



Sun Multipath Failover Driver 1.0 for Windows NT User's Guide

Sun Microsystems, Inc.
901 San Antonio Road
Palo Alto, CA 94303-4900 U.S.A.
650-960-1300

Part No. 806-7766-10
February 2001, [Revision 01](#)

[Send comments about this document to: docfeedback@sun.com](mailto:docfeedback@sun.com)

Copyright 2001 Sun Microsystems, Inc., 901 San Antonio Road, Palo Alto, CA 94303-4900 U.S.A. All rights reserved.

This product or document is distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, AnswerBook2, docs.sun.com, Solaris, Java, and Sun StorEdge are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

Federal Acquisitions: Commercial Software—Government Users Subject to Standard License Terms and Conditions.

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Copyright 2001 Sun Microsystems, Inc., 901 San Antonio Road, Palo Alto, CA 94303-4900 Etats-Unis. Tous droits réservés.

Ce produit ou document est distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées des systèmes Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, AnswerBook2, docs.sun.com, Solaris, Java, et Sun StorEdge sont des marques de fabrique ou des marques déposées, ou marques de service, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

LA DOCUMENTATION EST FOURNIE "EN L'ETAT" ET TOUTES AUTRES CONDITIONS, DECLARATIONS ET GARANTIES EXPRESSES OU TACITES SONT FORMELLEMENT EXCLUES, DANS LA MESURE AUTORISEE PAR LA LOI APPLICABLE, Y COMPRIS NOTAMMENT TOUTE GARANTIE IMPLICITE RELATIVE A LA QUALITE MARCHANDE, A L'APTITUDE A UNE UTILISATION PARTICULIERE OU A L'ABSENCE DE CONTREFAÇON.



Contents

Preface ix

1. Sun Multipath Failover Driver Overview 1

Driver Description 1

Driver Console 3

2. Installing the Driver 5

Preparing for Installation 5

Installing the Driver 6

Uninstalling the Driver 7

3. Working with the Driver Console 9

Accessing the Driver Console 9

Understanding the Console Window 10

Navigating the Console Window 11

4. Configuring the Driver 13

Enabling Auto Failback 13

Setting the Poll Rate 14

Setting the Debug Level and Log Level 14

| | |
|--|-----------|
| 5. Using the Driver | 15 |
| Checking the Status of the Host Data Paths | 15 |
| Changing the Host Data Path | 16 |
| Restoring the Primary Path to a LUN | 19 |
| Restoring the Primary Path to an Array | 19 |
| 6. Troubleshooting | 21 |
| Nothing displays below localhost in the Console Window | 21 |
| Glossary | 23 |
| Index | 25 |

Figures

| | | |
|------------|--|----|
| FIGURE 1-1 | Sun StorEdge T3 Array Partner Group | 2 |
| FIGURE 3-1 | Console with Driver Operations Tab Displayed | 10 |

Tables

TABLE 2-1 Required Hardware and Software 5

Preface

The *Sun Multipath Failover Driver 1.0 for Windows NT User's Guide* provides instructions for installing and using the Sun Multipath Failover Driver software.

This guide is designed for use with the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* and is written for experienced system administrators of the Windows NT operating environment and related disk storage systems.

Before You Read This Book

Read the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* to install and operate the Sun StorEdge™ T3 array.

How This Book Is Organized

This manual is organized as follows:

Chapter 1 provides an overview of the Sun Multipath Failover Driver.

Chapter 2 describes how to install and uninstall the driver.

Chapter 3 describes how to access and use the driver console.

Chapter 4 describes how to configure the driver's options.

Chapter 5 describes how to use the driver to change and restore the host data path.

Chapter 6 provides troubleshooting information.

Typographic Conventions

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

Related Documentation

| Application | Title | Part Number |
|---------------------------------|--|-------------|
| Late-breaking Information | <code>readme.txt</code> file in the installation directory | N/A |
| Installation and Service | <i>Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual</i> | 806-1062 |
| Release Notes | <i>Sun StorEdge T3 Disk Tray Release Notes</i> | 806-1497 |
| System Administration | <i>Sun StorEdge T3 Disk Tray Administrator's Guide</i> | 806-1063 |
| Component Manager Installation | <i>Sun StorEdge Component Manager Installation Guide</i> | 806-1576 |
| Component Manager User's Guide | <i>Sun StorEdge Component Manager User's Guide</i> | 806-1579 |
| Component Manager Release Notes | <i>Sun StorEdge Component Manager Release Notes</i> | 806-1580 |

Accessing Sun Documentation Online

The `docs.sun.com`SM web site enables you to access a select group of Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

<http://docs.sun.com>

Ordering Sun Documentation

Fatbrain.com, an Internet professional bookstore, stocks select product documentation from Sun Microsystems, Inc.

For a list of documents and how to order them, visit the Sun Documentation Center on Fatbrain.com at:

<http://www.fatbrain.com/documentation/sun>

Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can email your comments to Sun at:

docfeedback@sun.com

Please include the part number (806-7766-10) of your document in the subject line of your email.

Sun Multipath Failover Driver Overview

This chapter contains the following topics:

- “Driver Description” on page 1
- “Driver Console” on page 3

Driver Description

The Sun Multipath Failover Driver provides the ability to both automatically and manually transfer I/O from one host data path to another on your Sun StorEdge™ T3 array. If a failure occurs in one host data path, the driver automatically detects the failure and provides continuous access to your data.

The driver requires that you have two arrays configured as a partner group with two host bus adapters (HBAs) connected (as shown in FIGURE 1-1), providing controller and data path redundancy. Refer to the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* for information about configuring a partner group and enabling multipathing support.

Each array can have up to two logical unit numbers (LUNs), also known as volumes. For more information about LUNs and how to configure them, refer to the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* and the *Sun StorEdge T3 Disk Tray Administrator's Guide*.

When properly configured, each array in the partner group has two host data paths: primary and alternate. FIGURE 1-1 shows a typical partner group configuration and identifies the primary and alternate data paths for each array.

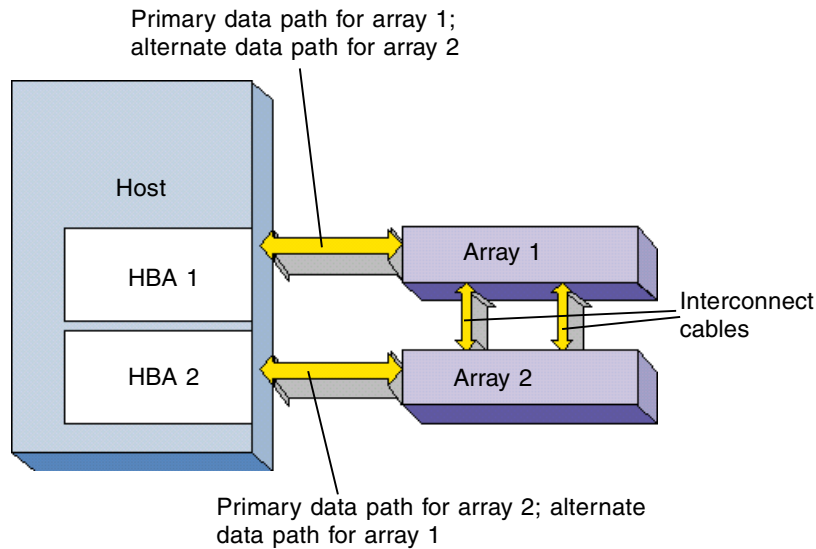


FIGURE 1-1 Sun StorEdge T3 Array Partner Group

The interconnect cables connect multiple arrays. The two arrays regularly exchange status and other information using these connections.

If the primary data path to one array fails for any reason, the driver transfers all I/O from the failed data path to the alternate data path, making sure that no data is lost. This process is called *failover*. When the primary host data path becomes operational again, the driver can automatically transfer I/O back to the primary path. This process is called *failback*. For information about enabling automatic failback, see “Enabling Auto Failback” on page 13.

The failure of any component in the host data path (HBA, cables, RAID controller, or the whole array) will cause a failover.

You can also manually transfer the I/O for each LUN from the primary path to the alternate path and back again using the driver console.

Driver Console

The driver console window provides a graphical user interface (GUI) to configure the driver, check array status, and manually cause a failover or failback. For information about accessing the console, see Chapter 3.

Installing the Driver

This chapter contains the following topics:

- “Preparing for Installation” on page 5
- “Installing the Driver” on page 6
- “Uninstalling the Driver” on page 7

Preparing for Installation

Before you install the driver, you must make sure that you have the correct versions of the following hardware and software.

TABLE 2-1 Required Hardware and Software

| Component | Version |
|---|--|
| Operating system | Windows NT 4.0, Service Pack 6 |
| HBA (Two required in any combination of the HBAs listed) | QLogic QLA2200F/66 <ul style="list-style-type: none">• Driver version 7.05.05• Firmware version 1.61 or Emulex LP8000 F1 or N1 <ul style="list-style-type: none">• Driver version 4.31• Firmware version 3.03x10/1.51a1 |
| Sun StorEdge T3 array | Firmware 1.14 or later |
| Component Manager Workstation | Ultra 60 or higher on Solaris™ |

Version 1.0 of the Sun Multipath Failover Driver only supports direct connections between the host and arrays. It does not support connections using Fibre Channel hubs or switches.

Installing the Driver

After you download the installation file for Windows NT (Sun_Multipath_Driver.exe) from the Sun Web site, you are ready to install the driver. When you install the driver, the Java™ Runtime Environment (JRE) version 1.3 installs automatically. This installation does not affect any JREs you may already have installed on your computer.

To install the driver:

1. **Double-click the file you downloaded in Windows Explorer.**

The Multipath Failover Driver - InstallShield Wizard displays.



2. **Click Next.**

3. **Follow the on-screen prompts to complete the installation.**

You should install the Typical configuration. If you select the Custom installation option, you cannot deselect the Driver option. This option is required to install the driver. If you deselect the Console option, you will not be able to configure and use the driver manually.

4. **Reboot your computer.**

You must reboot your computer before you can use the driver. Read the readme.txt file in the installation directory for late-breaking information about the driver.

Uninstalling the Driver

You uninstall the driver the same way you uninstall most Windows NT software.

Caution – Before you uninstall the driver, you must shut down the arrays. If you do not, uninstalling the driver will cause the operating system to see two paths to each LUN, which may result in data corruption.

To uninstall the driver:

1. **Shut down the arrays.**
2. **Choose Start -> Settings -> Control Panel.**
The Control Panel window displays.
3. **Double-click Add/Remove Programs.**
The Add/Remove Programs Properties window displays.
4. **Select Sun Microsystems Multipath Failover Driver from the Install/Uninstall tab.**
5. **Click Add/Remove.**
6. **Follow the on-screen prompts to complete the uninstallation.**
7. **Reboot your computer.**

Working with the Driver Console

This chapter contains the following topics:

- “Accessing the Driver Console” on page 9
- “Understanding the Console Window” on page 10

Accessing the Driver Console

You use the console to configure the driver, check array status, and manually cause a failover or failback.

To access the console:

- **Choose Start -> Programs -> Sun Multipath Driver -> Multipath Failover Console.**
Three DOS windows display first. After a few seconds, the driver window displays.

Note – You must leave these DOS windows open as long you want to use the console. You can minimize the windows.

Understanding the Console Window

FIGURE 3-1 shows the console window with the Driver Operations tab and all the details of one HBA displayed. From the console, you can configure the driver, check the status of an array, and cause a failover or failback.

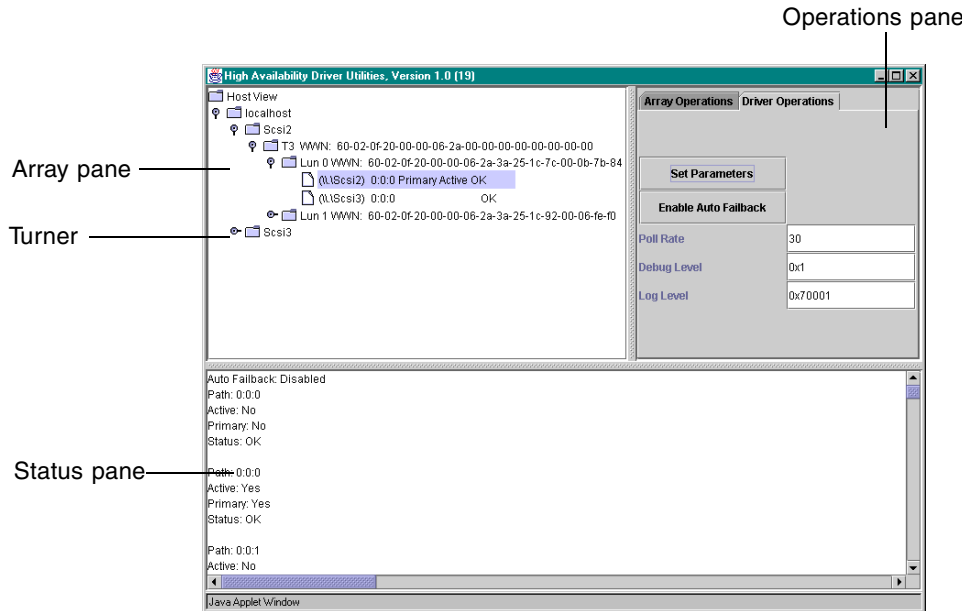


FIGURE 3-1 Console with Driver Operations Tab Displayed

The primary parts of the driver console window are:

- **Array pane**—Displays the HBAs, arrays, LUNs (also known as volumes), and host data paths in a hierarchy.
- **Turner**—Expands or collapses the hierarchy in the Array pane.
- **Status pane**—Displays status information as you change the host data path, change the driver configuration, and check array status.
- **Operations pane**—Displays the buttons and fields that you use to configure and use the driver.
 - **Array Operations tab**—Use these buttons to change the host data path between the primary and alternate paths. If the buttons do not display, expand the hierarchy and select the array. For information about using these functions, see Chapter 5.
 - **Driver Operations tab**—Use these buttons and fields to configure the driver. If the buttons do not display, expand the hierarchy and select the HBA. For information about these settings, see Chapter 4.

Navigating the Console Window

When the console window first displays, only the Host View folder displays at the top of the Array pane. You can display a hierarchy of information including the host computer, HBAs, arrays, LUNs, and host data paths.

To display the host data path information in the Array pane:

1. **Double-click the Host View folder to display your host computer.**
2. **Click the turner next to the host computer name to display the HBAs installed in the host.**
3. **Click the turner next to the HBA to display the array.**

The array's World Wide Name (WWN) displays next to the array.

4. **Click the turner next to the array to display the LUNs on the array.**

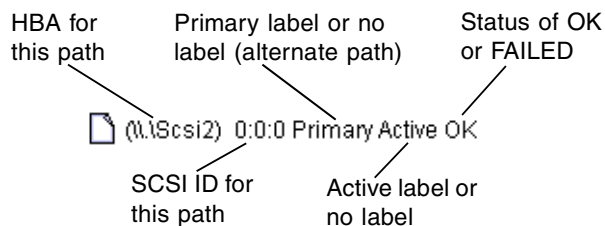
Each LUN's WWN displays next to the LUN.

For more information about LUNs and how to configure them, refer to the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* and the *Sun StorEdge T3 Disk Tray Administrator's Guide*.

5. **Click the turner next to the LUN to display the host data paths.**

You see two host data paths for each array. One is the primary path and the other is the alternate path.

The data paths display the following information:



Configuring the Driver

This chapter contains the following topics:

- “Enabling Auto Failback” on page 13
- “Setting the Poll Rate” on page 14
- “Setting the Debug Level and Log Level” on page 14

Enabling Auto Failback

You can configure the driver to automatically fail back to the primary host data path when that path becomes operational. By default, Auto Failback is *not* enabled.

To enable Auto Failback:

- 1. From the console window, click the Driver Operations tab.**

If the buttons do not display, expand the hierarchy and select the HBA.

- 2. Click Enable Auto Failback.**

The Auto Failback button is a toggle. After you click Enable Auto Failback, the button changes to Disable Auto Failback. Click the button again to disable Auto Failback.

The configuration change occurs immediately.

Setting the Poll Rate

You can change how often the driver checks the status of the primary data path after a failover. The poll rate setting is only applicable when Auto Failback is enabled. If Auto Failback is enabled and the driver finds that the primary path is operational after polling, the driver fails back to the primary path.

The default poll rate setting is 30 seconds.

To set the poll rate:

1. **From the console window, click the Driver Operations tab.**
If the buttons do not display, expand the hierarchy and select the HBA.
2. **Type how often, in seconds, you want the driver to check the status of the primary path in the Poll Rate field.**
3. **Click Set Parameters.**

The change does not take effect until you click Set Parameters. A configuration changed status message displays in the Status pane.

Setting the Debug Level and Log Level

The Debug Level and Log Level functions are for use by service engineers only.

Using the Driver

This chapter contains the following topics:

- “Checking the Status of the Host Data Paths” on page 15
- “Changing the Host Data Path” on page 16
- “Restoring the Primary Path to a LUN” on page 19
- “Restoring the Primary Path to an Array” on page 19

Checking the Status of the Host Data Paths

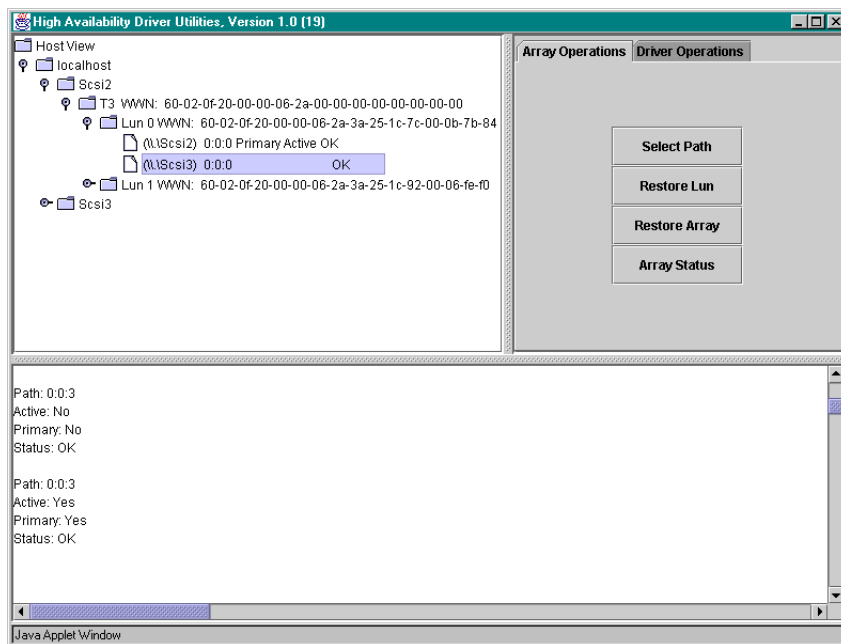
You can check the status of both host data paths for each LUN.

To check the status of the host data paths:

1. **From the console window, click the Array Operations tab.**
If the buttons do not display, expand the hierarchy and select the array.
2. **Select the LUN whose data path status you want to check.**

3. Click Array Status.

The status information for each data path displays in the Status pane as shown in the following example console window.



Changing the Host Data Path

You can change the host data path from the primary path to the alternate path for a specific LUN. When you do this, you are manually causing a failover.

After a failover, you can also change the host data path from the alternate path to the primary path for a specific LUN. When you do this, you are manually causing a failback.

You might want to use this function when you perform maintenance on one HBA or need to replace the HBA or another component in the host data path.

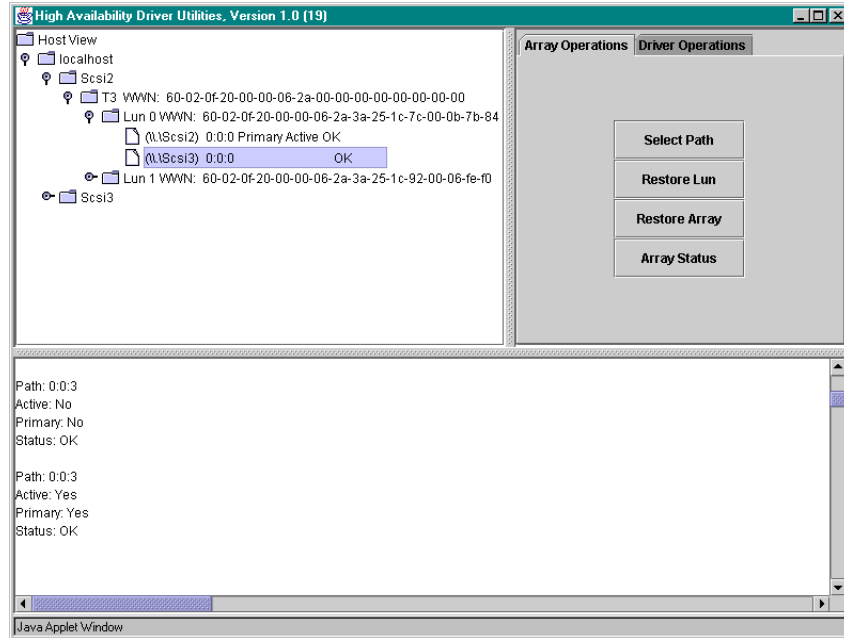
To change the host data path:

1. From the console window, click the Array Operations tab.

If the buttons do not display, expand the hierarchy and select the array.

2. Select the inactive host data path for a LUN.

The Active label shows which host data path is currently active.

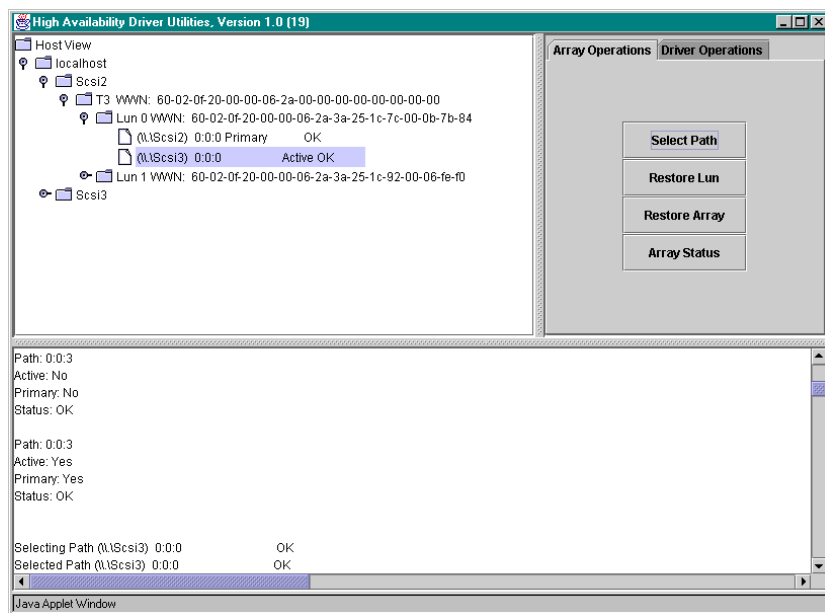


3. Click Select Path.

The following messages display in the Status pane (the second message takes a few seconds) and the Active label moves to the new path:

Selecting Path *HBA SCSI ID Status*

Selected Path *HBA SCSI ID Status*



If the change fails, a message displays in the Status pane. Check that all components of the host data path you want to use are working properly.

Restoring the Primary Path to a LUN

After a failover, you can change the host data path for a specific LUN back to the primary data path. The change only works if the primary data path is operational.

To restore the primary path to a LUN:

1. **From the console window, click the Array Operations tab.**

If the buttons do not display, expand the hierarchy and select the array.

2. **Select the LUN whose primary path you want to restore.**

3. **Click Restore Lun.**

The following messages display in the Status pane (the second message takes a few seconds) and the Active label moves to the primary path:

Restoring Lun *LUN identifier*

Restored Lun *LUN identifier*

If the change fails, a message displays in the Status pane. Check that all components of the primary data path you want to use are working properly.

Restoring the Primary Path to an Array

After a failover, you can change the host data path for all LUNs on an array back to the primary data path. The change only works if each primary data path is operational.

To restore the primary path to all LUNs on an array:

1. **From the console window, click the Array Operations tab.**

If the buttons do not display, expand the hierarchy and select the array.

2. **Select the array whose primary paths you want to restore.**

3. Click **Restore Array**.

The following messages display in the Status pane (the second message takes a few seconds) and the Active label moves to the primary path:

Restoring Array T3 WWN *array's WWN*

Restored Array T3 WWN *array's WWN*

If the change fails, a message displays in the Status pane. Check that all components of the primary data path you want to use are working properly.

Troubleshooting

This chapter contains the following topics:

- “Nothing displays below localhost in the Console Window” on page 21

Nothing displays below localhost in the Console Window

If you display the console window and you cannot display anything below localhost, the driver is not communicating properly with the array. Try the following to resolve the problem:

1. Be sure that the arrays are up and running.

Refer to the *Sun StorEdge T3 Disk Tray Installation, Operation, and Service Manual* and the *Sun StorEdge T3 Disk Tray Administrator's Guide*.

2. Be sure the connections to each array are operational.

Diagnosing errors in the host data channel is outside of the scope of this document. To determine the cause of failures in the data path, you must use host-based application diagnostics. Refer to the documentation for the selected diagnostics tool for information on identifying data channel failures.

3. Check the event log by choosing Start -> Programs -> Administrative Tools (Common) -> Event Viewer.

The event log stores failover event information and driver messages that may assist you in diagnosing the problem.

Glossary

| | |
|----------------------------------|--|
| array | A Sun StorEdge T3 array that contains an internal RAID controller and nine disk drives with Fibre Channel connectivity to the data host. |
| alternate path | The secondary host I/O path that a controller fails over to when a failure occurs on the primary path. |
| failback | The process by which a failed over controller changes its I/O from the alternate path back to its primary path after the primary path becomes operational. |
| failover | The process by which one controller changes its I/O from the primary path to the alternate path. |
| logical unit number (LUN) | One or more drives that is grouped into a unit; also called a “volume.” |
| partner group | A pair of interconnected arrays. |
| primary path | The host I/O path that each controller uses by default under normal operating conditions. |
| volume | One or more drives that is grouped into a unit; also called a “LUN.” |
| World Wide Name (WWN) | Unique number assigned to each device on a Fibre Channel loop. |

Index

A

- accessing the console, 9
- active data path
 - changing, 16
 - making the primary, 19
- alternate path
 - changing, 16
 - checking the status of, 15
 - defined, 2
 - making active or inactive, 16
- Array Operations tab, 10
- Array pane, 10
- arrays, displaying, 11
- Auto Failback, enabling, 13

C

- changing
 - the active data path, 16
 - the host data paths, 16
- checking the status of the host data paths, 15
- configuring the driver, 13
- console
 - accessing, 9
 - Array Operations tab, 10
 - Array pane, 10
 - data path information displayed, 11
 - Driver Operations tab, 10
 - navigating, 11
 - Operations pane, 10
 - Status pane, 10

- turner, 10
- understanding, 10
- conventions, typographic, x

D

- data paths
 - alternate, 2
 - changing, 16
 - checking the status of, 15
 - displaying, 11
 - information displayed in console, 11
 - primary, 2
- Debug Level, 14
- displaying
 - array information, 11
 - HBAs, 11
 - host data paths, 11
 - LUNs, 11
 - the console, 9
- documentation, related, x
- DOS windows, requirement to leave open, 9
- driver
 - accessing the console, 9
 - configuring, 13
 - installing, 6
 - system requirements, 5
 - understanding the console, 10
 - uninstalling, 7
- Driver Operations tab, 10

E

enabling Auto Failback, 13

F

failback

- defined, 2
- enabling automatic, 13
- forcing manually, 16, 19

failover

- defined, 2
- forcing manually, 16

H

HBAs, displaying, 11

host data paths

- alternate, 2
- changing, 16
- checking the status of, 15
- displaying, 11
- information displayed in console, 11
- primary, 2

I

inactive data path, changing, 16

installing

- preparation for, 5
- the driver, 6

L

Log Level, 14

LUNs, displaying, 11

O

Operations pane, 10

P

poll rate, setting, 14

primary path

- changing, 16
- checking the status of, 15
- defined, 2
- making active, 19
- making active or inactive, 16
- restoring, 19

R

related documentation, x

requirements for driver, 5

restoring the primary path, 19

S

setting the poll rate, 14

Status pane, 10

status, checking for data paths, 15

Sun Multipath Failover Driver

- accessing the console, 9
- configuring, 13
- installing, 6
- system requirements, 5
- understanding the console window, 10
- uninstalling, 7

system requirements, 5

T

troubleshooting, 21

turner, 10

typographic conventions, x

U

understanding the console, 10

uninstalling the driver, 7