtest.

TABLE 7-1 `a5ktest` Options *(Continued)*

Options	Description
Connection Test for disk	• Option Menu for hard disk partition—0 to 7 [default] • Test Media—[Enable](fixed to Enable) • Media Write Read Mode—[Read Only](fixed to Read Only) Media Test Method-[SyncIO] (fixed to SyncIO) • Media Coverage(%)—1% • Media Transfer Size—[2KB] • Test File System—[Disable](fixed to Disable)
Functional Test for disk	• Partition—0 - 7 [default] • Test Media—[Enable | Disable] • Read Mode—[Read-only | WriteRead] • Media Test method—[SyncIO | AsyncIO] • Media Coverage(%)—1% • Media Transfer Size—[2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB] • Test File System—[Enable | Disable] • File System File Size—[512KB | 2MB | 8MB | 20MB | 100MB | 200MB] • File System Transfer Size—[512B | 1024B | 10KB | 40KB | 80KB] • File System Test Pattern—{user | critical | all pattern| sequential | random} • Test device buffer (`wrdevbuf` option)[Enable | Disable] • Number of times to run pattern (`wrdevbufpasses` option) • Test device buffer pattern (`wrdbptn` option)—{user | critical | all pattern} • User Defined Test device buffer pattern (`wrdevbufptn` option)
Expert test for disk	• The Expert mode runs `stexpert` on the targeted disk and its data path FRUs. If a failure is detected, the system might display a prompt to run `stexpert` interactively from the command line.

Note – If you are using the `sequential` option for the Functional Test for disk, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

TABLE 7-2 describes the `a5ktest` subtests.

TABLE 7-2 `a5ktest` Subtests

Subtest	Description
Media subtest	Verifies disk media by reading data from the disk. The Media subtest treats a disk as one large chunk of contiguous data.
File System subtest	Verifies the file system's integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or pre-mounted, then the test is blocked. The test opens two temporary files (of the size specified on `File System File Size`) and performs a read / write test.
Asynchronous I / O subtest	Uses the asynchronous read feature of the Solaris disk driver to exercise the disk. In read-only mode, the test sends a maximum of four asynchronous read packets, each with a random size and a random offset into the selected partition. The test then waits for all outstanding I / O activity to complete before issuing another round of packets. This process continues until the whole area is tested.
Write / Read Device Buffer subtest	Verifies the Fibre Channel loop by performing a pattern test. If the write / read device buffer test fails on a particular device, there is a problem with an upstream Fibre Channel component that might not be on the actual device where the test failed. Refer to Chapter 13 for information on using the `stexpert` command to isolate the problem.
Self Test	Instructs a device to run its internal diagnostics. If the device fails this test, check the error message for a more detailed description of the error.

a5ktest Test Modes

The a5ktest test modes are listed in TABLE 7-3.

TABLE 7-3 a5ktest Test Modes

Test Mode	Supported?	Description
Connection	Yes	Only one instance of the a5ktest test is allowed for each disk device. The a5ktest test displays messages and reports errors. The test also opens the disk, checks the disk configuration, reads a few blocks, and then closes the disk. No File System subtest is run. No Write option is available in Connection test mode.
Functional (Offline)	Yes	More than one instance of the a5ktest test is allowed for one disk device. Both the File System and Media subtests can be run in offline Functional test mode.
Expert (Offline)	Yes	The Expert mode runs stexpert on the targeted disk and its data path FRUs. If a failure is detected, you might be requested to run stexpert interactively from the command line.

a5ktest Command-Line Syntax

The a5ktest command-line syntax is shown below.

```
/opt/SUNWvtsst/bin/a5ktest standard-arguments -o \
      dev=RegisterName,partition=0–7,rawsub=enable|disable,\
      rawcover=coverage,method=method,rawiosize=size,\
      fssub=enable|disable,fssize=file-system-size,\
      fsiosize=IO-transfer-size,udptn=0xpattern,fspattern=data-pattern,\
       wrdevbuf=enable|disable,wrdevbufptn=0xPattern,\
      wrdevbufpasses=passes-per-pattern,wrdbptn=data-pattern,\
       selftest=enable|disable
```

Note – The text cannot execute in the KornShell (ksh(1)) with all the a5ktest test-specific command-line arguments. Use this command in an executable file or use a different shell.

TABLE 7-4 describes the arguments associated with the `a5ktest` test.

TABLE 7-4 `a5ktest` Command-Line Syntax

Argument	Description
`dev`=*RegisterName*	The name of the device that is shown in `discman`(1M) output.
`partition`=`0–7`	The partition number to test, such as `partition=6(/export/s6)` ,if mounted on partition 6.
`rawsub`= `enable|disable`	Enables or disables the Media subtest.
`rawcover=`*value*	Specifies media coverage from 0–100% of the partition.
`method=`*value*	Specifies the Media Test Methods (SyncIO and AsyncIO).
`rawiosize=`*size*	The media size to transfer. Values equal: 2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB
`fssub=` `enable|disable`	Enables or disables the File System subtest.
`udptn`=`0x00000000`	Used to specify a specific pattern for file system testing.
`fspattern`=*data-pattern*	Specifies the File System data pattern as sequential or random. {`user|critical|allpattern|sequential|random` }
`fssize`=*file-system-size*	Indicates the File System subtest size in kilobytes or megabytes: • K | k | KB | kb—kilobytes • M | m | MB | mb—megabytes • {512KB | 2MB | 8MB | 20MB | 100MB | 200MB}
`fsiosize`=*IO-transfer-size*	Indicates the size of the file system subtest I/O transfer in bytes or kilobytes: {512B | 1024B | 10KB | 40KB | 80KB}
`wrdevbuf=` `enable|disable`	Runs the Write/Read device Buffer test on a specified disk.
`wrdevbufptn=`*0xpattern*	Specifies a specific pattern to send to the write/read device buffer.
`wrdevbufpasses=` *passes-per-pattern*	Runs the specified number of each pattern to the write/read buffer on the disk.
`wrdbptn=`*data-pattern*	`wrdbptn` uses the pattern for the W/R device buffer. `critical` is the 10 most critical patterns for fault detection. `all` is the complete list of hexadecimal patterns for fault detection. `all` patterns also includes the critical patterns. The default is `critical`.
`selftest=` `enable|disable`	Enables or disables the `selftest`.

Note – If you are using the `sequential` option for the `fspattern` option, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/`*testname*. For more information, refer to “32-Bit and 64-Bit Tests” on page 5.

CHAPTER 8

Sun StorEdge T3 Array Test (t3test)

The t3test(1M) test verifies the functionality of Sun StorEdge T3 array logical unit numbers (LUNs) using three subtests: Media, File System, and Asynchronous I/O.

The file system subtest can be run only if the selected partition is mounted (described in TABLE 8-2).

An instance of the t3test test is present for each LUN.

This chapter is organized as follows:

t3test Test Options

To display the dialog box shown in FIGURE 8-1, right-click on the t3test Test Parameter Options in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

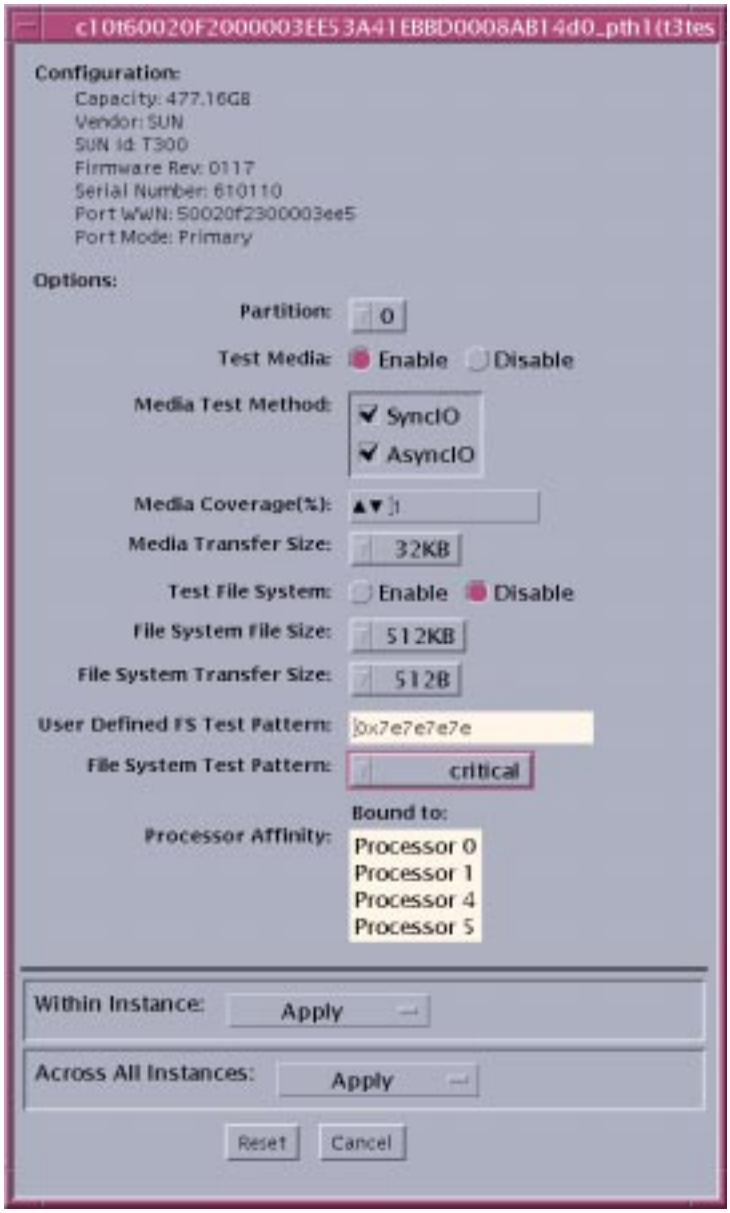

FIGURE 8-1 `t3test` Test Parameter Options Dialog Box

TABLE 8-3 describes the test mode options for the `t3test` test.

TABLE 8-1 `t3test` Configurations and Options

Options	Description
Partition	The partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Test Media	Enables or disables the Media subtest.
Media Test Method	Enables or disables the Media Test Methods (SyncIO and AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System File Size	Creates a file twice the size of what is specified.
File System Transfer Size	The transfer size of the File System subtest.
User Defined FS Test Pattern	Test pattern options.
File System Test Pattern	The test pattern of the File System subtest.
Connection Test for LUN	• Option Menu for hard LUN partition—0 to 7 [default] • Test Media—[Enable] (fixed to Enable) • Media Write Read Mode—[Read Only] (fixed to Read Only) Media Test Method-[SyncIO] (fixed to SyncIO) • Media Coverage(%)—1% • Media Transfer Size—[2KB] • Test File System—[Disable](fixed to Disable)
Functional Test for LUN	• Partition—0 - 7 [default] • Test Media—[Enable | Disable] • Read Mode—[Read-only | WriteRead] • Media Test method—[SyncIO | AsyncIO] • Media Coverage(%)—1% • Media Transfer Size—[2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB] • Test File System—[Enable | Disable] • File System File Size—[128KB | 256KB | 512KB | 2MB | 8MB | 20MB | 100MB | 200MB] • File System Transfer Size—[512B | 1024B | 10KB | 40KB | 80KB] • User Defined FS Test Pattern (`udptn` option) • File System Test Pattern—{user | critical | allpattern | sequential | random}
Expert Test for LUN	• The Expert mode runs `stexpert` on the targeted LUN and it's data path FRUs. If a failure is detected, you might be requested to run `stexpert` interactively from the command line.

Note – If you are using the `sequential` option for the File System Test Pattern, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

TABLE 8-2 describes the `t3test` subtests.

TABLE 8-2 `t3test` Subtests

Subtest	Description
Media subtest	Verifies LUN media by reading data from the LUN. The Media subtest treats a LUN as one large chunk of contiguous data.
File System subtest	Verifies the LUN system's integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or premounted, the test is blocked. The test opens two temporary files (of the size specified on `File System File Size`) and performs a read/write test.
Asynchronous I/O subtest	Uses the asynchronous read/write feature of the Solaris LUN driver to exercise the LUN. In read-only mode, the test sends a maximum of four asynchronous read packets, each with a random size and a random offset into the selected partition. The test then waits for all outstanding I/O activity to complete before issuing another round of packets. This process continues until the whole area is tested. In read-write mode, one write packet is issued in every four read packets as a spot check of the write operation.

Monitoring Sun StorEdge T3 Array Messages

Before using the StorTools diagnostic package to monitor messages from a Sun StorEdge T3 array, you must use the following procedures to set up the array to mirror its `/syslog` messages to the host that is running the StorTools package. The array messages may be mirrored to the `/var/adm/messages.t3` file on the host.

▼ To Set Up the Host

1. **On the host system, add the following line to the `/etc/syslog.conf` file.**

```
local7.debug /var/adm/messages.t3
```

Note – When editing the `/etc/syslog.conf` file, you must insert a tab between `local7.debug` and `/var/adm/messages.t3`. If you inset a space character, the following error message is displayed: `syslogd: line 37: unknown priority name "debug /var/adm/messages.t3".`

---

2. **Ensure that the `/var/adm/messages.t3` file exists by typing:**

```
# touch /var/adm/messages.t3
```

3. **Send a hangup signal to the `syslog` daemon.**

   For example:

```
# ps -ef | grep syslog
    root   242     1   0     Sep 22 ?       0:00 /usr/sbin/syslogd
    root 23537 21154   0   18:16:19 pts/5   0:00 grep syslog
# kill -HUP 242
```

▼ To Set Up the Sun StorEdge T3 Array

Note – To use the `ftp`(1) program to transfer the `syslog.conf` and `host` files to the Sun StorEdge T3 array, you must have set a root password on the array. Otherwise the `ftp` login will fail.

---

1. **On the host system, use a text editor to create a `syslog.conf` file in the `/tmp` directory containing the following line:**

```
*.info @hostname
```

where *hostname* is the name of the host running the StorTools package.

Note – This allows Info, Notice, Warning, and Error messages to be passed from the array to the host.

---

2. **Create a `hosts` file in the `/tmp` directory that contains the following line identifying the host's IP address and name:**

```
192.xxx.xxx.xxx hostname
```

3. **Use the `ftp`(1) utility to transfer the `syslog.conf` and `hosts` files you created in steps 1 and 2 from the host system to the array.**

   For example:

```
hostname# ftp t3name
Connected to t3name
220 IPAddress pSOSystem FTP server (NUPPC/2.0.0-G) ready.
Name (diag216:root): root
331 Password required for root.
Password:
230 User root logged in.
ftp> cd etc
250 CWD command successful.
ftp> put syslog.conf
200 PORT command successful.
150 Opening ASCII mode data connection for syslog.conf.
226 Transfer complete.
local: syslog.conf remote: syslog.conf
17 bytes sent in 0.00046 seconds (36.17 Kbytes/s)
ftp> put hosts
200 PORT command successful.
150 Opening ASCII mode data connection for hosts.
226 Transfer complete.
local: hosts remote: hosts
ftp> quit
221 Goodbye
hostname#
```

   Where *hostname* is the name of the host running the StorTools package and *t3name* is the name of the Sun StorEdge T3 array.

4. **On the array, start the message traffic on the host.**

   The `syslogd`(1M) must be redirected at the array.

```
t3name:/etc:<4>set logto *
```

5. **Type the following to reboot the Sun StorEdge T3 array:**

```
t3name:/etc:<5>sync
t3name:/etc:<5>reset
Reset the system, are you sure? [N]: y
```

6. **Reboot the host or restart the SNMP daemon.**

t3test Test Modes

The t3test test modes are listed in TABLE 8-3.

TABLE 8-3 t3test Test Modes

Test Mode	Supported?	Description
Connection	Yes	Only one instance of the t3test test is allowed for each LUN device. The t3test test displays messages and reports errors. The test also opens the LUN, checks the LUN configuration, reads a few blocks, and then closes the LUN. No File System subtest is run. No Write option is available in Connection test mode.
Functional (Offline)	Yes	More than one instance of the t3test test is allowed for one disk device. Both the File System and Media subtests can be run in offline Functional test mode.
Expert (Offline)	Yes	The Expert mode runs stexpert on the targeted LUN and its data path FRUs. If a failure is detected, you might be requested to run stexpert interactively from the command line.

t3test Command-Line Syntax

The t3test command-line syntax is as follows:

```
/opt/SUNWvtsst/bin/t3test standard-arguments -o \
      dev=RegisterName,partition=0—7,rawsub=Enable | Disable,\
      method=method,rawiosize=size,fssub=Enable | Disable,\
      fssize=file-system-size,fsiosize=file-system-size,udptn=0xpattern \
      fspattern=data-pattern,rawcover=coverage
```

TABLE 8-4 describes the arguments associated with the `t3test` test.

TABLE 8-4 `t3test` Command-Line Syntax

Argument	Description
dev=*RegisterName*	The name of the device that is shown in `discman`(1M) output.
partition=*0—7*	The partition number to test, such as `partition=/6(/export/s6)`, if mounted on partition 6.
rawsub= `enable|disable`	Enables or disables the Media subtest.
method=*method*	The Media Test Methods (SyncIO and AsyncIO). {`SyncIO	AsyncIO	SyncIO+AsyncIO`}
rawiosize=*size*	The media size to transfer. Values equal: 2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB
fssub= `enable|disable`	Enables or disables the File System subtest.
fssize=*file-system-size*	Indicates the File System subtest size in kilobytes or megabytes: • K | k | KB | kb—kilobytes • M | m | MB | mb—megabytes • {512KB | 2MB | 8MB | 20MB | 100MB | 200MB}
fsiosize=*file-system-size*	Indicates the size of the file system subtest I/O transfer in bytes or kilobytes: {512B / 1024B / 10KB / 40KB / 80KB}
udptn=*0xpattern*	Specifies a specific pattern for file system testing.
fspattern=*data-pattern*	Specifies the File System subtest data pattern as sequential or random. {user | critical | allpattern| sequential | random }
rawcover=*coverage*	Specifies media coverage from 0-100% of the partition.

Note – If you are using the `sequential` option for the `fspattern` option, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/`*testname*. For more information, refer to “32-Bit and 64-Bit Tests” on page 5.

CHAPTER 9

Sun StorEdge A3500FC Array Test (a3500fctest)

The a3500fctest(1M) test verifies the functionality of the Sun StorEdge A3500FC disk tray using four subtests: Media, File System, Write/Read Buffer, and Asynchronous I/O.

The file System subtest can be run only if the selected partition is mounted (described in TABLE 9-2).

An instance of a3500fctest is present for each LUN.

This chapter is organized as follows:

a3500fctest Test Options

To display the dialog box shown in FIGURE 9-1, right-click on the a3500fctest Test Parameter Options dialog box in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

FIGURE 9-1 `a3500fctest` Test Parameter Options Dialog Box

TABLE 9-1 describes the test mode options for the `a3500fctest` test.

TABLE 9-1 `a3500fctest` Configurations and Options

Options	Description
Partition	The partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Test Media	Enables or disables the Media subtest.
Media Test Method	Enables or disables the Media Test Methods (SyncIO or AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System File Size	Creates a file twice the size of what is specified.
File System Transfer Size	The transfer size of the File System subtest.
User Defined FS Test Pattern	The test pattern for a file system subtest. This option is valid only when the user option is chosen in File System Test Pattern.
File System Test Pattern	The test pattern of the File System subtest.
W/R Device Buffer Test	Enables or disables the W/R Device Buffer Test. **Note:** The Sun StorEdge A3500FC array firmware level must be at 3010360 or greater to support the W/R Device Buffer Test.
User Defined W/R Device Buffer Pattern	The test pattern for the W/R Device Buffer Test. This option is valid only when the user option is chosen in the W/R Device Buffer Patterns.
W/R Device Buffer Iterations	Specifies the number of times W/R are done to the internal buffer of the Sun StorEdge A3500FC array.
W/R Device Buffer Patterns	Enables you to choose `user`, `critical`, and `allpattern` options.

TABLE 9-1 `a3500fctest` Configurations and Options *(Continued)*

Options	Description
Connection Test for LUN	• Option Menu for hard LUN partition—0 to 7 [default] • Test Media—[Enable](fixed to Enable) • Media Write Read Mode—[Read Only](fixed to Read Only) Media Test Method-[SyncIO] (fixed to SyncIO) • Media Coverage(%)—1% • Media Transfer Size—[2KB] • Test File System—[Disable](fixed to Disable)
Functional Test for LUN	• Partition—0 to 7 [default] • Test Media—[Enable | Disable] • Read Mode—[Read-only | WriteRead] • Media Test method—[SyncIO | AsyncIO] • Media Coverage(%)—1% • Media Transfer Size—[2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB] • Test File System—[Enable | Disable] • File System File Size—[512KB | 2MB | 8MB | 20MB | 100MB | 200MB] • File System Transfer Size—[512B | 1024B | 10KB | 40KB | 80KB] • File System Test Pattern—{user | critical | allpattern | sequential | random} • Test device buffer (`wrdevbuf` option) • Number of times to run pattern (`wrdevbufpasses` option) • User Defined FS Test Pattern (`udptn` option) • Test Device Buffer pattern (`wrdbptn` option) {user | critical | allpattern} • User Defined Test Device Buffer pattern (`wrdevbufptn` option)
Expert Test for LUN	• The Expert mode runs `stexpert` on the targeted LUN and its data path FRUs. If a failure is detected, the system might display a prompt to run `stexpert` interactively from the command line.

Note – If you are using the `sequential` option for the Functional Test for LUN, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

TABLE 9-2 describes the `a3500fctest` subtests.

TABLE 9-2 `a3500fctest` Subtests

Subtest	Description
Media subtest	Verifies LUN media by reading data from the LUN. The Media subtest treats a LUN as one large chunk of contiguous data.
File System subtest	Verifies the LUN system's integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or premounted, the test is blocked. The test opens two temporary files (of the size specified on `File System File Size`) and performs a read / write test.
Asynchronous I / O subtest	Uses the asynchronous read / write feature of the Solaris LUN driver to exercise the LUN. In read-only mode, the test sends a maximum of four asynchronous read packets, each with a random size and a random offset, into the selected partition. The test then waits for all outstanding I / O activity to complete before issuing another round of packets. This process continues until the whole area is tested. In read-write mode, one write packet is issued in every four read packets as a spot check of the write operation.
Write / Read Device Buffer subtest	This test verifies the Fibre Channel loop by performing a pattern test. If the write / read device buffer test fails on a particular device, there is a problem with an upstream Fibre Channel component, which may not be on the actual device where the test failed. Refer to Chapter 12 for information on using the `stexpert`(1M) command to isolate the problem.

a3500fctest Test Modes

The a3500fctest test modes are listed in TABLE 9-3.

TABLE 9-3 a3500fctest Test Modes

Test Mode	Supported?	Description
Connection	Yes	Only one instance of a3500fctest is allowed for each LUN device. a3500fctest displays messages and reports errors. The test also opens the LUN, checks the LUN configuration, reads a few blocks, and then closes the LUN. No File System subtest is run. No Write option is available in Connection test mode.
Functional (Offline)	Yes	Both the File System and Media subtests can be run in offline Functional test mode.
Expert (Offline)	Yes	The Expert mode runs stexpert on the targeted LUN and its data path FRUs. If a failure is detected you might be requested to run stexpert interactively from the command line.

a3500fctest Command-Line Syntax

The a3500fctest command-line syntax is as follows:

```
/opt/SUNWvtsst/bin/a3500fctest standard-arguments -o\
    dev=RegisterName,partition=0–7,rawsub=enable|disable, \
    rawcover=percent,method=method,rawiosize=size,\
    fssub=enable|disable,fssize=file-system-size,fsiosize=IO-transfer-size,\
    fspattern=data-pattern,wrdevbuf=enable|disable,\
     wrdevbufptn=0xpattern,wrdevbufpasses=passes-per-pattern, \
    udptn=0xpattern,wrdbptn=data-pattern
```

TABLE 9-4 describes each of the arguments associated with `a3500fctest`.

TABLE 9-4 `a3500fctest` Command-Line Syntax

Argument	Explanation
`dev=`*RegisterName*	The name of the device that is shown in `discman`(1M) output.
`partition=``0–7`	Specifies the partition number to test, such as `partition=6(/export/s6)`, if mounted on partition 6.
`rawsub=` `enable|disable`	Enables or disables the Media subtest.
`method=`*method*	The Media Test Methods (SyncIO and AsyncIO).
`rawcover``=`*percent*	The media coverage (from 0—100% of the partition).
`rawiosize=`*size*	The media size to transfer. The values can be: 2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB
`fssub``=` `enable|disable`	Enables or disables the File System subtest.
`fspattern=`*data-pattern*	The File System data pattern as sequential or random. {`user` | `critical|allpattern|sequential|random` }
`fssize=`*file-system-size*	Indicates the File System subtest size in kilobytes or megabytes: • K | k | /KB | kb—kilobytes • M | m | MB | mb—megabytes • {512KB | 2MB | 8MB | 20MB | 100MB | 200MB}
`fsiosize=` *I/O-transfer-size*	Indicates the size of the file system subtest I/O transfer in bytes or kilobytes: {512B | 1024B | 10KB | 40KB | 80KB}
`wrdevbuf=` `enable|disable`	Runs the Write/Read device buffer test on a specified LUN.
`wrdevbufptn=`*0xpattern*	The pattern to send to the Write/Read device Buffer.
`wrdevbufpasses=` *passes_per_pattern*	Runs the specified number of each pattern to the Write/Read Buffer on the disk.
`udptn=`*0xpattern*	Sspecifies a specific pattern for file system testing.
`wrdbptn=`*data-pattern*	`wrdbptn` uses the pattern for the W/R device buffer. `critical` is the 10 most critical patterns for fault detection. `all` is the complete list of hexadecimal patterns for fault detection. `all` patterns also includes the critical patterns. The default is `critical`.

Note – If you are using the `sequential` option for the `fspattern` option, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/testname`. For more information, refer to "32-Bit and 64-Bit Tests" on page 4.

CHAPTER 10

Sun StorEdge Internal Fibre Channel Disk Test (`fcdisktest`)

The `fcdisktest`(1M) test verifies the functionality of the Internal Fibre Channel disk using five subtests: Media, File System, Asynchronous I/O, Write/Read Buffer, and Self Test.

The file System subtest can only be run if the selected partition is mounted (described in TABLE 10-2).

An instance of `fcdisktest` is present for each internal fibre channel disk.

This chapter is organized as follows:

`fcdisktest` Test Options

To reach the dialog box below, right-click on the `fcdisktest` Test Parameter Options name in the System Map and select Test Parameter Options. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system might not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

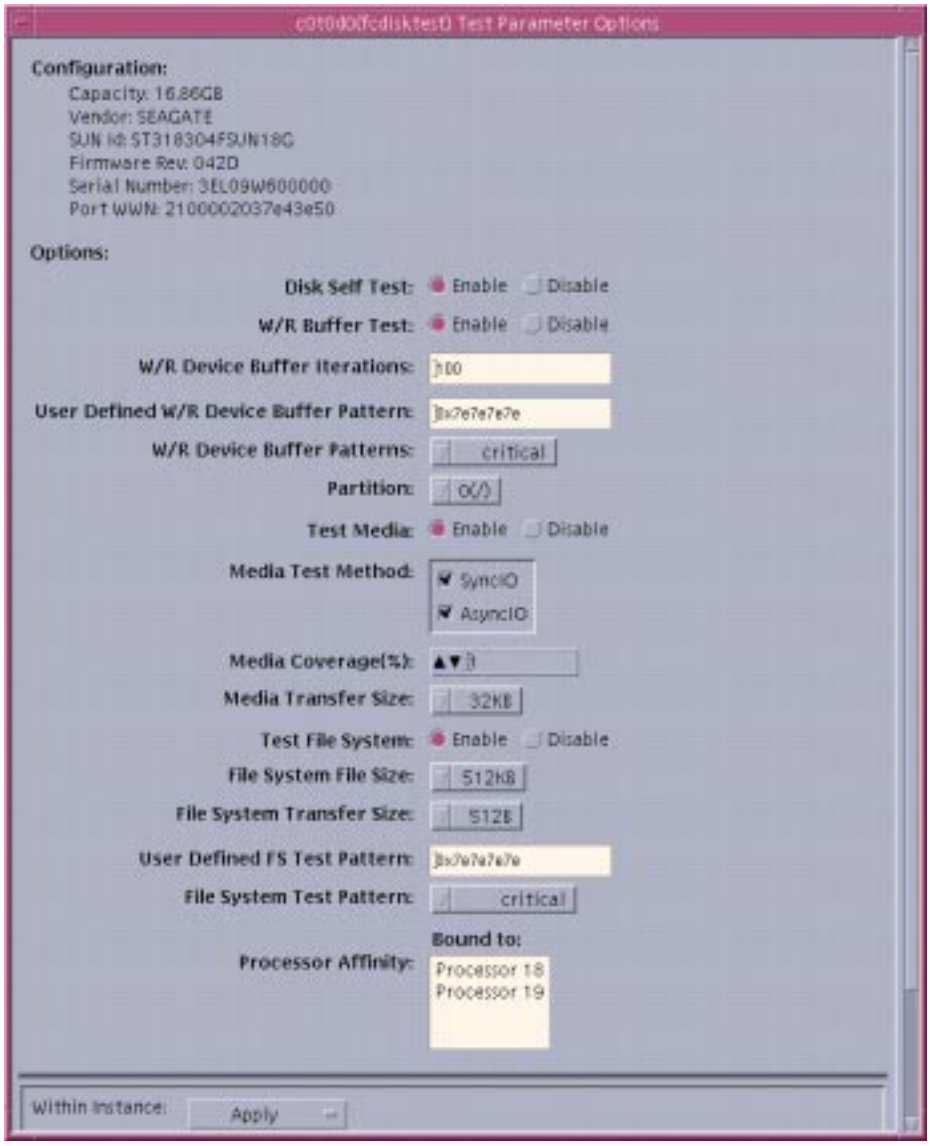

FIGURE 10-1 `fcdisktest` Test Parameter Options Dialog Box

TABLE 10-1 describes the test mode options for the `fcdisktest` test.

TABLE 10-1 `fcdisktest` Options

Options	Description
Partition	The partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Test Media	Enables or disables the Media subtest.
Media Test Method	Enables or disables the Media Test Methods (SyncIO or AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System File Size	Creates a file twice the size of what is specified.
File System Transfer Size	The transfer size of the File System subtest.
User Defined FS Test Pattern	Enables users to choose an (input) test pattern for a file system subtest. This option is valid only when the user option is chosen in File System Test Patterns.
File System Test Pattern	The test pattern of the File System subtest.
W/R Buffer Test	Enables or disables the W/R Device Buffer Test
User Defined W/R Device Buffer Pattern	The test pattern for the W/R Device Buffer Test. This option is valid only when the user option is chosen in the W/R Device Buffer Patterns.
W/R Device Buffer Patterns	Enables you to choose `user`, `critical`, and `allpattern` options.

TABLE 10-1 `fcdisktest` Options *(Continued)*

Options	Description
Connection Test for Hard Disk	• Option Menu for hard disk partition—`0` to 7 [default] • Test Media—[Enable](fixed to Enable) • Media Write Read Mode—[Read Only](fixed to Read Only) Media Test Method-[SyncIO] (fixed to SyncIO) • Media Coverage(%)—1% • Media Transfer Size—[2KB] • Test File System—[Disable](fixed to Disable)
Functional Test for Disk	• Partition—`0` to 7 [default] • Test Media—[`enable` | `disable`] • Read Mode—[`read-only | writeread`] • Media Test method—[`SyncIO | AsyncIO`] • Media Coverage(%)—1% • Media Transfer Size—[2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB] • Test File System—[Enable | Disable] • File System File Size—[512KB | 2MB | 8MB | 20MB | 100MB | 200MB] • File System Transfer Size—[512B | 1024B | 10KB | 40KB | 80KB] • File System Test Pattern—{`user` | `critical` | `allpattern` | `sequential` | `random`} • Test device buffer (`wrdevbuf` option) • Run all patterns (`allwrdevbufptn` option) • Run pattern (`wrdevbufptn` option) • Number of times to run pattern (`wrdevbufpasses` option) • User Defined FS Test Pattern (`udptn` option) • Test Device Buffer Pattern (`wrdbptn`)—{`user | critical | allpattern`} • User Defined Test Device Buffer Pattern (`wrdevbufptn` option)
Expert Test for Disk	• The Expert mode runs `stexpert` on the targeted disk and its data path FRUs. If a failure is detected the system might display a prompt to run `stexpert` interactively from the command line.

Note – If you are using the `sequential` option for the Functional Test for disk, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

TABLE 10-2 describes the `fcdisktest` subtests.

TABLE 10-2 `fcdisktest` Subtests

Subtest	Description
Media subtest	Verifies disk media by reading data from the disk. The Media subtest treats a disk as one large chunk of contiguous data.
File System subtest	Verifies the disk system's integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or pre-mounted, the test is blocked. The test opens two temporary files (of the size specified on `File System File Size`) and performs a read / write test.
Asynchronous I / O subtest	Uses the asynchronous read / write feature of the Solaris disk driver to exercise the disk. In read-only mode, the test sends a maximum of four asynchronous read packets, each with a random size and a random offset, into the selected partition. The test then waits for all outstanding I / O activity to complete before issuing another round of packets. This process continues until the whole area is tested. In read-write mode, one write packet is issued in every four read packets as a spot check of the write operation.
Write / Read Device Buffer subtest	Verifies the Fibre Channel loop by performing a pattern test. If the write / read device buffer test fails on a particular device, there is a problem with an upstream fibre channel component, which may not be on the actual device where the test failed. Refer to Chapter 12 for information on using the `stexpert`(1M) command to isolate the problem.
Self Test	Prompts a device to run its internal diagnostics. If the device fails on this test, check the error message for a more detailed description.

`fcdisktest` Test Modes

The `fcdisktest` test modes are listed in TABLE 10-3.

TABLE 10-3 `fcdisktest` Test Modes

Test Mode	Supported?	Description
Connection	Yes	Only one instance of `fcdisktest` is allowed for each disk device. `fcdisktest` displays messages and reports errors. The test also opens the disk, checks the disk configuration, reads a few blocks, and then closes the disk. No File System subtest is run. No Write option is available in Connection test mode.
Functional (Offline)	Yes	More than one instance of `fcdisktest` is allowed for one disk. Both the File System and Media subtests can be run in offline Functional test mode.
Expert (Offline)	Yes	The Expert mode runs `stexpert` on the targeted LUN and its data path FRUs. If a failure is detected, the system might display a prompt to run `stexpert` interactively from the command line.

`fcdisktest` Command-Line Syntax

The `fcdisktest` command-line syntax is as follows:

```
/opt/SUNWvtsst/bin/fcdisktest standard_arguments -o \
      dev=RegisterName,partition=0–7,rawsub=enable|disable,\
      rawcover=coverage,method=method,rawiosize=size,\
      fssub=enable|disable,fssize=file-system-size,\
      fsiosize=IO-transfer-size,fspattern=data-pattern,\
      selftest=enable|disable,wrdevbuf=enable|disable,\
      udptn=data-pattern,wrdevbufptn=data-pattern,\
      wrdevbufpasses=passes-per-pattern,wrdbptn=data-pattern
```

TABLE 10-4 describes each of the arguments associated with `fcdisktest`.

TABLE 10-4 `fcdisktest` Command-Line Syntax

Argument	Description
`dev`=*RegisterName*	The name of the device that is shown in `discman`(1M) output.
`partition`=`0–7`	The partition number to test, such as `partition=6(/export/s6)`, if mounted on partition 6.
`rawsub`= `enable|disable`	Enables or disables the Media subtest.
`method=`*method*	The Media Test Methods (SyncIO and AsyncIO).
`rawcover=`*percent*	The media coverage from 0—100% of the partition.
`rawiosize=`*size*	Specifies the media size to transfer. Values can be: 2KB | 16KB | 32KB | 64KB | 128KB | 256KB | 512KB
`fssub=` `enable|disable`	Enables or disables the File System subtest.
`udptn=`*data-pattern*	Specifies a specific pattern for file system testing.
`fspattern`=*data-pattern*	Specifies the File System data pattern as sequential or random. Values can be: `user|critical|allpattern|sequential|random`
`fssize`=*file-system-size*	Indicates the File System subtest size in kilobytes or megabytes: • K | k | KB | kb—kilobytes • M | m | MB | mb—megabytes • {512KB | 2MB | 8MB | 20MB | 100MB | 200MB}
`fsiosize`= *IO-transfer-size*	Indicates the size of the file system subtest I/O transfer in bytes or kilobytes: {512B | 1024B | 10KB | 40KB | 80KB}
`selftest`= `enable|disable`	Runs the specified disks internal diagnostics if any are available.
`wrdevbuf=` `enable|disable`	Runs the Write/Read device buffer test on a specified disk.

TABLE 10-4 `fcdisktest` Command-Line Syntax *(Continued)*

Argument	Description
`wrdevbufptn=` *data-pattern*	Used to specify a specific pattern to send to the Write/Read device buffer.
`wrdbptn=`*data-pattern*	`wrdbptn` uses the pattern for the W/R device buffer. `critical` is the 10 most critical patterns for fault detection. `all` is the complete list of hexadecimal patterns for fault detection. `all` patterns also includes the critical patterns. The default is `critical`.
`wrdevbufpasses=` *passes-per-pattern*	Runs the specified number of each pattern to the Write/Read buffer on the disk.

Note – If you are using the `sequential` option for the `fspattern` option, make sure the File System File Size is appropriate for the File System Transfer Size. For example, if the File System File Size selected is 512 Kbytes and the File System Transfer Size is 512 bytes, 1024 patterns can be run.

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/`*testname*. For more information, refer to “32-Bit and 64-Bit Tests” on page 5.

CHAPTER 11

Sun StorEdge Fibre Channel Tape Test (`fctapetest`)

The `fctapetest`(1M) synchronous I/O test writes a pattern on the tape. It `fctapetest` then rewinds the tape and reads and compares the data just written. The `fctapetest` asynchronous I/O test sends a series of up to five asynchronous read/write requests to the tape drive, writing to the tape and then reading and comparing the data. The terms asynchronous and synchronous referred to here, and in the "method" field are not related to the SCSI messaging terms of the same name. The `fctapetest` file test writes four files to the tape and then reads them back, comparing the data.

The `fctapetest` diagnostic provides a variety of tests for Sun-supported Fibre Channel tape drives. The `fctapetest` does not test the tape library; it presumes that the user of the diagnostic either uses tape-library management software or manually inserts tapes into the drives.

This chapter is organized as follows:

`fctapetest` Test Requirements

If you have a Sun Fibre Channel tape drive in your system, load a blank writable tape (scratch tape) before you start the StorTools application.

Caution – If you mount a tape containing valid data, that data will be overwritten by the `fctapetest` diagnostic.

If a tape is not mounted in a drive when `fctapetest` is started, the following error is displayed:

```
05/24/01 22:04:46 diag246.Central.Sun.COM StorTools 4.1: VTSID
6002 fctapetest.
  ERROR rmt/2l: "Cannot open /dev/rmt/2c: I/O error."
  Probable_Cause(s):
    (1)No tape media in drive
    (2)Faulty upstream Fibre Channel Device such as
       hba/gbic/hub/switch/cable/tape
  Recommended_Action(s):
    (1)Put a tape in the drive
    (2)Run stexpert -I -o dev=Tape-500104f000413819 from the
       cli to isolate the failing FRU.
    (3)If the problem persists, call your authorized Sun service
       provider.
```

`fctapetest` Test Options

To reach the dialog box below, right-click on the `fctapetest` Test Parameter Option name in the System Map. If you do not see this test in the System Map, you might need to expand the collapsed groups, or your system may not include the device appropriate to this test. Refer to the *SunVTS 4.1 User's Guide* for more details.

`fctapetest` supports Sun Fibre Channel tape devices. The options available for each of the tape devices may differ slightly. An example of the Options dialog box for a device is shown in FIGURE 11-1.

The Async I/O subtest uses the asynchronous read and write feature of the Solaris tape driver to exercise tape drives. In read-only mode the test sends a maximum of four asynchronous read packets, each with a random size and a random offset, to the tape drive. The test then waits for all outstanding I/O activity to complete before issuing another round of packets. This process continues until the whole area being tested has been covered. In read-write mode, one write packet is issued for every four read packets to ensure a spot check of the write operation. The area of the tape to be tested is written to first, this way the test works correctly.

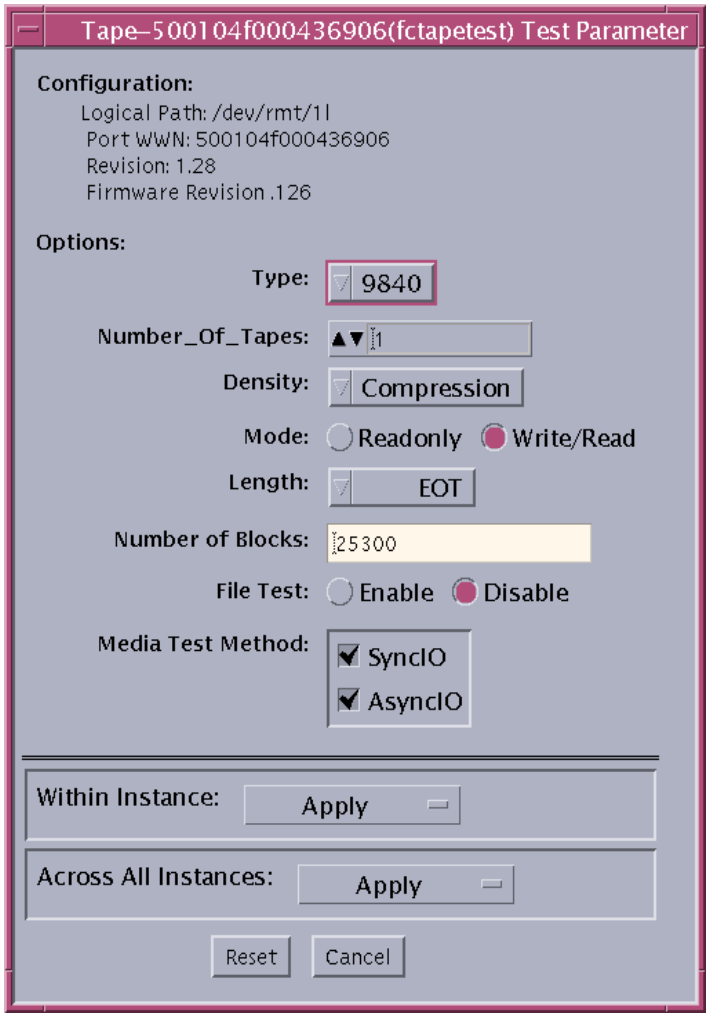

FIGURE 11-1 `fctapetest` Test Parameter Options Dialog Box (Fibre Channel Tape Drive)

Note – This test does not immediately stop after you click “Stop” on the StorTools main GUI window.

TABLE 11-1 describes the test mode options for the `fctapetest` test.

TABLE 11-1 `fctapetest` Options

Options	Description
Type	Normal tape drive or tape library (stacker).
Number_of_Tapes	This option applies only to tape libraries that have a stacker mode and are configured to run in stacker mode. Because no Sun supported Fibre Channel tape drives have stacker capable tape libraries, this option is ignored.
Density	The following settings are available for most tape drives: • Low—Tests the `l` tape device. • Medium—Tests the `m` tape device. • Compression—Tests the `c` tape device. • All—Tests the `l`, `m`, and `c` tape devices.
Mode	If you enable Write/Read mode, the test first writes to the tape and then reads it back to compare. If you enable Read-only mode, the test assumes the tape has been properly written and merely reads it. This mode is useful to check proper head alignment.
Length	The amount of the tape to be tested. The choices are: • `EOT`: The default; tests the entire tape. • `Long`: Tests 70,000 blocks of the tape. • `Short`: Only the first 1000 blocks are tested. • `Specified`: You must type the number of blocks to be tested in the `number of blocks` field.
Number of Blocks	If you select Specified under the Length option, you must type the number of blocks you want to test.
File Test	The tape file test sequence is as follows: 1. Writes three files. 2. Rewinds. 3. Reads part of the first file. 4. Forward spaces to the start of the second file. 5. Reads the second file. 6. Forward spaces to the start of the third file. 7. Tries to read to the end of that file for SCSI tapes only. The tape file test tries to backspace to the start of the second file and read it.
Media Test Method	• Sync I/O—tapetest reads/writes the number of blocks selected in Length. • Async I/O—tapetest makes four asynchronous read requests to the tape drive. If read and write testing is selected, one asynchronous write request is also sent. The test continues after completing the requests.

`fctapetest` Test Modes

The `fctapetest` test modes are listed in TABLE 11-2.

TABLE 11-2 `fctapetest` Test Modes

Test Mode	Supported?	Description
Connection	Yes	Verifies that the drive can be opened and that the drive type can be determined. If both checks are successful, or if the drive is currently busy, the test passes. The `fctapetest` fails if the open operation is unsuccessful for any reason other than the drive is busy.
Functional (Offline)	Yes	Checks the status, rewinds the tape, and erases it. If the device is a cartridge tape, `fctapetest` writes a pattern to EOT (default), rewinds the tape, and then reads and compares of the pattern.
Expert (Offline)	Yes	The Expert mode runs `stexpert` on the targeted tape drive and its data path FRUs. If a failure is detected, the system might display a prompt to run `stexpert` interactively from the command line.

`fctapetest` Command-Line Syntax

The `fctapetest` command-line syntax is as follows:

```
/opt/SUNWvts/bin/fctapetest standard_arguments -f -o \
  dev=RegisterName,s=block-count,m=mode,l=length,\
  method=method,ft=enable|disable,dat=dat-type,num=magazine-size
```

TABLE 11-3 describes the arguments associated with the `fctapetest` test.

TABLE 11-3 `fctapetest` Command-Line Syntax

Argument	Explanation
`-o`	Used to indicate that the options and arguments that follow are test-specific.
`dev=`*RegisterName*	The *RegisterName* is the name of the device that is shown in `discman`(1M) output.
`-f`	Offline mode. Unless this option is specified, only the `Readonly` tests are run. The `-f` option must appear on the command line before the `-o` option.
`m=`*mode*	Setting `m` to `Readonly` test the drive as a read-only device. The default mode is `Readwrite`.
`l=`*length*	Specifies the length of the test (EOT, Specified, Long, or Short). The default is Specified.
`s=`*block-count*	When `l` is set to "Specified," use this argument for the count of the number of blocks to read / write on the tape. The default is 2^{31}-1.
`method=`*method*	Run synchronous tests (`S`), asynchronous tests (`A`), or both (`A+S`). **Note:** This option does not invoke the SCSI message "synchronous" data transfer request. It is only asynchronous or synchronous in nature. The default is synchronous.
`ft=` `enable|disable`	`enable` the file test (ft). The default value is `disable`.
`dat=`*dat-type*	If your tape library has a stacker-library mode and it is enabled, this instructs `fctapetest` to test multiple tape cartridges in the test. The number of tapes is specified in the `num` argument. The default is no stacker library.
`num=`*magazine-size*	If your tape library has a stacker-library mode and it is enabled, specify the number of cartridges to use. The default is one tape.

Note – 64-bit tests are located in the `sparcv9` subdirectory: `/opt/SUNWvtsst/bin/sparcv9/`*testname*. For more information, refer to "32-Bit and 64-Bit Tests" on page 5.

CHAPTER 12

Sun StorEdge Network FC Switch-8 and Switch-16 Test (`switchtest`)

The `switchtest`(1M) test is used to diagnose the Sun StorEdge FC network switch-8 and switch-16 devices. The `switchtest` process also provides command-line access to switch diagnostics. `switchtest` supports testing on local and remote switches.

`switchtest` runs the port diagnostic on connected switch ports. While `switchtest` is running, the port statistics are monitored for errors.

This chapter is organized as follows:

`switchtest` Test Options

The configuration window in the `switchtest` Test Parameter Options dialog box shows the switch information, which includes:

- SW IP Address—The IP address of the switch
- SW IP Name—The name of the switch in `/etc/fcswitch.conf`
- SW Port—The switch port number for this instance of the test
- SW Flash—The version of Flash on the Switch
- SW PROM HW—The version of the switch hardware
- SW PROM SW—The base version of the software

- SW Flash SW—The version number of the flash software
- SW HW Version—Vendor hardware version
- SW MAC Address—Switch MAC address
- SW Max Ports—Maximum number of ports on the switch
- GBIC 1-*n*—The type of GBIC that is inserted into the switch port. The types can be optical shortwave, optical longwave, copper, and none installed.

You can modify the following options using Test Parameter Options dialog box.

- xfer—The transfer count for the port test, between 250 and 2000.
- passes—The number of iterations the port test should run, between 100000 and 1000000 (which equals approximately 30 seconds).
- User data Pattern—The default pattern, in hexadecimal format, to be used for the port test. You can also enter the hexadecimal pattern to run for the test.
- Loopback Patterns—Gives the user the choice of running the one user pattern, critical patterns (10 of the most critical patterns) or all patterns (a complete list of test patterns).

You cannot use `switchtest` to test F-port types. For point-to-point connections (that is, the F-port), the Sun StorEdge network FC switch-8 and switch-16 switch uses the `ELS ECHO` command instead of `ELS TEST`. The `ELS ECHO` command is not support by the fabric host bus adapters.

The `switchtest` options are shown in FIGURE 12-1.

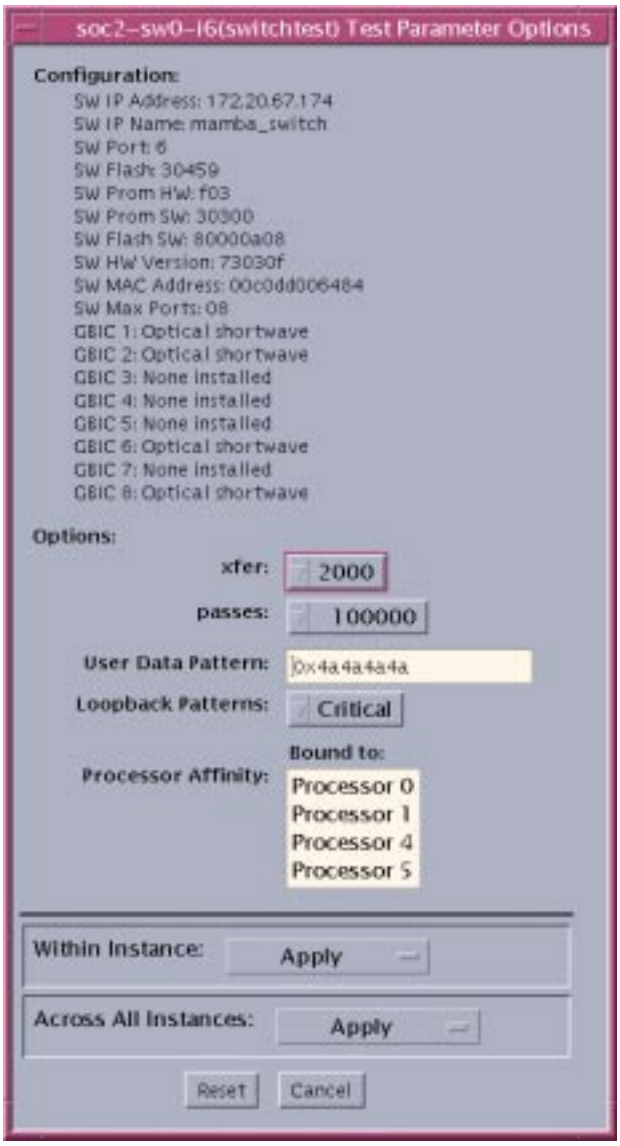

FIGURE 12-1 `switchtest` Test Parameter Options Dialog Box

Fibre Channel Device Names

This section provides descriptions for device names and Fibre Channel port types

The device name `fc-8p-sw0-dp7` is interpreted as a Fibre Channel 8-port switch with data port 7 as the destination port.

The Fibre Channel device name abbreviations are listed in TABLE 12-1

TABLE 12-1 Fibre Channel Device Name Abbreviations

Abbreviation	Meaning
`dp`	Data port (Fibre Channel port connect to a storage device (SL Zone)).
`e`	E_PORT Fibre Channel port connected to a Fibre Channel port on another switch.
`f`	F_PORT fabric port - port connected to a HBA.
`fl`	FL_PORT - Connection to multiple HBAs on a single port.
`HBA`	Host bus adapter (card plugged into bus slot on host).
`ip`	Initiator port (Fibre Channel port connected to the host's HBA (SL Zone)).
`p`	Number of ports on switch, either 8 or 16.
`qlc`	Sun StorEdge PCI Dual Fibre Channel Network Controller HBA 1.
`sw`	Fibre Channel switch 1 (local switch in this example).
`e`	Connected to a remote switch.
`tl`	(TL_PORT) Connection to private loop storage devices (for example, Sun StorEdge A5200 array).

An example use of the names are shown in TABLE 12-2.

TABLE 12-2 Example Use of Fibre Channel Names

Device Name	Meaning
`qlc0-sw0-fl13-e16`	Sun StorEdge PCI Dual Fibre Channel Network Controller HBA 0, connected to switch 0 on fabric loop port 13, which is connected to port 16, which is an eport that is number 16.
`qlc0-sw0-fl13-e16-sw1-e8`	Sun StorEdge PCI Dual Fibre Channel Network Controller HBA 0 connected to switch 0 on port 13, which is connected to port 16, which is an eport connected to remote switch 1 port number 8.
`qlc0-sw0-fl13-e16-sw1-e8-tl7`	Sun StorEdge PCI Dual Fibre Channel Network Controller HBA 0 connected to switch 0 on port 13, which is connected to port 16, which is a eport connected to remote switch 1 port 8, which is connected to storage on port 7 (TL_PORT).

`switchtest` Test Modes

The `switchtest` test modes are listed in TABLE 12-3.

TABLE 12-3 `switchtest` Test Modes

Test Mode	Supported?	Description
Connection	Yes	Performs only an open/close operation.
Functional	Yes	Runs the port loopback test.
Expert	No	Expert is supported only when an end device (such as a LUN) is selected.

switchtest Command-Line Syntax

The switchtest test command-line syntax is as follows:

```
/opt/SUNWvtsst/bin/switchtest standard-arguments -o \
      dev=RegisterName,xfer=number,passes=number, \
      userpattern=0xpattern,choicepattern=choice
```

TABLE 12-4 describes the arguments associated with the switchtes test.

TABLE 12-4 Standard Command-Line Arguments

Argument	Description
dev=*RegisterName*	The name of the device that is shown in discman(1M) output.
xfer=*number*	The transfer count. The range is 250 to 2000.
passes=*number*	The number of iterations the port test should run. The range is: 10000 to 1000000.
userpattern= *pattern*	User-specific pattern in hexadecimal, for exampl 0x4a4a4a4a.
choicepattern= {User|Critical|All}	choicepattern uses the pattern entered. critical is the 10 most critical patterns for fault detection. all is the complete list of hexadecimal patterns for fault detection. all patterns also includes the critical patterns. The default is critical.

Note – 64-bit tests are located in the sparcv9 subdirectory: /opt/SUNWvtsst/bin/sparcv9/*testname*. For more information, refer to “32-Bit and 64-Bit Tests” on page 5.

CHAPTER 13

StorTools Expert (`stexpert`)

The StorTools Expert (`stexpert`(1M)) test is a heuristic-based expert system aimed at end-to-end path testing. It examines the configuration of malfunctioning FC-AL paths and applies the diagnostics in the StorTools toolkit to isolate the suspect components. The `stexpert` test processes established rules from the `stexpert` rule base and executes standalone diagnostics to test elements of the path from devices to HBAs.

This chapter is organized as follows:

Overview

The algorithms used by `stexpert` vary according to the FC-AL path configuration. During execution, individual component test sessions are run by the appropriate component tests. Each component's test session is logged to a file. Successful sessions delete their session logs to conserve space on the disk. If a session fails, its log is kept and the session name is recorded in the `stexpert.log` for reporting purposes.

Upon completion, `stexpert` displays a list of suspected components. You should change the suspected failing components and either re-run `stexpert` or validate each replaced component using its associated StorTools functional test.

Note – Do not run customer applications while executing the `stexpert` test. The `stexpert` test forces FC-AL attached devices offline during HBA testing or during manual intervention sequences when you are asked to disconnect or substitute components during the isolation process. See Chapter 5 for more information on the `qlctest` test.

The `stexpert` test can affect switch counters. It can also cause event notification by the Network Storage Agent software.

The StorTools Expert provides a set of diagnostic programs that test specific components or groups of components in an intelligent manner. Each program returns either pass or fail status upon completion. This return status is then used by `stexpert` to select the next action from the `stexpert` rulebase. This type of testing provides offline field-replaceable unit (FRU) isolation.

You can start the StorTools Expert from the command line or from the StorTools GUI.

To run the StorTools Expert from the command line:

1. **Become super user.**
2. **Change to the appropriate StorTools directory.**

   Use the executable in `/opt/SUNWvtsst/bin` for 32-bit operation or `/opt/SUNWvtsst/bin/sparcv9` for 64-bit operation. Use the isainfo(1) to determine your architecture. For example:

```
# isainfo -b
64
#
```

3. **Start the StorTools Expert command with the appropriate options.**

```
# ./stexpert -v -I -o dev=c7t60020F20000009453AB622AC00061462d0
...
#
```

To run StorTools Expert from the GUI:

1. **Become super user.**
2. **Change to the appropriate StorTools directory.**

Use the executable in `/opt/SUNWvtsst/bin` for 32-bit operation or `/opt/SUNWvtsst/bin/sparcv9` for 64-bit operation. Use the isainfo(1) to determine your architecture. For example:

```
# isainfo -b
64
#
```

3. **Start the `stortools` GUI.**

```
# stortools
```

4. **Click the StorTools Expert radio button and select intervention.**
5. **Select the storage devices and click on the StorTools Start button.**

FIGURE 13-1 shows the `stexpert` running in a StorTools window.

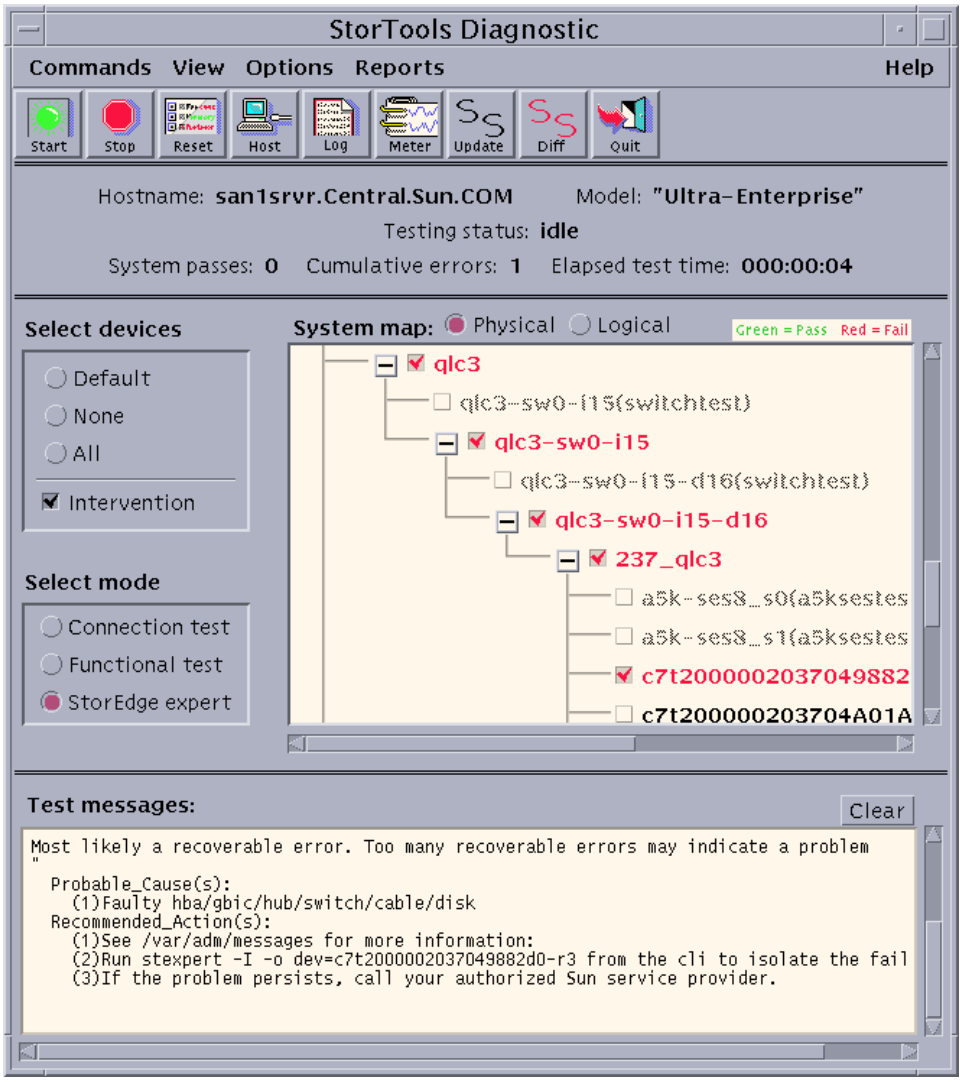

FIGURE 13-1 `stexpert` Running a Test on a Sun StorEdge A5*x*00 Array

The `stexpert` GUI options are shown in FIGURE 13-2. These options are available from the toolbar, under Options.

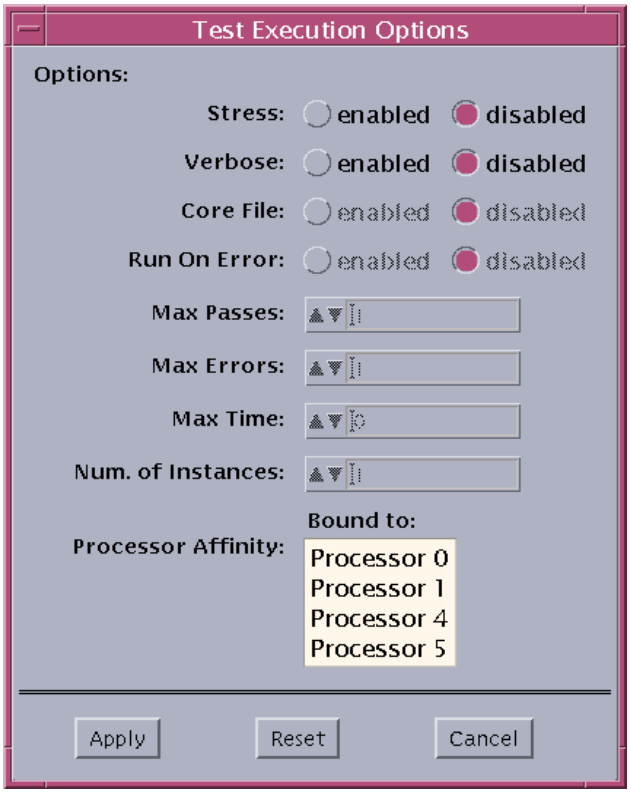

FIGURE 13-2 `stexpert` Test Execution Options

`stexpert` Command-Line Syntax

The target of `stexpert` is the *RegisterName* output from `discman`(1M). Use the `discman -s` command to view the register names contained in the `snapshot.log` file (`/var/opt/SUNWvtsst/logs/snapshot.log`). Use `format`(1M) to see the current c*n*t*n*d*n* numbers on your host. When specifying a device on the command line, the device must be slice 2.

When using `stexpert` with the Sun StorEdge Traffic Manager software (MPxIO), you can use either the physical name or the registered name.

The following example shows the typical CLI invocation of `stexpert` to the suspect device path `c7t200000203704A0lAd0-r6`. This example specifies user interaction (`-I`), verbose (`-v`), and targets a single FC-AL device on the suspect path.

```
# stexpert -I -v -o dev=c7t200000203704A0lAd0-r6
```

The following example is a variant of the typical CLI invocation. Like the previous example, it specifies user interaction, quick test mode, and verbose, but the `-a` option instructs `stexpert` to test all attached FC-AL storage.

```
# stexpert -I -v -a
```

When using the command line form of `stexpert`, you must invoke the command from the correct directory dependent on which version of the Solaris environment you are using. The 32-bit version of Sun StorTools Expert is located in `/opt/SUNWvtsst/bin`. The 64-bit version is in `/opt/SUNWvtsst/bin/sparcv9`. If you run the `stexpert` test from the StorTools GUI, only Sun StorEdge Fibre Channel disks, Fibre Channel tapes, and LUNs can be used as target devices; all other selection choices are greyed out.

CODE EXAMPLE 13-1 Sample Output from the `stexpert` Test When Used on the Command Line

```
# isainfo -b
64
# /opt/SUNWvtsst/bin/sparcv9/stexpert -u
stexpert: USAGE: stexpert options
WHERE: options         explanation
       -a              test all target FC devices
       -A              test all paths to an MPxIO device
       -d              log debug messages to stexpert.dbg
       -e              stress testing
       -I              user intervention required
       -m #            percentage of media
       -o dev=         test target device
       -u              shows this message
       -v              verbose
# /opt/SUNWvtsst/bin/sparcv9/stexpert -v -I -o dev=c7t200000203704A0lAd0-r6
05/09/01 14:13:31 STARTED: stexpert on c7t200000203704A0lAd0-r6
05/09/01 14:13:31 STARTED: c5t86d0-r6
05/09/01 14:13:31 NOTICE: Executing SCSI w/r buffer stress_test
05/09/01 14:13:31 NOTICE: Completed SCSI w/r buffer stress_test
05/09/01 14:13:31 COMPLETED: c5t86d0-r6
05/09/01 14:13:32 FAILED: for details see:
/var/opt/SUNWvtsst/logs/09May2001_14:13:31_c5t86d0-r6.errlog
05/09/01 14:13:32 STARTED: qlc2-sw1-i15-d16
05/09/01 14:13:32 NOTICE: Executing switch_dport [64 bit version]
05/09/01 14:13:34 COMPLETED: qlc2-sw1-i15-d16
05/09/01 14:13:34 FAILED: for details see:
/var/opt/SUNWvtsst/logs/09May2001_14:13:34_qlc2-sw1-i15-d16.errlog
stexpert: Remove fiber cable from DPORT GBIC in port 16
stexpert: Type ok to continue or exit to quit: ok
stexpert: Insert a loopback cable in DPORT GBIC in port 16
stexpert: Type ok to continue or exit to quit: ok
Waiting for FC-AL loop to go online (5 min timeout)
05/09/01 14:14:22 STARTED: qlc2-sw1-i15-d16
05/09/01 14:14:22 NOTICE: Executing switch_dport [64 bit version]
05/09/01 14:14:24 COMPLETED: qlc2-sw1-i15-d16
05/09/01 14:14:24 FAILED: for details see:
/var/opt/SUNWvtsst/logs/09May2001_14:14:24_qlc2-sw1-i15-d16.errlog
stexpert: Remove the GBIC in port 16
stexpert: Insert a new GBIC in port 16
stexpert: Type ok to continue or exit to quit: ok
#
```

TABLE 13-1 describes the arguments associated with the `stexpert` test.

TABLE 13-1 `stexpert` Command-Line Syntax

Argument	Description
`-a`	Tests all target Fibre Channel devices connected to the host.
`-A`	Tests all Sun StorEdge Traffic Manager software (MPxIO multiplexing) paths to the device.
`-d`	Logs the debug messages to the `stexpert.dbg` file.
`-e`	The `-e` option specifies stress testing. Normal testing utilizes the critical Fibre Channel data patterns. Stress testing utilizes all Fibre Channel data patterns.
`-I`	Used in the command-line interface only. Enables user intervention during fault isolation. Setting this option will require the user to reconfigure the system (that is, you must connect and unconnect fiber cables, you must replace or restore components, and install or remove loopback cables) during the isolation process.
`-m` *number*	Test the *number* percent of the target devices media during disk tests. The number represents an integer number between 1 and 100 percent coverage. The default is 1 percent.
`dev=`*RegisterName*	The name of the device that is shown in `discman`(1M) output.
`-u`	Display this usage message.
`-v`	The `-v` option is the verbose flag.

StorTools Expert Output

All `stexpert` logs are maintained in the `/var/opt/SUNWvtsst/logs/` directory.

StorTools Expert maintains two specific log file types: the `stexpert.log` and session logs.

The `stexpert.log` represents the history of `stexpert` over time. This file contains three specific types of messages, which are shown in TABLE 13-2.

TABLE 13-2 Message Types

Message Type	Meaning
STARTED	This messages record the beginning of an `stexpert` test scenario against a given FC-AL path.
FAILED	This messages indicate when `stexpert` programs failed and includes the location of a saved `errlog` file. The user should review these files to determine what caused the failure.
COMPLETED	This messages indicate completion of the `stexpert` test scenario.

Review the `stexpert.log` periodically, and remove it when it becomes too large and all FAILED errlogs have been reviewed.

The session logs are started by the specific `stexpert` module and are named with the suffix `.session`. The `.session` files indicate activity in progress by `stexpert`. If the specific `stexpert` program fails, the session log will be renamed using the nomenclature: *ddmmmyyyy.hh:mm:ss_xxx* `.errlog`, where:*ddmmmyyyy.hh:mm:ss* reflects the date and time the failure was detected, while the *xxx* is the pseudonym of the component being tested. This naming convention should make it easy to identify by date, time, and name, the component that failed.

Example entries from `stexpert.log` appear as follows:

```
# tail -f /var/opt/SUNWvtsst/logs/stexpert.log
05/09/01 14:11:36 STARTED: stexpert on /dev/rdsk/c5t86d0s2
05/09/01 14:11:36 FAILED: for details see:
/var/opt/SUNWvtsst/logs/09May2001_14:11:36_c5t86d0-r6.errlog
05/09/01 14:11:36 NOTICE: to perform additional fault isolation, enter
'/opt/SUNWvtsst/bin/sparcv9/stexpert -I -o dev=/dev/rdsk/c5t86d0s2'

05/09/01 14:11:39 FAILED: for details see:
/var/opt/SUNWvtsst/logs/09May2001_14:11:39_qlc2-sw1-i15-d16.errlog
05/09/01 14:11:39 NOTICE: to perform additional fault isolation, enter
'/opt/SUNWvtsst/bin/sparcv9/stexpert -I -o dev=/dev/rdsk/c5t86d0s2'

05/09/01 14:11:40 NOTICE: DISK is a suspect component
05/09/01 14:11:40 NOTICE: DPORT_GBIC is a suspect component
05/09/01 14:11:40 NOTICE: DPORT_FIBER is a suspect component
05/09/01 14:11:40 NOTICE: DEV_GBIC is a suspect component
05/09/01 14:11:40 NOTICE: SWITCH is a suspect component
05/09/01 14:11:40 COMPLETED: stexpert on /dev/rdsk/c5t86d0s2
...
```

You can also access the `stexpert.log` from the StorTools GUI by clicking the Logs button and choosing “expert log” from the list of logs available.

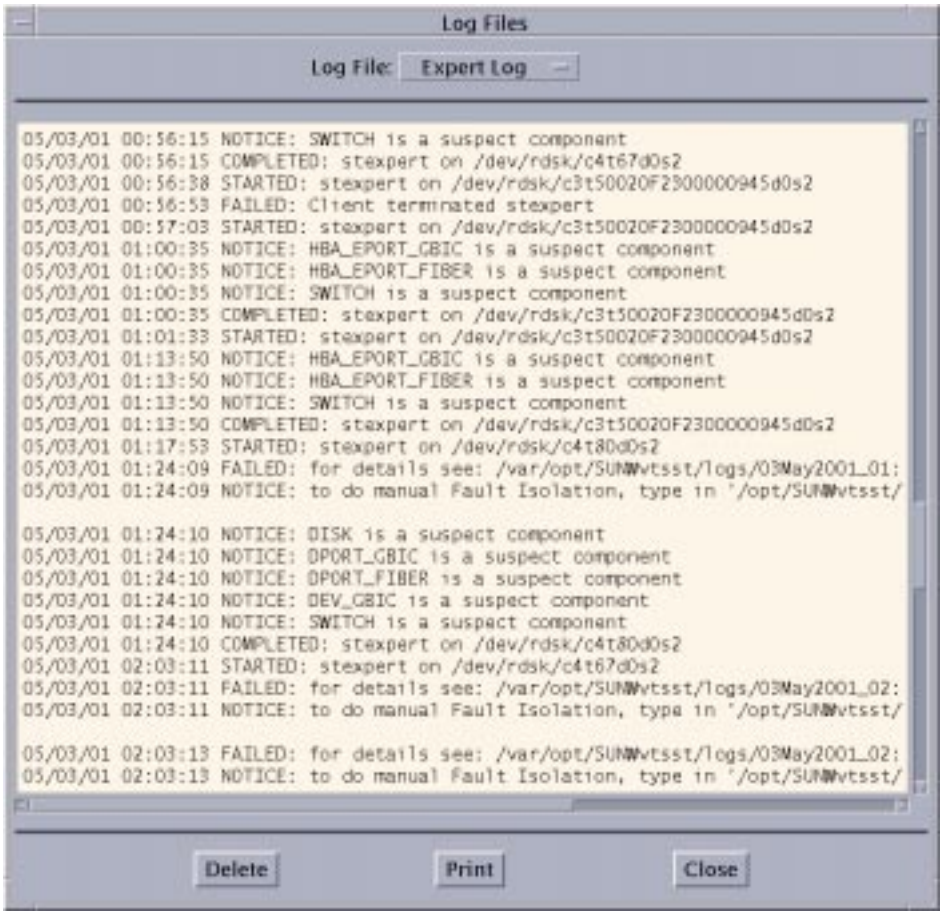

FIGURE 13-3 Example `stexpert.log` File Viewed Through the StorTools GUI

To display what the test finds as it runs, use the `tail`(1) command with the `-f` option on a session log.

Note – Be aware that whileyou are tailing an active session log, that session log could be terminated by `stexpert` at any time, with no indication given to the process tailing the session log.

```
# tail -f fc-sw0-dp15_qlc1.session
"switchtest: called with options: dev=fc-16p-sw0-dp15_qlc-1,passes=
200000,pattern=0xaa55aa55"
"switchtest: Started."
"Testing device fc-16p-sw0-dp15_qlc-1."
"Testing Device fc-16p-sw0-dp15_qlc-1 Port 15"
...
```

If the active session fails, the session log is moved into an `errlog` file for analysis later. The contents of an *mmmddyyyy.hh:mm:ss_component*.`errlog` file appear as follows:

```
# cat 27Apr2001_18:11:37_qlc1-sw1-i15-d16.errlog
04/27/01 18:11:36 STARTED: qlc1-sw1-i15-d16
04/27/01 18:11:36 NOTICE: Executing switch_dport [64 bit version]
"switchtest:  called with options: dev=qlc1-sw1-i15-d16,passes=
250,choicepattern=Critical"
"switchtest: Started."
04/27/01 18:11:36 san1srvr.Central.Sun.COM StorTools 4.1: VTSID 2
switchtest.INFO : "Start: switchtest"
"Testing device qlc1-sw1-i15-d16."
"Testing Device: qlc1-sw1-i15-d16 Port: 16 Pattern: 0x7e7e7e7e"
04/27/01 18:11:37 san1srvr.Central.Sun.COM StorTools 4.1: VTSID 6006
switchtest.FATAL : "Switchtest failed with bad Pattern 0x7e7e7e7e on Device
qlc1-sw1-i15-d16 Port 16 Field fcFPortInvalidTxWords" Probable_Cause(s):
<Faulty hba/gbic/hub/switch/cable/disk> Recommended_Action(s): <See
/var/adm/messages for more information:> <Select StorEdge Expert Mode or run
stexpert from the cli to re-test the selected device to see if the problem
persists. StorEdge Expert will attempt to isolate the failing FRU.> <If the
problem persists, call your authorized Sun service provider.>

04/27/01 18:11:37 COMPLETED: qlc1-sw1-i15-d16
#
```

When you start the `stexpert` test StorTools GUI or manually from the CLI without specifying the `-I` (user intervention) argument, the output of a failed session is logged and the `stexpert.log` displays a list of the suspect FRUs it has not yet ruled out. The `errlog` files contain instructions for using `stexpert` from the CLI with the user intervention option selected. To resolve a single failing FRU, use `stexpert` as directed and respond to all prompts during the isolation process. The

output might prompt you to connect or unconnect fibre cables and components, replace or restore components, and insert and remove Fibre Channel loopback cables during the isolation process.

CODE EXAMPLE 13-2 `stexpert` Command Run With Intervention Option

```
# /opt/SUNWvtsst/bin/sparcv9/stexpert -I -o dev=c7t2000002037049882d0-r3
05/31/01 16:13:11 STARTED: stexpert on c7t2000002037049882d0-r3
05/31/01 16:13:11 STARTED: c7t2000002037049882d0-r3
05/31/01 16:13:11 NOTICE: Executing SCSI w/r buffer stress_test
05/31/01 16:13:11 NOTICE: Completed SCSI w/r buffer stress_test
05/31/01 16:13:11 COMPLETED: c7t2000002037049882d0-r3
05/31/01 16:13:11 FAILED: for details see:
/var/opt/SUNWvtsst/logs/31May2001_16:13:11_c7t2000002037049882d0-r3.errlog
05/31/01 16:13:12 STARTED: qlc3-sw0-i15-d16
05/31/01 16:13:12 NOTICE: Executing switch_dport [64 bit version]
05/31/01 16:13:13 COMPLETED: qlc3-sw0-i15-d16
05/31/01 16:13:13 FAILED: for details see:
/var/opt/SUNWvtsst/logs/31May2001_16:13:13_qlc3-sw0-i15-d16.errlog
stexpert: Remove fiber cable from qlc3-sw0-i15-d16 GBIC in port 16
stexpert: Type ok to continue or exit to quit: ok
stexpert: Insert a loopback cable in qlc3-sw0-i15-d16 GBIC in port 16
stexpert: Type ok to continue or exit to quit: ok
Waiting for FC-AL loop to go online (5 min timeout)
05/31/01 16:14:17 STARTED: qlc3-sw0-i15-d16
05/31/01 16:14:17 NOTICE: Executing switch_dport [64 bit version]
05/31/01 16:14:19 COMPLETED: qlc3-sw0-i15-d16
05/31/01 16:14:19 FAILED: for details see:
/var/opt/SUNWvtsst/logs/31May2001_16:14:19_qlc3-sw0-i15-d16.errlog
stexpert: Remove the GBIC in port 16
stexpert: Insert a new GBIC in port 16
stexpert: Type ok to continue or exit to quit: ok
stexpert: Insert a loopback cable in qlc3-sw0-i15-d16 GBIC in port 16
stexpert: Type ok to continue or exit to quit: ok
Waiting for FC-AL loop to go online (5 min timeout)
05/31/01 16:14:26 STARTED: qlc3-sw0-i15-d16
05/31/01 16:14:26 NOTICE: Executing switch_dport [64 bit version]
05/31/01 16:14:27 COMPLETED: qlc3-sw0-i15-d16
05/31/01 16:14:28 FAILED: for details see:
/var/opt/SUNWvtsst/logs/31May2001_16:14:27_qlc3-sw0-i15-d16.errlog
stexpert: Reinstall original qlc3-sw0-i15-d16 GBIC and cable in port 16
stexpert: Type ok to continue or exit to quit: exit
#
```

CHAPTER 14

snaphot Utility

The chapter describes the snapshot(1M) utility, which saves a copy of the system configuration to a file every time uyou start the StorTools software.

This chapter is organized as follows:

Overview of the snapshot Utility

The snapshot functions are accessed using the stortools GUI toolbar buttons SS Update and SS Diff.

Every time you start the StorTools software, the snapshot utility captures the system configuration information and saves it to the /var/opt/SUNWvtsst/logs/snapshot.log file. It also compares the current configuration to the last saved snapshot file and saves that output to the /var/opt/SUNWvtsst/logs/snapshot.diff file. If the two files are different, a message is displayed indicating that a difference has been detected.

The message displayed in the StorTools SnapShot Differences Alert window contains the following text:

```
The configuration has changed! Please read
/var/opt/SUNWvtsst/logs/config.txt before continuing
```

Note – The StorTools software displays only the configuration that is contained in the `snapshot` file. If the `snapshot` file is different from the actual system configuration, you will see only what is saved in the `snapshot` file. You will not see the changed hardware.

▼ To View the `snapshot` Message

1. **In the stortools GUI, click on the SS Diffs button.**
2. **Choose Log File -> SnapShot Diffs.**

   The Log Files window is displayed (see FIGURE 14-1).

Detecting Configuration Changes

The `snapshot` utility can detect configuration changes which occur due to faulty components or system configuration changes by running from the `snapshot` file. When `stortools` is started and differences are detected, the configuration in the last `snapshot` is used and the user is told to view the `SnapShot.diff` file for the changes.

To include new configuration changes into `stortools` you must update the Snapshot by pressing the “SS Update” button.

Note – Do not update the `snapshot` unless you are sure the differences are what you expected. If you do update the `snapshot` when there are unexpected differences, `stortools` might not be able to help diagnose hardware that can no longer communicate with the system.

The StorTools Log Files window in shown in FIGURE 14-1.

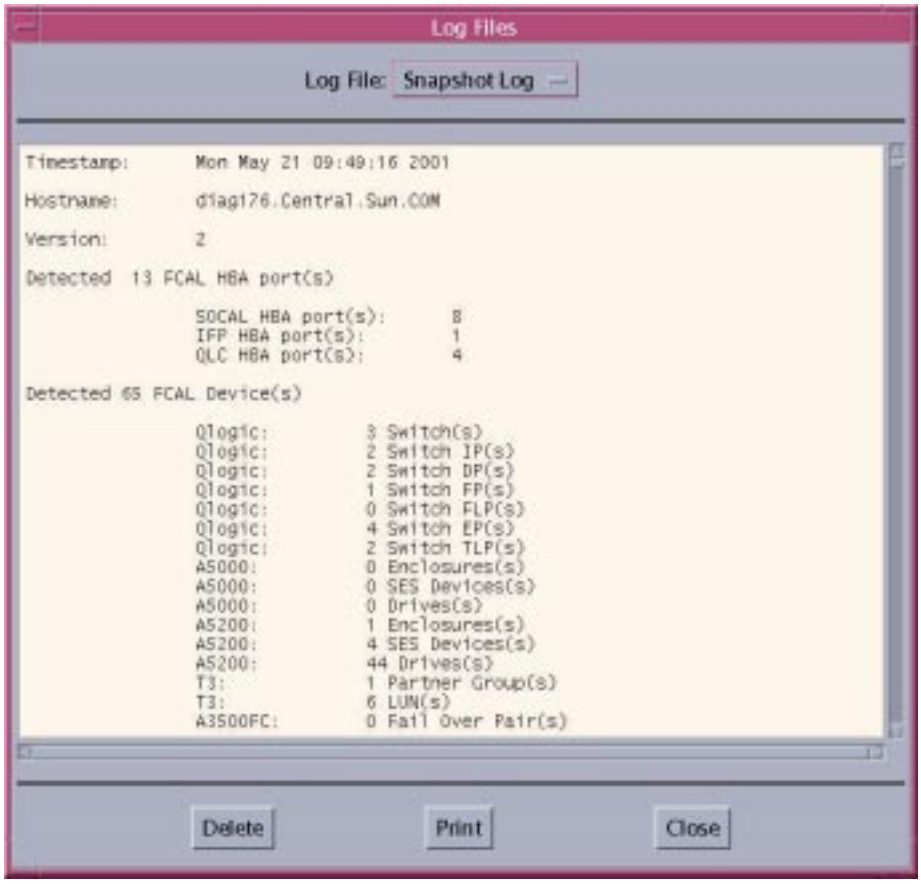

FIGURE 14-1 StorTools Snapshot Log Files Window

The StorTools Snapshot Diffs window shown in FIGURE 14-2.

FIGURE 14-2 StorTools Snapshot Diffs Window

snapshot Output

The `snapshot` output is a text-based capture of a non-fabric FC-AL topology from a Solaris host. It is the output of the `discman -c` command and is saved in `/var/opt/SUNWvtsst/logs/snapshot.log`. You can use the `discman -v` command at any time to compare the current system topology against the one captured invoking `discman -c`. The output of the `discman -v` command is saved in `/var/opt/SUNWvtsst/logs/snapshot.diffs`.

The `snapshot` logfile comprises three sections:

- Header
- Summary

- Topology

The following example header information contains a timestamp and the name of the host under inspection:

```
Timestamp:  Mon May 21 13:18:08 2001
Hostname:   diag176.Central.Sun.COM
Version:    2
```

The following example summary contains a count of all FC-AL HBA(s) and device(s):

```
Detected  13 FCAL HBA port(s)

    SOCAL HBA port(s):     8
    IFP HBA port(s):       0
    QLC HBA port(s):       4

Detected 20 FCAL Device(s)

    Qlogic:        2 Switch(s)
    Qlogic:        1 Switch IP(s)
    Qlogic:        1 Switch DP(s)
    Qlogic:        0 Switch FP(s)
    Qlogic:        1 Switch FLP(s)
    Qlogic:        4 Switch EP(s)
    Qlogic:        2 Switch TLP(s)
    5000:          1 Enclosures(s)
    A5000:         2 SES Devices(s)
    A5000:         5 Drives(s)
    A5200:         0 Enclosures(s)
    A5200:         0 SES Devices(s)
    A5200:         0 Drives(s)
    T3:            1 Partner Group(s)
    T3:            2 LUN(s)
    A3500FC:       0 Fail Over Pair(s)
    A3500FC:       0 LUN(s)
    Internal:      2 FC Disk Drive(s)
    FC Tape:       0 FC Tape Drive(s)
```

The following example of topology describes each node of the current topology under inspection. This is broken down into two basic structure types (HBA structures and Device structures). Each Device structure is displayed after the HBA that hosts that specific FC-AL. A typical HBA output is shown below:

```
HBA Port 8 Path:
           /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0:devctl

      RegisterName: qlc0
      LGroup: StorEdge-QLC-HostBusAdaptors
      PGroup: /StorEdge
      NodeWWN: 200000e08b800000
      PortWWN: 210000e08b800000
      wNODEWWN: 0000000000000000
      Mode: online
      DriverName: fp
      Instance: 0
      al_pa: 31
      DeviceType: 3
      Initial device: 3
```

A typical switch device output is as follows:

```
Device # 3:
       LogicalPath:
       PhysPath:
       HBA node path:
       RegisterName:       qlc0-sw1-fl1
       LGroup:             StorEdge-16P-Switches(qlc0)
       PGroup:             /StorEdge/qlc0
       NodeWWN:
       PortWWN:            210000e08b800000
       wNODEWWN:
       DualPort:
       Path State:         MDI_PATHINFO_STATE_INIT
       Instance:           1
       VendorID:           Qlogic
       ProductID:          Switch-16
       BoxName:
       Box ID:             0
       Revision:
       FirmwareRev:
       SerialNo:
       Capacity:
       DeviceID:           3
       DriverName:
       Status:             0x00000000
       sw_PortNum:         1
       sw_PortType:        FL_Port
       sw_PortState:       online
       sw_DevCount:        0
       sw_DevAlpas:
       sw_ipAddr:          172.20.32.58
       sw_ipAddr_remote:   172.20.32.58
       sw_remote_fcaddr:   0x0
       sw_ipName:          san1sw2
       sw_WWN:             100000c0dd008869
       sw_Flash:           30449
       sw_PromHW:          e06
       sw_PromSW:          40500
       sw_Flash:           30449
       sw_FabricID:        01
       sw_ModAddr:         100000
       sw_HWVer:           125040e
       sw_MAC:             00c0dd008868
       sw_MaxPorts:        16
...
       next device:      4
```

A typical disk device output is as follows:

```
Device # 18:

        LogicalPath:    /dev/rdsk/c3t50020F2300000945d1s2
        PhysPath:
            /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/ \
            ssd@w50020f2300000945,1:c,raw
        HBA node path:
            /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/ \
            ssd@w50020f2300000945,1:c,raw
        RegisterName:       c3t50020F2300000945d1
        LGroup:             StorEdge-T3-50020f2000000945_qlc0
        PGroup:             /StorEdge/qlc0/qlc0-sw1-fl1/qlc0- \
               sw1-fl1-e3/qlc0-sw1-fl1-e3-sw0-e4/qlc0-sw1-fl1 \
               -e3-sw0-e4-tl1
        NodeWWN:            50020f2000000945
        PortWWN:            50020f2300000945
        wNODEWWN:           0000000000000000
        DualPort:           Yes
        PortMode:           Primary
        Path State:         MDI_PATHINFO_STATE_ONLINE
        Instance:           0
        VendorID:           SUN
        ProductID:          T300
        BoxName:
        Box ID:             0
        Revision:           0117
        FirmwareRev:        0000
        SerialNo:           237320
        Capacity:           33.34GB
        DeviceID:           18
        DriverName:         fp
        Status:             0x00000000
        sf_al_pa:           0
        sf_hard_addr:       0
        sf_inq_dtype:       0
        DeviceType:         20
        Parent:             6
        Parent type:        DEVICE
        next device:        19
```

The following is a description of each of the field types:

```
LogicalPath   Logical Path of the node.
PhysPath      Physical Path of the node.
RegisterName  Unique (textual) identifier for this node.
Lgroup        SUNWvtsst Logical Group name.
Pgroup        SUNWvtsst
Physical Group name.
NodeWWN       Node WWN as determined by collection process.
PortWWN       Port WWN as determined by the collection process.
DualPort      Dual Port mode.
PortMode      Primary or Alternate.
Instance      Driver instance of this node.
VendorID      Name of hardware provider for this node.
ProductID     Textual description of the hardware that \
                    comprises this node.
BoxName       A500x Box/Enclosure name.
Revision      Revision of hardware comprising this node.
FirmwareRev   Revision of firmware comprising this node.
SerialNo      Serial number of hardware comprising this node.
DeviceID      Unique index value of this node.
DriverName    Driver which supports this node.
Status        Read/Write scratch area for tracking test status \
                    for this node.
sf_al_pa      Arbitrated loop physical address.
sf_inq_dtype  Device Type.
```

The following fields are specific to switch-type devices only. Each field relates to only one port on the switch:

```
sw_PortNum    Port Number of this node's port.
sw_PortType   Fabric mode that this node is configured for.
sw_PortState  Describes online/offline state of this port.
sw_DevCount   Count of devices on this port's FC-AL loop.
sw_DevAlpas   Array of index values which are on this port's loop.
sw_ipAddr     Internet Protocol address for this device.
sw_ipName     Internet Protocol name for this device.
sw_WWN        WWN of the HBA to which this device associates.
sw_Flash      Flash ROM version of this device.
sw_PromHW     Switch PROM hardware version.
sw_PromSW     Switch PROM software version.
sw_Flash      Current version of Flash RAM software that \
                   is loaded.
sw_HWVer     Switch hardware version.
sw_MAC       MAC (ethernet) address of switch.
sw_MaxPorts  Number of ports on this switch.
DeviceType   vfd device type.
Parent       vfd Index of this node's parent node.
```

CHAPTER 15

Changes from Previous Releases

This chapter provides a brief comparison of the functional differences between versions 3.x and 4.1 of the StorTools software.

Version 3.0 of the StorTools software is the network storage tool for FC-AL diagnostics, monitoring, configuration and revision checking. Version 4.1 includes the added functionality of being responsible for diagnostics and configuration checking. Version 4.1 depends on Network Storage Agent 2.0 for monitoring and PatchPro for revision checking.

Note – PatchPro *cannot* currently check firmware revisions, so the StorTools 4.1 revision checking feature has been exported to the Network Storage Agent.

The principle features provided in StorTools 4.1 that were not available under StorTools 3.x are:

- Configuration checking using the `discman` and `snapshot` utilities.
- Revision checking using Sun StorEdge PatchPro and Network Storage Agent.
- Diagnostic and FRU isolation using Sun StorEdge StorTools 4.1 utilities and `stexpert`.
- Online monitoring using Network Storage Agent.

Network Storage Agent

The Network Storage Agent is a remote monitoring agent that collects and resports information about Sun's storage products. The types of information collected includes:

- Device Configuration
- Device Statistics
- Device state and availability
- System configuration

Network Storage Agent Log Monitoring

The Network Storage Agent can monitor messages files for errors and can connect directly to Sun StorEdge T3 arrays and Sun StorEdge Fibre Channel switches to get status and configuration information.

For more detailed information about the Network Storage Agent's log monitoring capabilities, refer to the *Network Storage Agent User's Guide*.

Accessing Sun StorEdge PatchPro

You can use Sun StorEdge PatchPro to access the latest patches for your version of the Solaris operating environment. PatchPro is available at the following web site:

`http://sunsolve.Sun.COM`

Note – You must have a Bronze, Silver, Gold, or Platinum service agreement with Sun Microsystems in order to obtain patches from SunSolve.

Glossary

DMA direct memory access. The transfer of data directly into memory without supervision of the processor. The data is passed on the bus directly between the memory and another device.

expert system Expert knowledge is a combination of a theoretical understanding of the problem and a collection of heuristic problem-solving rules that experience has shown to be effective in the domain. Expert systems are constructed by obtaining this knowledge from a human expert and coding it into a form that a computer can apply to similar problems.

Fibre Channel A cost-effective gigabit communications link deployed across a wide range of hardware.

FC-AL Fibre Channel-Arbitrated Loop. FC-AL is implemented as either a loop or a fabric. A loop can contain up to 126 nodes, accessible through only one or two servers.

FRU field-replaceable unit. An assembly that a manufacturer replaces on failure of an assembly component.

GBIC Gigabit Interface Converter. A hot-swapable input/output device that plugs into a Gigabit Ethernet port or Fibre Channel.

HBA host bus adapter. A controller board connecting the I/O expansion bus to the fibre channel subsystem.

LUN Logical Unit Number. The major and minor device numbers make up the logical unit numbering sequence for a particular device connected to the computer.

PCI peripheral component interconnect. This is a high-performance 32-bit or 64-bit local bus that provides a host processor independent interface and an interconnect mechanism between highly integrated peripheral components.

SCSI Small Computer Systems Interface. An industry standard for connecting disk and tape devices to a workstation.

SES SCSI Enclosure Services driver. An interface to SCSI enclosure services devices. These devices sense and monitor the physical conditions within an enclosure, as well as allow access to the status reporting and configuration features of the enclosure (such as indicator LEDs on the enclosure).

SunVTS Sun's comprehensive diagnostic package that tests and validates Sun hardware by verifying the connectivity and functionality of most hardware controllers, devices, and platforms. The SunVTS test suite is not supported on X86 platforms. SunVTS supports testing in both 32-bit and 64-bit Solaris operating environments. It automatically determines whether the platform is 32-bit or 64-bit and initiates the appropriate tests.

Index

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