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<td>TABLE 2-13</td>
<td>env_display Options and Arguments</td>
<td>23</td>
</tr>
<tr>
<td>TABLE 2-14</td>
<td>alarm_off Options and Arguments</td>
<td>23</td>
</tr>
<tr>
<td>TABLE 2-15</td>
<td>alarm_on Options and Arguments</td>
<td>24</td>
</tr>
<tr>
<td>TABLE 2-16</td>
<td>alarm_set Options and Arguments</td>
<td>24</td>
</tr>
<tr>
<td>TABLE 2-17</td>
<td>enclosure_name Options and Arguments</td>
<td>25</td>
</tr>
<tr>
<td>TABLE 2-18</td>
<td>perf_statistics Options and Arguments</td>
<td>26</td>
</tr>
<tr>
<td>Table</td>
<td>Command</td>
<td>Options and Arguments</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>------------------------</td>
</tr>
<tr>
<td>2-19</td>
<td>power_off</td>
<td></td>
</tr>
<tr>
<td>2-20</td>
<td>power_on</td>
<td></td>
</tr>
<tr>
<td>2-21</td>
<td>release</td>
<td></td>
</tr>
<tr>
<td>2-22</td>
<td>reserve</td>
<td></td>
</tr>
<tr>
<td>2-23</td>
<td>set_boot_dev</td>
<td></td>
</tr>
<tr>
<td>2-24</td>
<td>start</td>
<td></td>
</tr>
<tr>
<td>2-25</td>
<td>stop</td>
<td></td>
</tr>
<tr>
<td>2-26</td>
<td>fast_write</td>
<td></td>
</tr>
<tr>
<td>2-27</td>
<td>nvram_data</td>
<td></td>
</tr>
<tr>
<td>2-28</td>
<td>purge</td>
<td></td>
</tr>
<tr>
<td>2-29</td>
<td>sync_cache</td>
<td></td>
</tr>
<tr>
<td>2-30</td>
<td>remove_device</td>
<td></td>
</tr>
<tr>
<td>2-31</td>
<td>insert_device</td>
<td></td>
</tr>
<tr>
<td>2-32</td>
<td>replace_device</td>
<td></td>
</tr>
<tr>
<td>A-1</td>
<td>Expert Mode Subcommands</td>
<td></td>
</tr>
</tbody>
</table>
Preface

Platform Notes: Using luxadm Software describes how to use the luxadm administrative program for the Sun™ StorEdge™ A5000 disk array (formerly named the Sun™ Enterprise Network Array™), and SPARCstorage™ disk arrays. These instructions are designed for an experienced system administrator.

Note – The ssadm command is now linked to the luxadm command; the luxadm command has incorporated all the features of the ssadm command.

Using UNIX Commands

This document does 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
- AnswerBook™ online documentation for the Solaris software environment
- Other software documentation that you received with your system
Typographic Conventions

**TABLE P-1**  Typographic Conventions

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

Shell Prompts

**TABLE P-2**  Shell Prompts

<table>
<thead>
<tr>
<th>Shell</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>C shell</td>
<td>machine_name%</td>
</tr>
<tr>
<td>C shell superuser</td>
<td>machine_name#</td>
</tr>
<tr>
<td>Bourne shell and Korn shell</td>
<td>$</td>
</tr>
<tr>
<td>Bourne shell and Korn shell superuser</td>
<td>#</td>
</tr>
</tbody>
</table>
Related Documentation

<table>
<thead>
<tr>
<th>TABLE P-3</th>
<th>Related Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td><strong>Part Number</strong></td>
</tr>
<tr>
<td>Sun StorEdge A5000 Installation and Service Manual</td>
<td>802-7573</td>
</tr>
</tbody>
</table>

Sun Documentation on the Web

The docs.sun.com web site enables you to access 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

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smcc-docs@sun.com

Please include the part number of your document in the subject line of your email.
luxadm Command Basics

The luxadm program is an administrative command that manages both the Sun StorEdge A5000 and SPARCstorage Array disk arrays. luxadm performs a variety of control and query tasks, depending on the command-line arguments and options used.

Command Syntax

The command line must contain a subcommand. You can enter options, usually at least one enclosure name or path name, and other parameters depending on the subcommand. You specify a device by entering either a physical path name or a logical path name.

The basic syntax is as follows:

```
luxadm [options] subcommand [options] [enclosure[,dev]... | pathname...]
```

When specifying a subcommand, you need to enter only as many characters as are required to uniquely identify the subcommand. For example, to run the display subcommand on an enclosure named box1, you could enter:

```
#luxadm disp box1
```
Addressing

This section explains how to specify, or address, a disk array.

Addressing a StorEdge A5000 Disk Array

You can address a StorEdge A5000 disk array by path name or enclosure name.

Specifying the Path Name

You can specify the device or controller using either a complete physical path name or a complete logical path name. A typical physical path name for a StorEdge A5000 disk array is:

```
/devices/sbus@1f,0/SUNW,socal@1,0/sf@0,0/
ssd@w2200002037000f96,0:a,raw
```

or

```
/devices/io-unit@f,e0200000/sbi@0,0/SUNW,socal@2,0/sf@0,0/
ssd@34,0:a,raw
```

For all StorEdge A5000 disk array interface boards (IBs) on the system, a logical link to the physical paths is kept in the directory `/dev/es`. An example of a logical link is `/dev/es/ses0`.

Specifying the Enclosure Name

For the StorEdge A5000 disk array, you can select a device or interface board using the world wide name (WWN) instead of the path name. The WWN is a unique 16-digit hexadecimal value that specifies either the port used to access the device or the device itself. A typical WWN value is `2200002037000f96`. 
You can also specify the name of the StorEdge A5000 disk array and an identifier for the particular device in the enclosure. A device in a StorEdge A5000 disk array is identified as follows:

\[ BOX_NAME, [f|r]slot_number \]

where:

**TABLE 1-1  Addressing a StorEdge A5000 Disk Array by Enclosure Name**

<table>
<thead>
<tr>
<th>Options/Arguments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOX_NAME</td>
<td>is the name of the StorEdge A5000 enclosure, as specified by the enclosure_name subcommand</td>
</tr>
<tr>
<td>f or r</td>
<td>specifies the front or rear slots in the StorEdge A5000 enclosure</td>
</tr>
<tr>
<td>slot_number</td>
<td>is the slot number in the StorEdge A5000 enclosure, either 0-6 or 0-10</td>
</tr>
</tbody>
</table>

When addressing the StorEdge A5000 disk array, the path name or enclosure name specifies the StorEdge A5000 IB.
Addressing a SPARCstorage Array

When addressing the SPARCstorage Array, the path name specifies the SPARCstorage Array controller or a disk in the SPARCstorage Array. The controller name is specified by its physical name. For example:

```
/devices/.../SUNW,soc@3,0/SUNW,pln@axxxxxxx,xxxxxxx:ctlr
```

The controller name can also be specified by a name of the form cN, where N is the logical controller number. luxadm uses the cN name to find an entry in the /dev/rdsk directory of a disk that is attached to the SPARCstorage Array controller. The /dev/rdsk entry is then used to determine the physical name of the SPARCstorage Array controller.

A disk in the SPARCstorage Array is specified by its logical or physical device name. For example:

```
/dev/rdsk/c1t0d0s2
```

or

```
/devices/.../SUNW,soc@3,0/SUNW,pln@axxxxxxx,xxxxxxx:ssd@0,0:c,raw
```

See the `disks(1M)` and `devlinks(1M)` man pages for more information on logical names for disks and subsystems.
Addressing a SPARCstorage RSM Tray

When addressing the SPARCstorage RSM tray, the path name specifies the controller or a disk in the SPARCstorage RSM tray. The controller name is specified by its physical name. For example

!/devices/sbus@1f,0/QLGC,isp@1,10000/sd@8,0:c,raw

The controller name can also be specified by a name of the form cN, where N is the logical controller number. luxadm uses the cN name to find an entry in the /dev/rdsk directory of a disk that is attached to the SPARCstorage Array controller. The /dev/rdsk entry is then used to determine the physical name of the controller.

A disk in the SPARCstorage RSM tray is specified by its logical or physical device name. For example:

!/dev/rdsk/c2t8d0s2

See the disks(1M) and devlinks(1M) man pages for more information on logical names for disks and subsystems.
luxadm Subcommands

This chapter discusses the luxadm subcommands and is divided into the following sections:

- Subcommand Support Matrix
- Checking and Setting Disk LEDs
- Displaying Enclosure and Disk Information
- Downloading Firmware and fcode
- Accessing the Enclosure Services Card
- Performing Enclosure and Disk Operations
- Displaying and Setting NVRAM
- Removing, Inserting, and Replacing Enclosures and Disks

For information on how to specify (address) a disk array, see Section “Addressing” on page 1-2.
Subcommand Support Matrix

The following basic luxadm subcommands are supported on the StorEdge A5000 disk array, the SPARCstorage Array, and SPARCstorage RSM trays. See Appendix A for information about export mode subcommands and their supported platforms.

<table>
<thead>
<tr>
<th>Subcommand</th>
<th>StorEdge A5000</th>
<th>SPARCstorage Array</th>
<th>SPARCstorage RSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>alarm_off</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>alarm_on</td>
<td>yes</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>alarm_set</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>display</td>
<td>yes</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>download</td>
<td>yes</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>enclosure_name</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>env_display</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>fast_write</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fc_s_download</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fcal_s_download</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>inquiry</td>
<td>yes</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>insert_device</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>led</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>led_blink</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>led_off</td>
<td>yes</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>led_on</td>
<td>yes</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>nvram_data</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>perf_statistics</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>power_off</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>power_on</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>probe</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>purge</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>release</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>remove_device</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Checking and Setting Disk LEDs

Checking the Current State of a Disk LED (led)

Use the `led` subcommand to check the current state of the yellow LED associated with a specific disk.

Supported on:
- StorEdge A5000
- SPARCstorage Array
- SPARCstorage RSM

```
luxadm [-v] led { enclosure, dev... | pathname...}
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enclosure</td>
<td>The enclosure name of a StorEdge A5000 disk array</td>
</tr>
<tr>
<td>dev</td>
<td>The name of a specific disk in an enclosure</td>
</tr>
<tr>
<td>pathname</td>
<td>The physical or logical path name of a specific disk in an array</td>
</tr>
</tbody>
</table>
Example:

```
# luxadm led /devices/sbus@3,0/SUNW,socal@0,0/sf@0,0/
ssd@w21000020370412ec,0:c,raw
LED state is OFF for device in location: front,slot 0
```

Setting a Disk LED to the Blink Mode  
(*led_blink*)

Use the *led_blink* subcommand to make the yellow LED associated with a specific disk blink or flash.

Supported on:
- StorEdge A5000

```
luxadm [ -v ] led_blink { enclosure, dev... | pathname... }
```

### TABLE 2-3  *led_blink* Options and Arguments

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>enclosure</em></td>
<td>The enclosure name of a StorEdge A5000 disk array</td>
</tr>
<tr>
<td><em>dev</em></td>
<td>The name of a specific disk in an enclosure</td>
</tr>
<tr>
<td><em>pathname</em></td>
<td>The physical or logical path name of a specific disk in an array</td>
</tr>
</tbody>
</table>

Example:

```
# luxadm led_blink /devices/sbus@3,0/SUNW,socal@0,0/sf@0,0/
ssd@w21000020370412ec,0:c,raw
LED state is BLINKING for device in location: front,slot 0
```

Example:
Turning Off a Disk LED (led_off)

Use the `led_off` subcommand to turn off the yellow LED associated with a specific disk.

Supported on:
- StorEdge A5000
- SPARCstorage Array
- SPARCstorage RSM

```
luxadm [-v] led_off { enclosure, dev... | pathname...}
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>enclosure</code></td>
<td>The enclosure name of a StorEdge A5000 disk array</td>
</tr>
<tr>
<td><code>dev</code></td>
<td>The name of a specific disk in an enclosure</td>
</tr>
<tr>
<td><code>pathname</code></td>
<td>The physical or logical path name of a specific disk in an array</td>
</tr>
</tbody>
</table>

**Note** – On a StorEdge A5000 disk array this may or may not cause the yellow LED to turn off or stop blinking depending on the state of the StorEdge A5000 disk array. Refer to StorEdge A5000 Installation and Service Manual for details.

Example:

```
# luxadm led_off /devices/sbus@3,0/SUNW,socal@0,0/sf@0,0/ ssd@w21000020370412ec,0:c,raw
LED state is OFF for device in location: front, slot 0
#
```

Turning On a Disk LED (led_on)

Use the `led_on` subcommand to turn on the yellow LED associated with a specific disk.

Supported on:
- SPARCstorage Array
Displaying Enclosure and Disk Information

Probing for StorEdge A5000 Disk Arrays (probe)

Use the probe subcommand to display information about all attached StorEdge A5000 disk arrays. The information displayed includes the logical path names, the WWNs, and the enclosure names.

Supported on:

- StorEdge A5000

```
luxadm [-v] probe [-p]
```

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-p</td>
<td>Also displays the physical path name</td>
</tr>
</tbody>
</table>
Example:

```bash
# luxadm probe
Found
SENA Name: macs1  Node WWN: 1234123412341234
  Logical Path: /dev/es/ses0
  Logical Path: /dev/es/ses1
```

Example:

```bash
# luxadm probe -p
Found
SENA Name: macs1  Node WWN: 5080020000000598
  Logical Path: /dev/es/ses0
  Physical Path: /devices/sbus@1f,0/SUNW,socal@0,0/sf@1,0/
    ses@w5080020000000599,0:0
  Logical Path: /dev/es/ses1
  Physical Path: /devices/sbus@1f,0/SUNW,socal@0,0/sf@1,0/
    ses@w508002000000059a,0:0
  Logical Path: /dev/es/ses2
  Physical Path: /devices/sbus@1f,0/SUNW,socal@0,0/sf@1,0/
    ses@w5080020000000599,0:0
  Logical Path: /dev/es/ses3
  Physical Path: /devices/sbus@1f,0/SUNW,socal@0,0/sf@1,0/
    ses@w508002000000059a,0:0
```

Displaying Enclosure or Device Specific Data (display)

Use the display subcommand to display enclosure specific or device specific data.

Enclosure data consists of enclosure environmental sense information and status for all subsystem devices including disks. Device data consists of inquiry, capacity, and configuration information.

Supported on:
- StorEdge A5000
- SPARCstorage Array
**luxadm** [ -v ] **display** enclosure[,dev]... | pathname...

**TABLE 2-7** display Options and Arguments

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-v</td>
<td>Displays mode sense data</td>
</tr>
<tr>
<td>enclosure</td>
<td>The enclosure name of a StorEdge A5000</td>
</tr>
<tr>
<td>dev</td>
<td>The name of a specific disk in an enclosure</td>
</tr>
<tr>
<td>pathname</td>
<td>The physical or logical path name of a StorEdge A5000, SPARCstorage Array, or a specific disk in an array</td>
</tr>
<tr>
<td>-p</td>
<td>Displays performance information for the specified device or subsystem</td>
</tr>
<tr>
<td>-r</td>
<td>Displays error information for the specified device or subsystem</td>
</tr>
</tbody>
</table>
Example:

```bash
# luxadm display macs1
(luxadm version: 1.36 98/03/10)

SENA

DISK STATUS

<table>
<thead>
<tr>
<th>SLOT</th>
<th>FRONT DISKS</th>
<th>(Node WWN)</th>
<th>REAR DISKS</th>
<th>(Node WWN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>On (O.K.)</td>
<td>2000002037049dfa</td>
<td>Not Installed</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>On (O.K.)</td>
<td>2000002037070608</td>
<td>On (O.K.)</td>
<td>200000203704a9e1</td>
</tr>
<tr>
<td>2</td>
<td>On (O.K.)</td>
<td>20000020370498</td>
<td>On (O.K.)</td>
<td>200000203704a285</td>
</tr>
<tr>
<td>3</td>
<td>On (O.K.)</td>
<td>200000203704f31</td>
<td>On (O.K.)</td>
<td>200000203704a252</td>
</tr>
<tr>
<td>4</td>
<td>On (O.K.)</td>
<td>200000203705e1</td>
<td>On (O.K.)</td>
<td>200000203704d61</td>
</tr>
<tr>
<td>5</td>
<td>On (O.K.)</td>
<td>200000203704b32</td>
<td>On (O.K.)</td>
<td>200000203704a8f1</td>
</tr>
<tr>
<td>6</td>
<td>On (O.K.)</td>
<td>2000002037049887</td>
<td>On (O.K.)</td>
<td>200000203704a9de</td>
</tr>
</tbody>
</table>

SUBSYSTEM STATUS

FW Revision: 1.05  Box ID: 0  Node WWN: 5080020000000598  Enclosure Name: macs1
Power Supplies (0, 2 in front, 1 in rear)
  0  O.K.(rev.-02)  1  O.K.(rev.-02)  2  O.K.(rev.-02)
Fans (0 in front, 1 in rear)
  0  O.K.(rev.-05)  1  O.K.(rev.-00)
ESI Interface board(IB) (A top, B bottom)
  A:  O.K.(rev.-04)
  GBIC module (1 on left, 0 on right in IB)
  0  O.K.(rev.-05)  1  O.K.(rev.-05): Not Installed

  B:  O.K.(rev.-04)
  GBIC module (1 on left, 0 on right in IB)
  0  O.K.(rev.-05)  1  O.K.(rev.-05): Not Installed

Disk backplane (0 in front, 1 in rear)
Front Backplane:  O.K.(rev.-05)
  Temperature sensors (on front backplane)
  0:42°C  1:42°C  2:40°C  3:39°C  4:40°C  5:42°C
  6:43°C  (All temperatures are NORMAL.)
Rear Backplane:  O.K.(rev.-05)
  Temperature sensors (on rear backplane)
  6:42°C  (All temperatures are NORMAL.)
Interconnect assembly
  O.K.(rev.-03)
Loop configuration
  Loop A is configured as a single loop.
  Loop B is configured as a single loop.
Language        USA English
```
### Example:

```
# luxadm display -r macs1
```

(luxadm version: 1.36 98/03/10)

**SENA**
- Information for FC Loop on port 0 of FC100/S Host Adapter
- at path: /devices/sbus@1f,0/SUNW,socal@0,0:0

<table>
<thead>
<tr>
<th>Version</th>
<th>Resets</th>
<th>Req_Q_Intrpts</th>
<th>Qfulls</th>
<th>Requests</th>
<th>Sol_Resps</th>
<th>Unsol_Resps</th>
<th>Lips</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

**Information from sf driver:**
- Version | Lip_count | Lip_fail | Alloc_fail | #_cmds | Throttle_limit | Pool_size |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1024</td>
<td>1</td>
</tr>
</tbody>
</table>

**TARGET ERROR INFORMATION:**

<table>
<thead>
<tr>
<th>AL_PA</th>
<th>Els_fail</th>
<th>Timouts</th>
<th>Abts_fail</th>
<th>Tsk_m_fail</th>
<th>Data_ro_mis</th>
<th>Dl_len_mis</th>
<th>Logouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>d2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ef</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>e4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>e2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>e1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>e0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>dc</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>b5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>cc</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>cb</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ca</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>c9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>c7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>c6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

### Displaying Disk Information (inquiry)

Use the `inquiry` subcommand to display `inquiry` information for a specific disk

**Supported on:**
- StorEdge A5000
- SPARCstorage Array
- SPARCstorage RSM
Example:

```bash
# luxadm inquiry macs1
INQUIRY:
  Physical path:
    /devices/sbus@1f,0/SUNW,socal@0,0/sf@1,0/ses@w5080020000000599,0:0
Vendor:        SUN
Product:       SENA
Revision:      1.05
Device type:   0xd (SES device)
Removable media: no
Medium Changer Element: no
ISO version:   0
ECMA version:  0
ANSI version:  3 (Device complies to SCSI-3)
Terminate task: no
Response data format: 2
Additional length: 0x7b
Command queueing: no

VENDOR-SPECIFIC PARAMETERS

<table>
<thead>
<tr>
<th>Byte#</th>
<th>Hex Value</th>
<th>ASCII</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>00 00 00 00</td>
<td>....</td>
</tr>
<tr>
<td>95</td>
<td>6d 61 63 73 31 00 00 00 00 00 00 00 00 00 00 00 00</td>
<td>macs1..........</td>
</tr>
<tr>
<td></td>
<td>00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00</td>
<td>...............</td>
</tr>
</tbody>
</table>
```

Downloading Firmware and fcode

Downloading Firmware (download)

Use the download subcommand to download a prom image to the FEPROMs on a StorEdge A5000 disk array IB or on a SPARCstorage Array controller board.

In a StorEdge A5000 disk array, when the download is complete, the disk array is be reset and the downloaded code is executed.

In a SPARCstorage Array, when the download is complete, you must reset the SPARCstorage Array to execute the downloaded code.

Supported on:
- StorEdge A5000
- SPARCstorage Array

Caution – When using the -s option, the download modifies the FEPROM in the StorEdge A5000 disk array.
Note – The -s option does not apply to the SPARCstorage Array controller, as it always writes the downloaded firmware into the FEPROM.

**TABLE 2-9 download Options and Arguments**

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-s</td>
<td>Saves the downloaded firmware in the FEPROM in a StorEdge A5000 disk array. If -s is not specified, the downloaded firmware will not be saved across power cycles.</td>
</tr>
<tr>
<td>-f filename</td>
<td>Downloads the prom image in <em>filename</em>. If you do not specify a filename, the default prom image is used. The default prom image in a StorEdge A5000 is in the directory <code>/usr/lib/locale/C/LC_MESSAGES</code> and is named <code>ibfirmware</code>. The default prom image in a SPARCstorage Array is in the directory <code>/usr/lib/firmware/ssa</code> and is named <code>ssafirmware</code>.</td>
</tr>
<tr>
<td>-w WWN</td>
<td>This option is for the SPARCstorage Array only. See “Changing a SPARCstorage Array WWN (download)” on page 19.</td>
</tr>
</tbody>
</table>

**Changing a SPARCstorage Array WWN (download)**

Use the `download` subcommand to change the WWN of a SPARCstorage Array controller board.

Supported on:
- SPARCstorage Array

```bash
luxadm [ -v ] download [-w WWN] pathname
```
TABLE 2-10  download Options and Arguments

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pathname</td>
<td>A SPARCstorage Array controller</td>
</tr>
<tr>
<td>-w WWN</td>
<td>Changes the World Wide Name for the SPARCstorage Array. WWN is a twelve-digit hex number; leading zeros are required. The new SPARCstorage Array controller’s image will have the least-significant 6 bytes of the 8-byte WWN modified to WWN.</td>
</tr>
</tbody>
</table>

Downloading fcode to FC25/S Host Adapters (fc_s_download)

Use the fc_s_download subcommand to download new fcode into all the FC25/S SBus Cards. (This is the 25 MHz host adapter card that connects to SPARCstorage Arrays.)

The fc_s_download subcommand is interactive; it waits for user confirmation before downloading the fcode.

The version of the FC/S SBus Cards fcode that was released with this version of the Operating System is located in the directory /usr/lib/firmware/fc_s and is named fc_s_fcode.

Supported on:
- SPARCstorage Array

Caution – Ensure that you download the /usr/lib/firmware/fc_s/fc_s_fcode file.

Caution – Only use fc_s_download subcommand in single user mode; otherwise the FC/S card could be reset.

luxadm [ -v ] fc_s_download [-F] [-f fcode-file]
Download fcode to FC100 Host Adapters
(fcal_s_download)

Use the fcal_s_download subcommand to download new fcode into all the FC100/S SBus or FC100/P PCI host adapters or to display the current version of the fcode in each host adapter. (This is the 100-MHz host adapter card which connects to StorEdge A5000 disk arrays.)

The fcal_s_download subcommand is interactive and waits for user confirmation before downloading the fcode.

Supported on:
- StorEdge A5000

**Caution** – Ensure that you download the /usr/lib/firmware/fc_s/fcal_s_fcode file.

**Caution** – Do not attempt to download fcode to a FC100/S SBus Card that is in your boot path. Boot from another device, such as a CDROM, and then download the fcode.

```
luxadm [ -v ] fcal_s_download [ -f fcode-file ]
```
Accessing the Enclosure Services Card

The `env_display` and various `alarm` subcommands apply only to an Enclosure Services Card (SES) in a RSM tray in a SPARCstorage Array. The RSM tray is addressed by using the logical or physical path of the SES device or by specifying the controller followed by the tray number. The controller is addressed by `cN` or the physical path to the controller in the SPARCstorage Array.

Displaying Environmental Information
(env_display)

Use the `env_display` subcommand to display the environmental information for a SPARCstorage Array.

Supported on:
- SPARCstorage Array
- SPARCstorage RSM

```
luxadm [-v] env_display { pathname | controller tray-number }
```
Disabling the Alarm (alarm_off)

Use the alarm_off subcommand to disable the audible alarm for this enclosure. When invoked without an option, the current state of audible alarm is printed.

Supported on:
- SPARCstorage Array
- SPARCstorage RSM

```bash
luxadm [-v] alarm_off { pathname | controller tray-number }
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pathname</td>
<td>The path to an SES device</td>
</tr>
<tr>
<td>controller</td>
<td>The path to a SPARCstorage Array controller</td>
</tr>
<tr>
<td>tray-number</td>
<td>An RSM tray number. tray-number is valid only for an RSM tray in a SPARCstorage Array</td>
</tr>
</tbody>
</table>

Enabling the Alarm (alarm_on)

Use the alarm_on subcommand to enable the audible alarm for this enclosure. When invoked without an option, the current state of audible alarm is printed.

Supported on:
- SPARCstorage Array
- SPARCstorage RSM
Setting the Alarm (**alarm_set**)  

Use the **alarm_set** subcommand to set the duration of the audible alarm to a specified number of seconds.

Supported on:
- SPARCstorage Array
- SPARCstorage RSM

```plaintext
luxadm [ -v ] alarm_set { pathname | controller tray-number } [seconds]
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>pathname</strong></td>
<td>The path to an SES device</td>
</tr>
<tr>
<td><strong>controller</strong></td>
<td>The path to a SPARCstorage Array controller</td>
</tr>
<tr>
<td><strong>tray-number</strong></td>
<td>An RSM tray number. <strong>tray-number</strong> is valid only for an RSM tray in a SPARCstorage Array</td>
</tr>
<tr>
<td><strong>seconds</strong></td>
<td>The number of seconds</td>
</tr>
</tbody>
</table>

---

TABLE 2-15 **alarm_on** Options and Arguments

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>pathname</strong></td>
<td>The path to an SES device</td>
</tr>
<tr>
<td><strong>controller</strong></td>
<td>The path to a SPARCstorage Array controller</td>
</tr>
<tr>
<td><strong>tray-number</strong></td>
<td>An RSM tray number. <strong>tray-number</strong> is valid only for an RSM tray in a SPARCstorage Array</td>
</tr>
</tbody>
</table>

---

TABLE 2-16 **alarm_set** Options and Arguments
Performing Enclosure and Disk Operations

Renaming a StorEdge A5000 Disk Array (enclosure_name)

Use the enclosure_name subcommand to change the enclosure name of one or more StorEdge A5000 disk arrays. The new name must be 16 or less characters. The only allowed characters are alphabetic or numeric digits.

Supported on:
- StorEdge A5000

```
luxadm [ -v ] enclosure_name new-name enclosure... | pathname...
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>new-name</td>
<td>The new enclosure name</td>
</tr>
<tr>
<td>enclosure</td>
<td>The enclosure name of a StorEdge A5000 disk array</td>
</tr>
<tr>
<td>pathname</td>
<td>The physical or logical path name of a StorEdge A5000 disk array</td>
</tr>
</tbody>
</table>

Collecting Performance Statistics (perf_statistics)

Use the perf_statistics subcommand to enable or disable the accumulation of performance statistics for a specific SPARCstorage Array controller.

Supported on:
- SPARCstorage Array
Note – The accumulation of performance statistics must be enabled before the `display -p` subcommand can be used.

```
luxadm [ -v ] perf_statistics [ -e ] pathname
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pathname</code></td>
<td>A SPARCstorage Array controller</td>
</tr>
<tr>
<td><code>-e</code></td>
<td>Enables the accumulation of performance statistics</td>
</tr>
</tbody>
</table>

### Powering Off an Enclosure or Disk Drive (power_off)

Use the `power_off` subcommand to set an enclosure to the power-save mode.

**Note** – StorEdge A5000 disk drives are not available when in the power-save mode.

When an Enclosure Services card in a SPARCstorage Array is addressed, the RSM tray is powered off.

When a disk drive in a StorEdge A5000 is addressed, the drive is set to the drive off/unmated state. When it is set to the drive off/unmated state, the drive is spun down (stopped) and put in the bypass mode.

Supported on:
- StorEdge A5000
- SPARCstorage Array

```
luxadm [ -v ] power_off { enclosure[,dev]... | pathname...}
```
Powering On Enclosures or Disk Drives

(power_on)

Use the power_on subcommand to set a drive to its normal power-on state. If you specify a StorEdge A5000 disk drive, the power_on subcommand sets the specified disks to the normal start-up state.

Supported on:
- StorEdge A5000

```
luxadm [-v] power_on { enclosure[,dev]... | pathname...}
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enclosure</td>
<td>is the enclosure name of a StorEdge A5000.</td>
</tr>
<tr>
<td>dev</td>
<td>is the name of a specific disk in an enclosure.</td>
</tr>
<tr>
<td>pathname</td>
<td>is the physical or logical path name of a StorEdge A5000, SPARCstorage Array, or a specific disk in an array.</td>
</tr>
</tbody>
</table>

Releasing Disks (release)

Use the release subcommand to release one or more disk drives from reservation.

Supported on:
- StorEdge A5000
- SPARCstorage Array
- SPARCstorage RSM
Reserving Disks (reserve)

Use the `reserve` subcommand to reserve the specified disk(s) for exclusive use by the host from which the subcommand was issued.

Supported on:
- StorEdge A5000
- SPARCstorage Array
- SPARCstorage RSM

```bash
luxadm [-v] reserve { pathname... }
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>enclosure</code></td>
<td>The enclosure name of a StorEdge A5000 disk array</td>
</tr>
<tr>
<td><code>dev</code></td>
<td>The name of a specific disk in a disk array</td>
</tr>
<tr>
<td><code>pathname</code></td>
<td>The physical or logical path name of a StorEdge A5000 disk array, SPARCstorage Array, or a specific disk in a disk array</td>
</tr>
</tbody>
</table>

TABLE 2-21  `release` Options and Arguments

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>enclosure</code></td>
<td>The enclosure name of a StorEdge A5000 disk array</td>
</tr>
<tr>
<td><code>dev</code></td>
<td>The name of a specific disk in a disk array</td>
</tr>
<tr>
<td><code>pathname</code></td>
<td>The physical or logical path name of a StorEdge A5000 disk array, SPARCstorage Array, or a specific disk in a disk array</td>
</tr>
</tbody>
</table>

TABLE 2-22  `reserve` Options and Arguments
Setting the Boot Device Variable (set_boot_dev)

Use the set_boot_dev subcommand to set the boot-device variable in the system PROM to a physical device name. The set_boot_device subcommand normally runs interactively; it requests confirmation for setting the default boot-device in the PROM.

Supported on:
- StorEdge A5000
- SPARCstorage Array
- SPARCstorage RSM

```bash
luxadm [ -v ] set_boot_dev [ -y ] pathname
```

**TABLE 2-23  set_boot_dev Options and Arguments**

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pathname</td>
<td>A block special device or a mount-point</td>
</tr>
<tr>
<td>-y</td>
<td>Runs non-interactively; no confirmation is requested or required</td>
</tr>
</tbody>
</table>

Starting Disks (start)

Use the start subcommand to spin up one or more disks.

Supported on:
- SPARCstorage Array

```bash
luxadm [ -v ] start [ -t tray-number ] pathname
```

**TABLE 2-24  start Options and Arguments**

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-t tray-number</td>
<td>The tray number</td>
</tr>
<tr>
<td>pathname</td>
<td>The physical or logical path name of a SPARCstorage Array, or a specific disk in a disk array</td>
</tr>
</tbody>
</table>
Stopping Disks (**stop**)

Use the `stop` subcommand to spin down one or more disks.

Supported on:
- SPARCstorage Array

```
luxadm [ -v ] stop [ -t tray-number ] pathname
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-t tray-number</code></td>
<td>is the tray number.</td>
</tr>
<tr>
<td><code>pathname</code></td>
<td>is the physical or logical path name of a SPARCstorage Array, or a specific disk in a disk array</td>
</tr>
</tbody>
</table>

Displaying and Setting NVRAM

Enabling and Disabling Fast Write (**fast_write**)

Use the `fast_write` subcommand to enable or disable the use of the NVRAM to enhance the performance of writes in the SPARCstorage Array.

Supported on:
- SPARCstorage Array

```
luxadm [ -v ] fast_write [-s] -c pathname
```
Displaying Fast Write Data (**nvram_data**)

Use the `nvram_data` subcommand to display the amount of fast write data in the NVRAM for a specific disk. This command can only be used for an individual disk.

Supported on:
- SPARCstorage Array

```
luxadm [-v] nvram_data pathname
```

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>pathname</code></td>
<td>A SPARCstorage Array controller or an individual disk</td>
</tr>
<tr>
<td><code>-e</code></td>
<td>Causes the SPARCstorage Array to save the change so it will persist across power-cycles</td>
</tr>
<tr>
<td><code>-c</code></td>
<td>Enables fast writes for synchronous writes only</td>
</tr>
<tr>
<td><code>-e</code></td>
<td>Enables fast writes</td>
</tr>
<tr>
<td><code>-d</code></td>
<td>Disables fast writes</td>
</tr>
</tbody>
</table>

Purging Fast Write Data from NVRAM (**purge**)

Use the `purge` subcommand to purge any fast write data from NVRAM for one or more disks.

Supported on:
- SPARCstorage Array

**Caution** – Use the `purge` subcommand with caution, usually only when a drive has failed.
Flushing NVRAM (*sync_cache*)

Use the *sync_cache* subcommand to flush all outstanding writes for one or more disks from NVRAM to the media.

Supported on:
- SPARCstorage Array

<table>
<thead>
<tr>
<th>TABLE 2-28</th>
<th>purge Options and Arguments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option/Argument</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>pathname</td>
<td>A SPARCstorage Array controller or an individual disk. If you specify a SPARCstorage Array controller, fast write data for all disks associated with that controller will be purged</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2-29</th>
<th>sync_cache Options and Arguments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option/Argument</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>pathname</td>
<td>A SPARCstorage Array controller or an individual disk. If you specify a SPARCstorage Array controller, outstanding writes for all disks associated with that controller will be flushed</td>
</tr>
</tbody>
</table>
Removing, Inserting, and Replacing Enclosures and Disks

This section discusses how to remove, insert, and replace disk drives, enclosures, or a chain of enclosures. For more detailed instructions on performing these operations with a StorEdge A5000 disk array, see Chapter 3 and refer to the Sun StorEdge A5000 Installation and Service Manual.

Removing Devices (remove_device)

Use the remove_device subcommand to hot remove a disk drive, enclosure, or a chain of enclosures. This subcommand interactively guides you through the hot removal of one or more devices.

Supported on:

- StorEdge A5000
- SPARCstorage RSM

In the StorEdge A5000 disk array, the remove_device subcommand:

- Checks whether the device is busy and if so warns you.
- Offlines the device (this fails if the disk is open).
- Informs you when device(s) can be safely removed.
- Informs you which device to remove by blinking the activity LED on the enclosure.
- Requests confirmation that the list(s) is/are as expected.
- Removes the logical device(s) names for the device that was removed.

In the SPARCstorage RSM, the remove_device subcommand:

- Takes the device offline.
- Quiesces the bus for buses that support quiescing.
- Informs you that the device can be safely replaced.
- Requests confirmation that the device has been replaced.
- Unquiesces the bus for buses that support quiescing.
- Brings the (now removed) device back online.
- Removes the logical device name for the device that was removed.
Example:

```
# luxadm remove_device macs1,f1

WARNING!!! Please ensure that no filesystems are mounted on these device(s).
All data on these devices should have been backed up.

The list of devices which will be removed is:

1: Box Name "macs1" frontslot 1

Please enter 'q' to Quit OR <Return> to Continue:

stopping: Drive in "macs1" front slot 1....Done
offlining: Drive in "macs1" front slot 1....Done

Hit <Return> after removing the device(s).
```
You must physically remove the device at this time. After you hit a key, the
displayed:

```
Drive in Box Name "macs1" front slot 1
Removing Logical Nodes:
Removing c2t1d0s0
Removing c2t1d0s1
Removing c2t1d0s2
Removing c2t1d0s3
Removing c2t1d0s4
Removing c2t1d0s5
Removing c2t1d0s6
Removing c2t1d0s7
#
```

**Inserting Devices (insert_device)**

Use the `insert_device` subcommand for hot insertion of a new disk drive,
enclosure, or chain of enclosures. If you specify more than one enclosure, you can
perform concurrent hot insertions on multiple buses.

Supported on:
- StorEdge A5000
- SPARCstorage RSM

The `insert_device` subcommand interactively guides you through the hot
insertion of one or more devices. In the StorEdge A5000 disk array the
`insert_device` subcommand:

- Informs you when the device(s) can be safely inserted.
- Requests confirmation that the list(s) as expected.
- Creates the logical device names for the new devices.
- Displays the logical path name for the devices.

In the SPARCstorage RSM, the `insert_device` subcommand:

- Quiesces the bus for buses that support quiescing.
- Informs you that the device can be safely inserted.
- Requests confirmation that the device has been inserted.
- Unquiesces the bus for buses that support quiescing.
- Creates the logical device name for the new device.
Example:

```
# luxadm insert_device, macs1,f1
```

The list of devices which will be inserted is:
1: Box Name "macs1" front slot 1

Please enter 'q' to Quit or <Return> to Continue:

Hit <Return> after inserting the device(s).

You must physically install the disk drive at this time. After hitting any key, the following is displayed:

```
Drive in Box Name "macs1" front slot 1
Logical Nodes under /dev/dsk and /dev/rdsk :
c2t1d0s0
c2t1d0s1
c2t1d0s2
c2t1d0s3
c2t1d0s4
c2t1d0s5
c2t1d0s6
c2t1d0s7
#```

---

**TABLE 2-31 insert_device Options and Arguments**

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enclosure</td>
<td>The enclosure name of a StorEdge A5000 disk array</td>
</tr>
<tr>
<td>dev</td>
<td>The name of a specific disk in a disk array</td>
</tr>
</tbody>
</table>
Replacing Devices (replace_device)

Use the `replace_device` subcommand to hot replace a device.

The `replace_device` subcommand interactively guides you through the hot insertion of one or more devices. The `replace_device` subcommand:

- Takes the device offline.
- Quiesces the bus for buses that support quiescing.
- Informs you that the device can be safely replaced.
- Requests confirmation that the device has been replaced.
- Unquiesces the bus for buses that support quiescing.
- Brings the device back online.

Supported on:

- SPARCstorage RSM

```
luxadm [ -v ] replace_device [ -F ] pathname
```

### TABLE 2-32  replace_device Options and Arguments

<table>
<thead>
<tr>
<th>Option/Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-F</code></td>
<td>Forces the hot-plugging operation on one or more devices even if those devices are being used by the host (and are, therefore, busy). Caution—Replacing devices which are in use will cause unpredictable results. Try to hot-plug normally (without <code>-F</code>) first, resorting to this option only when you are sure of the consequences of overriding normal hot-plugging checks.</td>
</tr>
<tr>
<td><code>pathname</code></td>
<td>A SPARCstorage Array controller or an individual disk</td>
</tr>
</tbody>
</table>
This chapter describes how to hot-plug StorEdge A5000 disk arrays and disk drives. The procedures are grouped depending upon whether you are using UNIX file system (UFS) operations or Sun StorEdge Volume Manager to perform the procedures.

**Note** – The procedure for hot-plugging an entire StorEdge A5000 disk array is similar to the procedure for removing and replacing an individual disk drive. Instead of specifying an `enclosure,dev`, you need to specify only the `enclosure` in the appropriate procedure.

You cannot perform hot-plug reconfiguration or operations on an active disk drive. All disk access activity must be stopped before you remove or replace a disk drive.

**Caution** – As with other high-RAS products, you should not randomly remove disk drives. The StorEdge A5000 disk array design provides support to replace failed drives in redundant (mirrored or RAID) configurations. If the drive is active, you must stop that activity before removing it. You can do this without bringing down the operating system or powering down the unit. The StorEdge A5000 disk array supports hot-plugging, but there are software considerations that must be taken into account. Follow the procedures in this section when removing, replacing, or adding disk drives.

Refer to the *Sun StorEdge A5000 Installation and Service Manual* for details on removing disk drives.
It is divided into the following sections:

- UNIX File System (UFS) Operations
- Adding a Disk Drive
- Replacing a Disk Drive
- Removing a Disk Drive
- Volume Manager Operations
- Adding a Disk Drive
- Replacing a Disk Drive
- Removing a Disk Drive

---

**UNIX File System (UFS) Operations**

**Adding a Disk Drive**

This section describes how to configure your system when you add a disk drive while the power is on and the operating system is running.

---

**Caution** – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive can result in data loss and/or data corruption.

You must create a new device entry for the drive in the /devices and /dev/dsk and /dev/rdsk hierarchy. The new drive is assigned a name associated with the slot into which the drive was installed.

1. **Select any available slot in the StorEdge A5000 disk array for the new disk drive.**
   For reference when you configure the software environment, make a note of which enclosure and slot you choose.
2. **Use the luxadm insert_device command to add the new device.**

   This command is interactive. You will be guided through the procedure for inserting a new device or chain of devices.

   ```bash
   # luxadm insert_device macs1,f1
   
   The list of devices which will be inserted is:
   1: Box Name "macs1" front slot 1
   
   Please enter 'q' to Quit or <Return> to Continue:
   
   Hit <Return> after inserting the device(s).
   
   Drive in Box Name "macs1" front slot 1
   Logical Nodes under /dev/dsk and /dev/rdsk :  
   c2t1d0s0
   c2t1d0s1
   c2t1d0s2
   c2t1d0s3
   c2t1d0s4
   c2t1d0s5
   c2t1d0s6
   c2t1d0s7
   #
   
   The new disk drive is now available for use as a block or character device. Refer to the sd(7) man page for further details.
   
   3. **Insert the disk drive and hit return.**

   The following is displayed:

   ```bash
   Drive in Box Name "macs1" front slot 1
   Logical Nodes under /dev/dsk and /dev/rdsk :
   c2t1d0s0
   c2t1d0s1
   c2t1d0s2
   c2t1d0s3
   c2t1d0s4
   c2t1d0s5
   c2t1d0s6
   c2t1d0s7
   #
   
   The new disk drive is now available for use as a block or character device. Refer to the sd(7) man page for further details.
   
   4. **Verify that the device label meets your requirements.**

   You can use the prtvtoc command to inspect the label for your disk. To modify the label, use the format command. Refer to the prtvtoc(1M) and format(1M) man pages for more information.
5. Once you have selected a disk slice for your UFS file system, create a file system on the slice:

\[
\# \text{newfs} \ /dev/rdsk/\text{cwtxdysz}
\]

Refer to the \texttt{newfs(1M)} man page for more information.

6. If necessary, create a mountpoint for the new file system:

\[
\# \text{mkdir} \text{ mount_point}
\]

where: \textit{mount_point} is a fully qualified path name. Refer to the \texttt{mount(1M)} man page for more information.

7. After the file system and mountpoint have been created, modify the \texttt{/etc/vfstab} file to reflect the new file system.

See the \texttt{vfstab(4)} man page for more details.

8. Mount the new file system using the \texttt{mount} command:

\[
\# \text{mount} \text{ mount_point}
\]

where: \textit{mount_point} is the directory you created.

The file system is ready to be used.

### Replacing a Disk Drive

This section describes how on configuring your system to replace a disk drive while the power is on and the operating system is running.

You must stop any activity on the disk; physically remove the old drive and install the new one; and configure the Solaris environment to recognize the drive. You must then configure your application to accept the new disk drive.
**Caution** – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive can result in data loss and/or data corruption.

Different applications provide various levels of error logging. In general, you can find messages about failing or failed disks in your system console window. The information is also logged in the `/usr/adm/messages` file(s). See the documentation that came with your application for more information.

## Preparing to Replace the Disk Drive

The following procedure describes how to unconfigure a disk being used by one or more UFS file systems.

1. **Stop any application processes on the file systems to be unconfigured.**
2. **Back up your system.**
3. **Determine what file system(s) are on the disk:**

    ```
    # mount | grep cwtxdysz
    # mount | grep c2t3d0
    /export/home (/dev/dsk/c2t1d0s7 ): 98892 blocks 142713 files
    /export/home2 (/dev/dsk/c2t1d0s5 ): 153424 blocks 112107 files
    ```

4. **Determine and save the partition table for the disk.**
   
   If the replacement disk is the same type as the faulty disk, you can use the `format` command to save the partition table of the disk. Use the `save` command in `format` to save a copy of the partition table to the `/etc/format.dat` file. This enables you to configure the replacement disk so that its layout matches the current disk. Refer to the `format(1M)` man page for more information.

5. **Unmount any file systems on the disk.**
Note – If the file system(s) is on a disk that is failing or has failed, the umount operation may not complete. A large number of error messages may be displayed in the system console and in the /var directory during the umount operation. If the umount operation does not complete, you may have to reboot the system.

For each file system from Step 3 returned, type:

```
# umount filesystem
```

where filesystem is the first field for each line returned in Step 3.

For example:

```
# umount /export/home
# umount /export/home2
```

6. Using the df command, verify that the file system has been unmounted.
Removing the Disk Drive

1. Use the `luxadm remove_device` command to remove the disk.
   The `luxadm remove_device` command is interactive. You will be guided through the procedure for removing a device or chain of devices.

   ```
   # luxadm remove_device /dev/rdsk/c2t1d0s5
   
   WARNING!! Please ensure that no filesystems are mounted on these device(s).
   All data on these devices should have been backed up.
   
   The list of devices which will be removed is:
   1: Box Name "macsl" front slot 1
   
   Please enter 'q' to Quit or <Return> to Continue:
   stopping: Drive in "macsl" front slot 1....Done
   offlining: Drive in "macsl" front slot 1....Done
   
   Hit <Return> after removing the device(s).
   #
   ```

2. Remove the disk drive and then hit any key.
Note – The yellow LED on the designated disk drive(s) should be flashing.

The following is displayed:

```
Drive in Box Name "macs1" front slot 1
Removing Logical Nodes:
Removing c2t1d0s0
Removing c2t1d0s1
Removing c2t1d0s2
Removing c2t1d0s3
Removing c2t1d0s4
Removing c2t1d0s5
Removing c2t1d0s6
Removing c2t1d0s7
#
```

Installing the New Disk Drive

1. Use the `luxadm insert_device` command to add the new device.

This command is interactive. You will be guided through the procedure for inserting a new device or chain of devices.

```
# luxadm insert_device, macs1,f1

The list of devices which will be inserted is:
1: Box Name "macs1" front slot 1

Please enter 'q' to Quit or <Return> to Continue:

Hit <Return> after inserting the device(s).
```
2. Insert the disk drive and hit Return.
   The following is displayed:

   Drive in Box Name "macs1" front slot 1
   Logical Nodes under /dev/dsk and /dev/rdsk :
   c2t1d0s0  
c2t1d0s1  
c2t1d0s2  
c2t1d0s3  
c2t1d0s4  
c2t1d0s5  
c2t1d0s6  
c2t1d0s7  
#

   The new disk drive is now available for use as a block or character device. Refer to the sd(7) man page for further details.

3. Verify that the device label meets your requirements.
   You can use the prtvtoc command to inspect the label for your disk. To modify the label, use the format command. See the prtvtoc(1M) and format(1M) man pages for more information.

4. Verify that the device's partition table satisfies the requirements of the file system(s) you intend to re-create.
   You can use the prtvtoc command to inspect the label for your device. If you need to modify the label, use the format command. Refer to the prtvtoc(1M) and format(1M) man pages for more information.
   For example:

   # prtvtoc /dev/rdsk/cwtxdysz

   If you have saved a disk partition table using the format utility and the replacement disk type matches the old disk type, then you can use the format utility's partition section to configure the partition table of the replacement disk. See the select and label commands in the partition section.

   If the replacement disk is of a different type than the disk it replaced, you can use the partition size information from the previous disk to set the partition table for the replacement disk. Refer to the prtvtoc(1M) and format(1M) man pages for more information.
5. Once you have selected a disk slice for your UFS file system, create a file system on the slice:

```
# newfs /dev/rdsk/cwtx dysz
```

6. Mount the new file system using the `mount` command:

```
# mount mount_point
```

where: `mount_point` is the directory on which the faulty disk was mounted.

The new disk is ready to be used. You can now restore data from your backups.
Removing a Disk Drive

This section describes how to configure your system to remove a disk drive while the power is on and the operating system is running. Use the procedures in this chapter if you do not intend to replace the disk drive.

You must select the disk and stop any activity or applications on it, unmount it, physically remove the drive, and configure the Solaris environment to recognize that the drive is no longer there. You must then configure your application to operate without this device in place.

Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive can result in data loss and/or data corruption.

Preparing to Remove the Disk Drive

The following procedure describes how to unconfigure a disk being used by one or more UFS file systems.

1. Stop any application processes on the file systems to be unconfigured.
2. Back up your system.
3. Determine what file system(s) are on the disk:

    # mount | grep cwtxdysz

For example, if the device to be removed is c2t1d0, enter the following:

    # mount | grep c2t1d0
    /export/home  (/dev/dsk/c2t1d0s7 ):  98892 blocks  142713 files
    /export/home2 (/dev/dsk/c2t1d0s5 ):  153424 blocks  112107 files

4. Unmount any file systems on the disk.
Note – If the file system(s) are on a disk that is failing or has failed, the umount operation may not complete. A large number of error messages may be displayed in the system console and in the /var directory during the umount operation. If the umount operation does not complete, you may have to restart the system.

For each file system returned, type:

```
# umount filesystem
```

where: filesystem is the first field for each line returned in Step 3.

For example:

```
# umount /export/home
# umount /export/home2
```


Removing the Disk Drive

1. **Use the luxadm remove_device command to remove the disk.**
   
   The `luxadm remove_device` command is interactive. You will be guided through the procedure for removing a device or chain of devices.

   ```bash
   # luxadm remove_device /dev/rdsk/c2t1d0s2
   
   WARNING!!! Please ensure that no filesystems are mounted on these device(s).
   
   All data on these devices should have been backed up.
   
   The list of devices which will be removed is:
   1: Box Name "macs1" front slot 1
   
   Please enter 'q' to Quit or <Return> to Continue:
   
   stopping: Drive in "macs1" front slot 1....Done
   
   offlining: Drive in "macs1" front slot 1....Done
   
   Hit <Return> after removing the device(s).
   ```

2. Remove the disk drive and then hit any key.

   **Note** – The yellow LED on the designated disk drive(s) should be flashing.

   The following is displayed:

   ```bash
   Drive in Box Name "macs1" front slot 1
   Removing Logical Nodes:
   Removing c2t1d0s0
   Removing c2t1d0s1
   Removing c2t1d0s2
   Removing c2t1d0s3
   Removing c2t1d0s4
   Removing c2t1d0s5
   Removing c2t1d0s6
   Removing c2t1d0s7
   #
   ```
Volume Manager Operations

Adding a Disk Drive

This section describes how to use Volume Manager to configure your system when you add a disk drive while the power is on and the operating system is running.

Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive may result in data loss and/or data corruption.

You must create a new device entry for the drive in the /devices and /dev/dsk and /dev/rdsk hierarchy. The new drive is assigned a name associated with the slot into which the drive was installed.

1. Select any available slot in the StorEdge A5000 disk array for the new disk drive.
   For reference when you configure the software environment, make a note of which enclosure and slot you choose.

2. Use the luxadm insert_device command to add the new device.
   This command is interactive. You will be guided through the procedure for inserting a new device or chain of devices.

```shell
# luxadm insert_device macs1,f1

The list of devices which will be inserted is:
  1: Box Name "macs1" front slot 1

Please enter 'q' to Quit or <Return> to Continue:

Hit <Return> after inserting the device(s).
```
3. Insert the disk drive and hit Return.
   The following is displayed:

   Drive in Box Name "macs1" front slot 1
   Logical Nodes under /dev/dsk and /dev/rdsk :
   c2t1d0s0
   c2t1d0s1
   c2t1d0s2
   c2t1d0s3
   c2t1d0s4
   c2t1d0s5
   c2t1d0s6
   c2t1d0s7

   The new disk drive is now available for use as a block or character device. Refer to the sd(7) man page for further details.

1. Configure the Volume Manager to recognize the disk drive.

   # vxdctl enable

2. Add the new disk to a new or existing Volume Manager disk group:

   # vxdiskadd cwtxdysz

   where: cwtxdysz is the new disk.

   Refer to the vxdiskadd(1M) man page for further details.

   The disk is now ready for use with Volume Manager as part of a new volume, added to an existing volume as a plex, or to increase an existing volume. Refer to your Sun StorEdge Volume Manager User’s Guide for more information.

Replacing a Disk Drive

This section describes how on using Volume Manager to configuring your system to replace a disk drive while the power is on and the operating system is running.
Caution – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive can result in data loss and/or data corruption.

Terminate all user- and application-level processes on all volumes, plexes, and/or subdisks that are located on the drive to be removed before performing this procedure.

Preparing to Replace the Disk Drive

1. Identify the faulty disk drive.
   Different applications provide various levels of error logging. In general, you can find messages about failing or failed disks in your system console window. The information is also logged in the /usr/adm/messages file(s). See the documentation that came with your application for more information.

2. Back up your system.
   Refer to the documentation that came with your system for backup details.

3. Identify the disk media name for the disk you intend to replace.

   \[
   \text{# vxdisk list | grep cwtxdysz}
   \]

   For example, if the disk to be removed is c2t1d0, enter:

   \[
   \text{# vxdisk list | grep c0t1d0}
   \]

   c2t1d0s2 sliced disk01 rootdg online

   The disk media name is the third field in the output above: disk01.
   You can use the vxdiskadm utility to prepare the disk for replacement.

4. Type \texttt{vxdiskadm} in a shell.

   \[
   \text{# vxdiskadm}
   \]

   This operation is interactive and requires user confirmation of the operation.
5. **Select the “Remove a disk for replacement” option.**

When prompted for a disk name to replace, type the disk media name from Step 3. `vxdiskadm` marks the disk for replacement and saves the subdisk information to be rebuilt on the replacement disk.

Redundant data is automatically recovered after the replacement disk has been reattached to Volume Manager. Nonredundant data is identified as unusable and must be re-created from backups.

Refer to the `vxdiskadm(1M)` man page for further details.

6. **Quit the `vxdiskadm` utility.**

### Replacing the Disk Drive

1. **Use the `luxadm remove_device` command to remove the disk.**

   The `luxadm remove_device` command is interactive. You will be guided through the procedure for removing a device or chain of devices.

   ```
   # luxadm remove_device macs1,f1
   
   WARNING!!! Please ensure that no filesystems are mounted on these device(s).
   All data on these devices should have been backed up.
   
   The list of devices which will be removed is:
   
   1: Box Name "macs3" rear slot 1
   
   Please enter 'q' to Quit OR <Return> to Continue:
   
   stopping: Drive in "macs1" front slot 1....Done
   offlining: Drive in "macs1" front slot 1....Done
   
   Hit <Return> after removing the device(s).
   
   2. Remove the disk drive and then hit any key.
Note – The yellow LED on the designated disk drive(s) should be flashing.

The following is displayed:

```
Drive in Box Name "macs1" front slot 1
   Removing Logical Nodes:
   Removing c2t18d0s0
   Removing c2t18d0s1
   Removing c2t18d0s2
   Removing c2t18d0s3
   Removing c2t18d0s4
   Removing c2t18d0s5
   Removing c2t18d0s6
   Removing c2t18d0s7
#
```

3. Use the `luxadm insert_device` command to add the new device.
   This command is interactive. You will be guided through the procedure for inserting a new device or chain of devices.

```
# luxadm insert_device macs1,f1

The list of devices which will be inserted is:
  1: Box Name "macs1" front slot 1

Please enter 'q' to Quit or <Return> to Continue:

Hit <Return> after inserting the device(s).
```
4. **Insert the disk drive and then hit Return.**
   
The following is displayed:

   ```
   Drive in Box Name "macs1" front slot 1
   Logical Nodes under /dev/dsk and /dev/rdsk :
   c2t1d0s0
   c2t1d0s1
   c2t1d0s2
   c2t1d0s3
   c2t1d0s4
   c2t1d0s5
   c2t1d0s6
   c2t1d0s7
   #
   
   # vxdctl enable
   ```

   The new disk drive is now available for use as a block or character device. Refer to the `sd(7)` man page for further details.

   **Recreating a Volume Manager Configuration on the New Drive**

   To re-create the replaced disk on the new drive:

   1. **Configure the Volume Manager to recognize the disk drive.**

   ```
   # vxdctl enable
   ```

   2. **Use the vxdiskadm utility to replace the failed disk.**
      
   Select the "Replace a failed or removed disk” option.
   
   This operation requires user confirmation. When prompted for a disk name to replace, use the disk media name from Step 3 of "Preparing to Replace the Disk Drive” on page 54.
   
   vxdiskadm supplies a list of available disks to be used as replacements.
3. **Select the replacement drive.**
   
   `vxdiskadm` automatically configures the replacement drive to match the failed drive.

   Redundant data is recovered automatically. Space for nonredundant data is created and identified. Nonredundant data must be recovered from backing store.

   See the `vxdiskadm` man page for further details.

---

**Removing a Disk Drive**

This section describes how to configure your system to remove a disk drive while the power is on and the operating system is running. Use the procedures in this section if you do not intend to replace the disk drive.

You must select the disk and stop any activity or applications on it, unmount it, physically remove the drive, and configure the Solaris environment to recognize that the drive is no longer there. You must then configure your application to operate without this device in place.

---

**Caution** – These procedures should be performed only by a qualified system administrator. Performing hot-plug operations on an active disk drive can result in data loss and/or data corruption.
Preparing to Remove the Disk Drive

1. Back up your system.

2. Identify the disk media name for the disk you intend to remove.

   For example, if the disk to be removed is `c2t1d0`, enter:

   ```
   # vxdisk list | grep cwtxdysz
   # vxdisk list | grep c2t1d0
   c2t1d0s2     sliced     disk01     rootdg     online
   # vxdiskadm
   ``

   The disk media name is the third field in the output above: disk01.
   You can use the vxdiskadm utility to prepare the disk for removal.

3. Type `vxdiskadm` in a shell.
   For example:

   ```
   # vxdiskadm
   ``

   This operation is interactive and requires user confirmation of the operation.

4. Select the “Remove a disk” option.
   When prompted for a disk name to remove, type the disk media name from Step 2.
   vxdiskadm marks the disk to be removed.
   Refer to the vxdiskadm(1M) man page for further details.
Removing the Disk Drive

1. **Use the `luxadm remove_device` command to remove the disk.**
   The `luxadm remove_device` command is interactive. You will be guided through the procedure for removing a device or chain of devices.

   ```
   # luxadm remove_device /dev/rdsk/c2t1d0s2
   
   WARNING!!! Please ensure that no filesystems are mounted on these device(s).
   All data on these devices should have been backed up.
   
   The list of devices which will be removed is:
   1: Box Name "macs1" front slot 1
   
   Please enter 'q' to Quit or <Return> to Continue:
   
   stopping: Drive in "macs1" front slot 1....Done
   offlining: Drive in "macs1" front slot 1....Done
   
   Hit <Return> after removing the device(s).
   ```

2. **Remove the disk drive and then hit any key.**

   **Note** – The yellow LED on the designated disk drive(s) should be flashing.

   The following is displayed:

   ```
   Drive in Box Name "macs1" front slot 1
   Removing Logical Nodes:
   Removing c2t1d0s0
   Removing c2t1d0s1
   Removing c2t1d0s2
   Removing c2t1d0s3
   Removing c2t1d0s4
   Removing c2t1d0s5
   Removing c2t1d0s6
   Removing c2t1d0s7
   ```
Expert Mode Subcommands

**Caution** – The expert mode subcommands should be used only by qualified personnel who are knowledgeable about the systems they are managing.

Expert mode subcommands are listed in the following table.

The command line must contain the `luxadm -e` (expert mode) option and a subcommand.

```
luxadm -e subcommand pathname
```

<table>
<thead>
<tr>
<th>Subcommand</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>bus_getstate</code></td>
<td>Gets and displays the state of the specified bus or the bus controlling the specified device.</td>
</tr>
<tr>
<td><code>bus_quiesce</code></td>
<td>Quiesces the specified bus or the bus controlling the specified device.</td>
</tr>
<tr>
<td><code>bus_reset</code></td>
<td>Resets the specified bus or the bus controlling the specified device.</td>
</tr>
<tr>
<td><code>bus_resetall</code></td>
<td>Resets the specified bus or the bus controlling the specified device, and all devices on that bus.</td>
</tr>
<tr>
<td><code>bus_unquiesce</code></td>
<td>Unquiesces the specified bus or the bus controlling the specified device.</td>
</tr>
<tr>
<td><code>dev_getstate</code></td>
<td>Gets and displays the state of the specified device.</td>
</tr>
<tr>
<td><code>dev_reset</code></td>
<td>Resets the specified device.</td>
</tr>
<tr>
<td><code>forcelip</code></td>
<td>Forcelyes the link to reinitialize using the Loop Initialize Primitive (LIP) sequence. This subcommand is supported on the StorEdge A5000 disk array only.</td>
</tr>
</tbody>
</table>
TABLE A-1  Expert Mode Subcommands (Continued)

<table>
<thead>
<tr>
<th>Subcommand</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>offline</td>
<td>Takes the specified device offline</td>
</tr>
<tr>
<td>online</td>
<td>Puts the specified device online</td>
</tr>
<tr>
<td>rdls</td>
<td>Reads the link error status block from a specified device. This subcommand also displays the link error status information for the host adapter associated with the specified device, if available. The rdls subcommand is supported on the Sun StorEdge A5000 disk array only.</td>
</tr>
</tbody>
</table>
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