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Platform Notes: Using luxadm  
Software

**Solaris 2.5.1 Hardware: 8/97**

***Sun™ Enterprise Network Array™  
SPARCstorage™ Array***

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Sun Microsystems  
2550 Garcia Avenue  
Mountain View, CA 94043  
U.S.A. 415-960-1300

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# Preface

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*Platform Notes: Using luxadm Software* contains information about the luxadm administrative program for the Sun™ Enterprise Network Array™ and the SPARCstorage™ Array. These instructions are designed for an experienced system administrator.

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## Using UNIX Commands

This document does not contain information on basic UNIX® commands and procedures such as shutting down the system or booting the system.

See one or more of the following for this information:

- *Solaris 2.x Handbook for SMCC Peripherals*
- AnswerBook™ online documentation for the Solaris™ 2.x software environment
- Other software documentation that you received with your system

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# Typographic Conventions

TABLE P-1 Typographic Conventions

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

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**TABLE P-2** SunExpress Contact Information

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|                |                |                |
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# Using the luxadm Command

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## The luxadm Command

The `luxadm` program is an administrative command that manages both the Sun Enterprise Network Array and SPARCstorage Array subsystems. `luxadm` performs a variety of control and query tasks, depending on the command line arguments and options used.

### Synopsis

The command line must contain a subcommand.

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

You may also enter options, usually at least one enclosure name or pathname, and other parameters depending on the subcommand. You specify a device by entering a physical path name, or a logical path name. See “Addressing” on page 2”.

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

```
#luxadm disp box1
```

---

# Addressing

## Addressing a Sun Enterprise Network Array

### Pathname

Either a complete physical path name or a complete logical path name may be entered to specify the device or controller. A typical physical path name for a Sun Enterprise Network Array device 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 Sun Enterprise Network Array IBs (Interface Boards) 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`.

### Enclosure

For the Sun Enterprise Network Array subsystem, the WWN may be used in place of the pathname to select a device or the Sun Enterprise Network Array subsystem Interface Board. 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`.

Or you can specify the name of the Sun Enterprise Network Array enclosure and an identifier for the particular device in the enclosure. A device in a Sun Enterprise Network Array enclosure is identified as follows;

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

where:

**TABLE 1-1** Addressing a Sun Enterprise Network Array by Enclosure Name

| Options/Arguments | Description                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------|
| BOX_NAME          | is the name of the Sun Enterprise Network Array enclosure, as specified by the enclosure_name subcommand |
| f or r            | specifies the front or rear slots in the Sun Enterprise Network Array enclosure                          |
| slot_number       | is the slot number in the Sun Enterprise Network Array enclosure, 0-6 or 0-10                            |

When addressing the Sun Enterprise Network Array subsystem the pathname or enclosure name specifies the Sun Enterprise Network Array Interface Board (IB).

## Addressing a SPARCstorage Array

When addressing the SPARCstorage Array, the pathname 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@xxxxxxxx,xxxxxxxx:ctrl
```

or 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/rdisk` directory of a disk that is attached to the SPARCstorage Array controller. The `/dev/rdisk` 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/rdisk/clt0d0s2
```

or

```
/dev/rdisk/clt0d0s2 or /devices/.../.../SUNW,soc@3,0/  
SUNW,pln@xxxxxxxx,xxxxxxxx/ssd@0,0:c,raw.
```

See the `disks(1M)` and `devlinks(1M)` manpages for more information on logical names for disks and subsystems.

---

## Subcommand Support Matrix

The following table lists the subcommands that are supported on both the Sun Enterprise Network Array and the SPARCstorage Array, subcommands that are supported on the Sun Enterprise Network Array only, and subcommands that are supported on the SPARCstorage Array only.

TABLE 1-2 Subcommand Support

| Supported on Sun Enterprise Network Array and SPARCstorage Array | Supported on Sun Enterprise Network Array Only | Supported on SPARCstorage Array Only |
|------------------------------------------------------------------|------------------------------------------------|--------------------------------------|
| display                                                          | enclosure_name                                 | alarm                                |
| download                                                         | fcsl_s_download                                | alarm_off                            |
| inquiry                                                          | forcelip                                       | alarm_on                             |
| led                                                              | insert_device                                  | alarm_set                            |
| led_off                                                          | led_blink                                      | env_display                          |
| power_off                                                        | power_on                                       | fast_write                           |
| release                                                          | probe                                          | fc_s_download                        |
| reserve                                                          | rdls                                           | led_on                               |
| set_boot_dev                                                     | remove_device                                  | nvrn_data                            |
|                                                                  |                                                | perf_statistics                      |
|                                                                  |                                                | purge                                |
|                                                                  |                                                | start                                |
|                                                                  |                                                | stop                                 |
|                                                                  |                                                | sync_cache                           |

## Common Subcommands

---

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### Displaying Subsystem Information

#### Displaying Enclosure or Device Specific Data

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.

```
luxadm [ -v ] display enclosure[ ,dev]. . . | pathname. . .
```

**TABLE 2-1** `display` Options and Arguments

| Option/Argument  | Description                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <code>-v</code>  | mode sense data is also displayed                                                                                                         |
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                                                    |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                                             |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array, SPARCstorage Array, or a specific disk in an array <sup>1</sup> . |

**TABLE 2-1** display Options and Arguments

| Option/Argument | Description                                                            |
|-----------------|------------------------------------------------------------------------|
| -p              | displays performance information for the specified device or subsystem |
| -r              | displays error information for the specified device or subsystem       |

<sup>1</sup>See "Addressing" on page 2".

**Example:**

```
# luxadm display dogbert

                               (luxadm version: 1.23 97/05/22)

      SENA

                DISK STATUS
SLOT  FRONT DISKS      (Node WWN)      REAR DISKS      (Node WWN)
0     On (O.K.)      20000020370412ec  On (O.K.)      200000203704141d
1     On (O.K.)      20000020370412e7  On (O.K.)      2000002037041375
2     On (O.K.)      2000002037041397  On (O.K.)      20000020370412be
3     On (O.K.)      200000203704139f  On (O.K.)      2000002037041433
4     On (O.K.)      2000002037041418  On (O.K.)      2000002037041348
5     On (O.K.)      200000203704140f  On (O.K.)      2000002037041333
6     On (O.K.)      200000203704143d  On (O.K.)      2000002037041382

                SUBSYSTEM STATUS
Revision Level: 0.16  Node WWN: 1234123412341234Enclosure Name: dogbert
Power Supplies (0,2 in front, 1 in rear)
  0 O.K.(REV 0)1 O.K.(REV 0)2 O.K.(REV 0)
Fans (0 in front, 1 in rear)
  0 O.K.(REV 0)1 O.K.(REV 0)
ESI Interface board(IB) (A top, B bottom)
  A: O.K. (mma)
  GBIC module (1 on left, 0 on right in IB)
  0 Not Installed1 O.K.(MODn)
  B: Not Installed
Disk backplane (0 in front, 1 in rear)
  Temperature sensors (on front backplane)
  0:42°C 1:42°C 2:40°C 3:39°C 4:40°C 5:40°C
  6:42°C (All temperatures are NORMAL.)
  Temperature sensors (on rear backplane)
  0:43°C 1:42°C 2:42°C 3:40°C 4:42°C 5:42°C
  6:43°C (All temperatures are NORMAL.)
Loop configurationThe loop is configured as a single loop.
Language          USA English
#
```

Example:

```
# luxadm display -r dogbert

                               (luxadm version: 1.23 97/05/22)

                               SENA
Information for FC Loop on port 0 of SOC+ Host Adapter
at path: /devices/sbus@3,0/SUNW,socal@0,0:0
Version Resets  Req_Q_Intrpts  Qfulls Requests Sol_Resps Unsol_Resps Lips
1           2           0           0           0           0           0           1
Els_sent  Els_rcvd  Abts           Abts_ok Offlines Onlines Online_loops
0           0           0           0           0           0           0           1
Information from sf driver:
Version Lip_count Lip_fail Alloc_fail #_cmds Throttle_limit Pool_size
1           0           0           0           0           1024           1

TARGET ERROR INFORMATION:
AL_PA  Els_fail Timouts Abts_fail Tsk_m_fail  Data_ro_mis Dl_len_mis Logouts
9e      0           0           0           0           0           0           0
b2      0           0           0           0           0           0           0
b1      0           0           0           0           0           0           0
ae      0           0           0           0           0           0           0
ad      0           0           0           0           0           0           0
ac      0           0           0           0           0           0           0
ab      0           0           0           0           0           0           0
aa      0           0           0           0           0           0           0
1       0           0           0           0           0           0           0
75      0           0           0           0           0           0           0
98      0           0           0           0           0           0           0
97      0           0           0           0           0           0           0
90      0           0           0           0           0           0           0
8f      0           0           0           0           0           0           0
88      0           0           0           0           0           0           0
84      0           0           0           0           0           0           0
82      0           0           0           0           0           0           0
#
```

## Displaying inquiry Information

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

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

**TABLE 2-2** inquiry Options and Arguments

| Option/Argument  | Description                                                                                                                              |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                                                   |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                                            |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array, SPARCstorage Array, or a specific disk in an array. <sup>1</sup> |

<sup>1</sup>See "Addressing" on page 2".

### Example:

```
# luxadm inquiry dogbert

INQUIRY:
  Physical path:
    /devices/sbus@3,0/SUNW,socal@0,0/sf@0,0/ses@w1234123412341235,0:0
Vendor:                SUN
Product:               SENA
Revision:              0.16
Device type:           0xd (Enclosure services 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
Byte#           Hex Value                               ASCII
35    12 34 12 34 12 34 12 34 00 00 00 00 00 00 00 00  .4.4.4.4.....
      00 00 00 00
95    64 6f 67 62 65 72 74 00 00 00 00 00 00 00 00 00  dogbert.....
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  .....
#
```

---

## Disk LEDs

### Displaying the Current State of a Disk LED

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

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

**TABLE 2-3** `led` Options and Arguments

| Option/Argument  | Description                                                                        |
|------------------|------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .             |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                      |
| <i>pathname</i>  | is the physical or logical path name of a specific disk in an array <sup>1</sup> . |

<sup>1</sup>See “Addressing” on page 2”.

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  
#
```

### Turning Off a Disk LED

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

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

**TABLE 2-4** led\_off Options and Arguments

| Option/Argument  | Description                                                                        |
|------------------|------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .             |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                      |
| <i>pathname</i>  | is the physical or logical path name of a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing" on page 2".

**Note** – On a Sun Enterprise Network Array this may or may not cause the yellow LED to turn off or stop blinking depending on the state of the Sun Enterprise Network Array. Refer to *Sun Enterprise Network Array 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  
#
```

---

# Disk Operations

## Reserving Disks

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

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

TABLE 2-5 `reserve` Options and Arguments

| Option/Argument  | Description                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                                                    |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                                             |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array, SPARCstorage Array, or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing" on page 2".

## Releasing Disks

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

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

TABLE 2-6 `release` Options and Arguments

| Option/Argument  | Description                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                                                    |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                                             |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array, SPARCstorage Array, or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing" on page 2".

---

## Other Operations

### Downloading Firmware

Use the `download` subcommand to download a prom image to the FEPROMs on a Sun Enterprise Network Array Interface Board or on a SPARCstorage Array controller board.

In a Sun Enterprise Network Array, when the download is complete, the Sun Enterprise Network Array subsystem will be reset and the downloaded code will be executed.

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

```
luxadm [ -v ] download [-s] [-f filename-path ]
```



---

**Caution** – When using the `-s` option the download modifies the FEPROM in the Sun Enterprise Network Array and should be used with CAUTION.

---

---

**Note** – The `-s` option does not apply to the SPARCstorage Array controller as it always writes the downloaded firmware into the FEPRM.

---

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

| Option/Argument          | Description                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>-s</code>          | saves the downloaded firmware in the FEPRM in a Sun Enterprise Network Array. If <code>-s</code> is not specified the downloaded firmware will not be saved across power cycles.                                                                                                                                                                                                                                                        |
| <code>-f filename</code> | downloads the prom image in filename. If you do not specify a filename, the default prom image will be used.<br><br>The default prom image in a Sun Enterprise Network Array is in the directory <code>/usr/lib/locale/C/LC_MESSAGES</code> and is named <code>ibfirmware</code> .<br><br>The default prom image in a SPARCstorage Array is in the directory <code>/usr/lib/firmware/ssa</code> and is named <code>ssafirmware</code> . |
| <code>-w WWN</code>      | This option is for the SPARCstorage Array only. See “Changing the World Wide Name” on page 33.                                                                                                                                                                                                                                                                                                                                          |

<sup>1</sup> See “Addressing” on page 2.

---

## Setting the Boot Device Variable

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

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

**TABLE 2-8** set\_boot\_dev Options and Arguments

| Option/Argument | Description                                                       |
|-----------------|-------------------------------------------------------------------|
| <i>pathname</i> | is a block special device or a mount-point <sup>1</sup> .         |
| <code>-y</code> | runs non-interactively; no confirmation is requested or required. |

<sup>1</sup> See “Addressing” on page 2.

---

## Powering Off an Enclosure or Disk Drive

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

---

**Note** – The Sun Enterprise Network Array 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 Sun Enterprise Network Array is addressed, the drive is set to the drive off/unmated state. When set to the drive off/unmated state, the drive is spun down (stopped) and put in the bypass mode.

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

**TABLE 2-9** `power_off` Options and Arguments

| Option/Argument  | Description                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                                                    |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                                             |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array, SPARCstorage Array, or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing" on page 2".

## Subcommands for the Sun Enterprise Network Array

---

### Hotplugging

This section describes two of the `luxadm` subcommands that are used in hotplugging devices in a Sun Enterprise Network Array. See Chapter 5, “Hotplugging in the Sun Enterprise Network Array” for more information.

### Removing Devices

Use the `remove_device` subcommand to hot remove a device or a chain of devices.

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

- 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.

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

**TABLE 3-1** remove\_device Options and Arguments

| Option/Argument  | Description                                                                                                          |
|------------------|----------------------------------------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                               |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                        |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing a Sun Enterprise Network Array" on page 2".

**Example:**

```
# luxadm remove_device macs3,r1

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:

offlining: Drive in "macs3" rear slot 1

Hit any key after inserting/removing drives:
```

You must physically remove the disk drive at this point.

```
Drive in Box Name "macs3" rear slot 1
  Removing Logical Nodes:
    Removing /dev/dsk/clt81d0s0
    Removing /dev/rdisk/clt81d0s0
    Removing /dev/dsk/clt81d0s1
    Removing /dev/rdisk/clt81d0s1
    Removing /dev/dsk/clt81d0s2
    Removing /dev/rdisk/clt81d0s2
    Removing /dev/dsk/clt81d0s3
    Removing /dev/rdisk/clt81d0s3
    Removing /dev/dsk/clt81d0s4
    Removing /dev/rdisk/clt81d0s4
    Removing /dev/dsk/clt81d0s5
    Removing /dev/rdisk/clt81d0s5
    Removing /dev/dsk/clt81d0s6
    Removing /dev/rdisk/clt81d0s6
    Removing /dev/dsk/clt81d0s7
    Removing /dev/rdisk/clt81d0s7
#
```

## Inserting Devices

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

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

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

```
luxadm [ -v ] insert_device enclosure, dev...
```

**TABLE 3-2** insert\_device Options and Arguments

| Option/Argument  | Description                                                            |
|------------------|------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> . |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .          |

<sup>1</sup> See "Addressing a Sun Enterprise Network Array" on page 2".

Example:

```
# luxadm insert_device
Please hit <enter> when you have finished adding device(s):
```

You must physically install the disk drive at this point.

```
Waiting for Loop Initialization to complete...
New Logical Nodes under /dev/es:
New Logical Nodes under /dev/dsk and /dev/rdisk :
    c1t81d0s0
    c1t81d0s1
    c1t81d0s2
    c1t81d0s3
    c1t81d0s4
    c1t81d0s5
    c1t81d0s6
    c1t81d0s7
#
```

---

## Downloading Code

### Downloading fcode

Use the `fcal_s_download` subcommand to download new fcode into ALL the FC100/S Sbus Cards or to display the current version of the fcode in each FC100/S Sbus card

When downloading new fcode, the `fcal_s_download` subcommand is interactive and expects user confirmation before downloading the fcode



---

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

---

```
luxadm [ -v ] fcal_s_download [ -f fcode-file ]
```

**TABLE 3-3** fcal\_s\_download Options

| Option                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>-f fcode-file</code> | <code>fcode-file</code> is the name of the file that has the new fcode. If you invoke the <code>fcal_s_download</code> subcommand without the <code>[ -f fcode-file ]</code> option, the current version of the fcode in each FC100/S Sbus card is displayed. The version of the FC100/S Sbus Cards fcode released with this operating system is kept in the directory <code>usr/lib/firmware/fc_s</code> and is named <code>fcal_s_fcode</code> . |

---

## Other Operations

### Powering On Enclosures or Disk Drives

Use the `power_on` subcommand to set a drive to its normal power on state. If you specify a Sun Enterprise Network Array disk drive, the `power_on` subcommand sets the specified disks to the normal start-up state.

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

**TABLE 3-4** power\_on Options and Arguments

| Option/Argument        | Description                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------------------|
| <code>enclosure</code> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                               |
| <code>dev</code>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                        |
| <code>pathname</code>  | is the physical or logical path name of a Sun Enterprise Network Array or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See “Addressing a Sun Enterprise Network Array” on page 2”.

## Probing for Sun Enterprise Network Arrays

Use the `probe` subcommand to display information about all attached Sun Enterprise Network Array. Information displayed includes the logical pathnames, the WWNs, and the enclosure names.:

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

**TABLE 3-5** `probe` Options

| Option          | Description                          |
|-----------------|--------------------------------------|
| <code>-p</code> | also displays the physical pathname. |

Example:

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

Example:

```
# luxadm probe -p
Found
SENA Name:dogbert   Node WWN:1234123412341234
  Logical Path:/dev/es/ses0
  Physical Path:/devices/sbus@3,0/SUNW,socal@0,0/sf@0,0/
ses@w1234123412341235,0:0
  Logical Path:/dev/es/ses1
  Physical Path:/devices/sbus@3,0/SUNW,socal@0,0/sf@0,0/
ses@w1234123412341236,0:0
#
```

## Renaming a Sun Enterprise Network Array

Use the `enclosure_name new_name` subcommand to change the enclosure name of one or more Sun Enterprise Network Arrays. The new name must be 16 or less characters. The only allowed characters are alphabetic or numeric digits.

```
luxadm [ -v ] enclosure_name ##### enclosure... | pathname...
```

**TABLE 3-6** enclosure\_name Options and Arguments

| Option/Argument  | Description                                                                           |
|------------------|---------------------------------------------------------------------------------------|
| #####            | is the new enclosure name.                                                            |
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array <sup>1</sup> . |

<sup>1</sup> See “Addressing a Sun Enterprise Network Array” on page 2”.

## Setting a Disk LED to the Blink Mode

Use the `led_blink` subcommand to start blinking (flashing) the yellow LED associated with a specific disk. The `led_blink` subcommand only applies to subsystems that support this functionality.

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

**TABLE 3-7** led\_blink Options and Arguments

| Option/Argument  | Description                                                                        |
|------------------|------------------------------------------------------------------------------------|
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .             |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                      |
| <i>pathname</i>  | is the physical or logical path name of a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See “Addressing a Sun Enterprise Network Array” on page 2”.

**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  
#
```

---

## Expert Mode Subcommands

### Reading Link Error Status Blocks



---

**Caution** – The `rdls` subcommand is for expert use only. It should only be used by users who are knowledgeable about the Sun Enterprise Network Array subsystem and Fiber Channel Loops

---

Use the `rdls` subcommand to read the link error status block from a specified device. The `rdls` subcommand also displays the link error status information for the Host Adapter associated with the specified device, if available.

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

**TABLE 3-8** `rdls` Options and Arguments

| Option/Argument  | Description                                                                                                          |
|------------------|----------------------------------------------------------------------------------------------------------------------|
| <code>-e</code>  | The <code>-e</code> option (expert mode) is required for this subcommand.                                            |
| <i>enclosure</i> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                               |
| <i>dev</i>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                        |
| <i>pathname</i>  | is the physical or logical path name of a Sun Enterprise Network Array or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See “Addressing a Sun Enterprise Network Array” on page 2”.

## Example

```
# luxadm -e rdls BOX

Link Error Status information for Device:
BOX
(AL_PA=0x9e)
Link Failures0
Loss of sync.-1159869698

Link Error Status information for the Host Adapter:
(AL_PA=0xef)
Link Failures123456
Loss of sync.7866121
Loss of signal.7867562
Primitive sequence protocol errors:4750704
Invalid transmission words8675309
CRC errors:123456
NOTE: These LESB counts are not cleared by a reset, only power
cycles.
These counts must be compared to previously read counts.
#
```

## Reinitializing a Link



---

**Caution** – The `forcelip` subcommand is for expert use only and should be used with CAUTION. It will reset all ports on the loop and may cause the device addresses to change.

---

Use the `forcelip` subcommand to force the link to reinitialize using the Loop Initialize Primitive (LIP) sequence. You can specify any device on the loop.

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

TABLE 3-9 `forcelip` Options and Arguments

| Option/Argument        | Description                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------------------|
| <code>-e</code>        | The <code>-e</code> option (expert mode) is required for this subcommand.                                            |
| <code>enclosure</code> | is the enclosure name of a Sun Enterprise Network Array <sup>1</sup> .                                               |
| <code>dev</code>       | is the name of a specific disk in an enclosure <sup>1</sup> .                                                        |
| <code>pathname</code>  | is the physical or logical path name of a Sun Enterprise Network Array or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing a Sun Enterprise Network Array" on page 2".



## Subcommands for the SPARCstorage Array

---

### NVRAM Operations

#### Enabling and Disabling Fast Writes

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

```
luxadm [ -v ] fast_write [-s] -c pathname
```

TABLE 4-1 `fast_write` Options and Arguments

| Option/Argument | Description                                                                              |
|-----------------|------------------------------------------------------------------------------------------|
| <i>pathname</i> | <i>pathname</i> is a SPARCstorage Array controller or an individual disk <sup>1</sup> .  |
| -e              | causes the SPARCstorage Array to save the change so it will persist across power-cycles. |
| -c              | enables fast writes for synchronous writes only.                                         |
| -e              | enables fast writes.                                                                     |
| -d              | disables fast writes.                                                                    |

<sup>1</sup> See “Addressing a SPARCstorage Array” on page 3”.

## Displaying Fast Write Data

Use the `nvrām_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.

```
luxadm [ -v ] nvrām_data pathname
```

TABLE 4-2 `nvrām_data` Options and Arguments

| Option/Argument | Description                                                                             |
|-----------------|-----------------------------------------------------------------------------------------|
| <i>pathname</i> | <i>pathname</i> is a SPARCstorage Array controller or an individual disk <sup>1</sup> . |

<sup>1</sup> See "Addressing a SPARCstorage Array" on page 3".

## Purging Fast Write Data from NVRAM



**Caution** – The `purge` subcommand should be used with caution, usually only when a drive has failed.

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

```
luxadm [ -v ] purge pathname
```

TABLE 4-3 `purge` Options and Arguments

| Option/Argument | Description                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>pathname</i> | is 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 <sup>1</sup> . |

<sup>1</sup> See "Addressing a SPARCstorage Array" on page 3".

## Flushing NVRAM

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

```
luxadm [ -v ] sync_cache pathname
```

**TABLE 4-4** `sync_cache` Options and Arguments

| Option/Argument | Description                                                                                                                                                                                                |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>pathname</i> | is 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 <sup>1</sup> . |

<sup>1</sup> See "Addressing a SPARCstorage Array" on page 3".

---

## Enclosure Services Card

The `env_display` and `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 SSA's controller.

## Displaying Environmental Information

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

```
luxadm [ -v ] env_display pathname / controller tray-number
```

TABLE 4-5 `env_display` Options and Arguments

| Option/Argument    | Description                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------|
| <i>pathname</i>    | is the path to an SES device <sup>1</sup> .                                                      |
| <i>controller</i>  | is the path to a SPARCstorage Array controller <sup>1</sup> .                                    |
| <i>tray-number</i> | is an RSM tray number. <i>tray-number</i> is only valid for an RSM tray in a SPARCstorage Array. |

<sup>1</sup>See “Addressing a SPARCstorage Array” on page 3”.

## Disabling the Alarm

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.

```
luxadm [ -v ] alarm_off pathname / controller tray-number
```

TABLE 4-6 `alarm_off` Options and Arguments

| Option/Argument    | Description                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------|
| <i>pathname</i>    | is the path to an SES device <sup>1</sup> .                                                      |
| <i>controller</i>  | is the path to a SPARCstorage Array controller <sup>1</sup> .                                    |
| <i>tray-number</i> | is an RSM tray number. <i>tray-number</i> is only valid for an RSM tray in a SPARCstorage Array. |

<sup>1</sup>See “Addressing a SPARCstorage Array” on page 3”.

## Enabling the Alarm

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.

```
luxadm [ -v ] alarm_on pathname / controller tray-number
```

TABLE 4-7 `alarm_on` Options and Arguments

| Option/Argument    | Description                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------|
| <i>pathname</i>    | is the path to an SES device <sup>1</sup> .                                                      |
| <i>controller</i>  | is the path to a SPARCstorage Array controller <sup>1</sup> .                                    |
| <i>tray-number</i> | is an RSM tray number. <i>tray-number</i> is only valid for an RSM tray in a SPARCstorage Array. |

<sup>1</sup> See “Addressing a SPARCstorage Array” on page 3”.

## Setting the Alarm

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

```
luxadm [ -v ] alarm_set controller-pathname / controller tray-number [seconds]
```

TABLE 4-8 `alarm_set` Options and Arguments

| Option/Argument    | Description                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------|
| <i>pathname</i>    | is the path to an SES device <sup>1</sup> .                                                      |
| <i>controller</i>  | is the path to a SPARCstorage Array controller <sup>1</sup> .                                    |
| <i>tray-number</i> | is an RSM tray number. <i>tray-number</i> is only valid for an RSM tray in a SPARCstorage Array. |
| seconds            | is the number of seconds.                                                                        |

<sup>1</sup> See “Addressing a SPARCstorage Array” on page 3”.

---

## Other Operations

### Downloading fcode

Use the `fc_s_download` subcommand to download new fcode into all the FC/S Sbus Cards.

The `fc_s_download` subcommand is interactive and expects 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 kept in the directory `usr/lib/firmware/fc_s` and is named `fc_s_fcode`.



---

**Caution** – Ensure that you download the correct file: `usr/lib/firmware/fc_s/fc_s_fcode`.

---

---

**Note** – The `fc_s_download` subcommand should be used only in single user mode; otherwise the FC/S card could be reset.

---

```
luxadm [ -v ] fc_s_download [-F] [-f fcode-file]
```

**TABLE 4-9** `fc_s_download` Options

| Option                     | Description                                                                                                                                                                                                                    |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>-F</code>            | Forcibly downloads the fcode. The subcommand still expects user confirmation before the download.                                                                                                                              |
| <code>-f fcode-file</code> | is the name of the file that has the new fcode. When the <code>fc_s_download</code> subcommand is invoked without the <code>[-f fcode-file]</code> option, the current version of the fcode in each FC/S Sbus card is printed. |

## Collecting Performance Statistics

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

---

**Note** – The accumulation of performance statistics must be enabled before using the `display -p` subcommand.

---

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

**TABLE 4-10** `perf_statistics` Options and Arguments

| Option/Argument | Description                                        |
|-----------------|----------------------------------------------------|
| <i>pathname</i> | is a SPARCstorage Array controller <sup>1</sup> .  |
| <code>-e</code> | Enable the accumulation of performance statistics. |

<sup>1</sup> See “Addressing a SPARCstorage Array” on page 3”.

## Changing the World Wide Name

Use the `download` subcommand to change the World Wide Name of a SPARCstorage Array controller board. :

```
luxadm [ -v ] download [-s] [-w WWN] pathname
```

**TABLE 4-11** `download` Options and Arguments

| Option/Argument     | Description                                                                                                                                                                                                                                                                     |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>pathname</i>     | is a SPARCstorage Array controller                                                                                                                                                                                                                                              |
| <code>-w WWN</code> | changes the SPARCstorage Array's World Wide Name. <code>WWN</code> 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 World Wide Name modified to <code>WWN</code> . |

## Starting Disks

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

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

**TABLE 4-12** `start` Options and Arguments

| Option/Argument             | Description                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------|
| <code>-t tray-number</code> | spins up all disks in the tray. <i>pathname</i> must specify the SPARCstorage Array controller.             |
| <i>pathname</i>             | is the physical or logical path name of a SPARCstorage Array, or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing a SPARCstorage Array" on page 3".

## Stopping Disks

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

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

**TABLE 4-13** `stop` Options and Arguments

| Option/Argument             | Description                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------|
| <code>-t tray-number</code> | spins down all disks in the tray. <i>pathname</i> must specify the SPARCstorage Array controller.           |
| <i>pathname</i>             | is the physical or logical path name of a SPARCstorage Array, or a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing a SPARCstorage Array" on page 3".

## Turning On a Disk LED

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

```
luxadm [ -v ] led_on pathname
```

**TABLE 4-14** `led_off` Options and Arguments

| Option/Argument | Description                                                                        |
|-----------------|------------------------------------------------------------------------------------|
| <i>pathname</i> | is the physical or logical path name of a specific disk in an array <sup>1</sup> . |

<sup>1</sup> See "Addressing a SPARCstorage Array" on page 3.



## Hotplugging in the Sun Enterprise Network Array

---

---

### Hotplugging Sun Enterprise Network Arrays

The procedure for hotplugging whole Sun Enterprise Network Array enclosures is very similar to the procedure for removing and replacing individual disk drives. Instead of specifying an *enclosure.dev* you only need to specify the *enclosure*.

For hotplugging Sun Enterprise Network Arrays, use the procedures in “Adding a Disk Drive” on page 38, “Replacing a Disk Drive” on page 41, and “Removing a Disk Drive” on page 52 except do not specify a device (*dev*). You only need to specify the *enclosure*.

---

### Hotplugging Disks



**Caution** – As with other high-RAS products, drives should not be pulled out randomly. The Sun Enterprise Network 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. This can be done without bringing down the operating system or powering down the unit. The Sun Enterprise Network

Array hardware fully supports hot-plugging, but there are software considerations that must be taken into account. Follow the procedures in this section when removing, replacing, and adding drives.

---

While there is no Solaris™ system software that provides hot-plug functionality to shield the operating system from the physical removal and replacement of a disk drive, there are several scenarios where a disk drive may be safely removed or added to the enclosure as long as the software framework managing the disk drives in the enclosure is taken into account.

## Overview

Hot-plug reconfiguration or hot-plug operations cannot be performed on an active disk drive. All disk access activity must be stopped prior to a disk drive being removed or replaced.

In general, hot-plug reconfiguration operations involve three stages:

1. Preparing for hot-plug reconfiguration
2. Adding, replacing, or removing a disk drive
3. Reconfiguring the operating environment.

Three specific cases exist where the hot-plug feature is useful.

- Adding a disk drive to a system to increase storage capacity
- Replacing a faulty disk drive while the system is running:
- Removing a drive from a system that no longer needs it

## Adding a Disk Drive

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

The way you add a disk drive depends on the application you are using. Each application requires that you decide where to install the new disk drive, add the drive, and then reconfigure the operating environment. Each application is different.

In all cases, you must select a slot, install the disk drive, and configure the Solaris environment to recognize the drive. Then you must 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 may result in data loss and/or data corruption.

---

## Selecting a Slot for the New Disk Drive

Select any available slot in the Sun Enterprise Network Array for the new disk drive. For reference when you configure the software environment, make a note of which enclosure and slot you chose.

## Configuring the Solaris Environment

A new device entry needs to be created for the drive in the `/devices` and `/dev/dsk` and `/dev/rdisk` hierarchy. The new drive is assigned a name associated with the slot into which the drive was installed.

**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
Please hit <enter> when you have finished adding the device(s):
```

**2. You must physically insert the disk drive at this time. After the drive is installed, hit Return. The following is displayed:**

```
Waiting for Loop Initialization to complete...
New Logical Nodes under /dev/es:
New Logical Nodes under /dev/dsk and /dev/rdisk :
    c1t3d0s0
    c1t3d0s1
    c1t3d0s2
    c1t3d0s3
    c1t3d0s4
    c1t3d0s5
    c1t3d0s6
    c1t3d0s7
#
```

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

## Configuring the New Disk Drive for a Unix File System (UFS)

Use the following procedure to configure a slice (single physical partition) on a disk to be used with a UFS file system. For instructions about adding a file system to a Volume Manager logical disk, refer to the documentation that came with your application.

**1. 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.

**2. Once you have selected a disk slice for your UFS file system, create a file system on the slice:**

```
# newfs /dev/rdisk/cwtxdysz
```

Refer to the `newfs(1M)` man page for more information.

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

```
# mkdir mount_point
```

where: `mount_point` is a fully qualified pathname. Refer to the `mount(1M)` man page for more information.

**4. After the file system and mountpoint have been created, modify the `/etc/vfstab` file to reflect the new file system.**

See the `vfstab(4)` man page for more details.

**5. Mount the new file system using the `mount` command:**

```
# mount mount_point
```

where: `mount_point` is the directory you created.

The file system is ready to be used.

## Adding the New Device to a Sun Enterprise Volume Manager Disk Group

Use the following procedure to configure the new device to be used with a new or existing Volume Manager disk group.

### 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 Enterprise Volume Manager User's Guide* for more information.

## Replacing a Disk Drive

This chapter contains information on configuring your system to replace a disk drive while the power is on and the operating system is running.

The way you replace a faulty disk drive depends on the application you are using. Each application is different, but requires that you

1. Determine which disk drive is failing or has failed
2. Remove the disk
3. Add the replacement drive
4. Reconfigure the operating environment.

In all cases 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. Then you must 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 may result in data loss and/or data corruption.

---

## Identifying 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.

## UNIX File System (UFS)

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



---

**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.

---

## *Preparing to Replace the Disk Drive*

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 `c1t3d0`, enter the following:

```
# mount | grep c1t3d0
/export/home (/dev/dsk/c1t3d0s7 ): 98892 blocks 142713 files
/export/home2 (/dev/dsk/c1t3d0s5 ): 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 will allow 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) 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 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/rdisk/clt3d0

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:

offlining: Drive in "macs3" rear slot 1

Hit any key after inserting/removing drives:
```

**2. You must physically remove the disk drive at this time. After the drive is removed, hit any key. The following is displayed:**

---

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

---

```
Drive in Box Name "macs3" rear slot 1
Removing Logical Nodes:
  Removing /dev/dsk/clt3d0s0
  Removing /dev/rdisk/clt3d0s0
  Removing /dev/dsk/clt3d0s1
  Removing /dev/rdisk/clt3d0s1
  Removing /dev/dsk/clt3d0s2
  Removing /dev/rdisk/clt3d0s2
  Removing /dev/dsk/clt3d0s3
  Removing /dev/rdisk/clt3d0s3
  Removing /dev/dsk/clt3d0s4
  Removing /dev/rdisk/clt3d0s4
  Removing /dev/dsk/clt3d0s5
  Removing /dev/rdisk/clt3d0s5
  Removing /dev/dsk/clt3d0s6
  Removing /dev/rdisk/clt3d0s6
  Removing /dev/dsk/clt3d0s7
  Removing /dev/rdisk/clt3d0s7
#
```

### *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
Please hit <enter> when you have finished adding the device(s):
```

- 2. You must physically insert the disk drive at this time. After the drive is installed, hit Return. The following is displayed:**

```
Waiting for Loop Initialization to complete...
New Logical Nodes under /dev/es:
New Logical Nodes under /dev/dsk and /dev/rdisk :
    c1t3d0s0
    c1t3d0s1
    c1t3d0s2
    c1t3d0s3
    c1t3d0s4
    c1t3d0s5
    c1t3d0s6
    c1t3d0s7
#
```

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

## Restoring the UFS File System

Use the following procedure to configure a slice on a disk to be used with the UFS file system.

- 1. 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.

- 2. 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/rdisk/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.

3. Once you have selected a disk slice for your UFS file system, create a file system on the slice:

```
# newfs /dev/rdisk/cwtxdysz
```

4. 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.

## Sun Enterprise Volume Manager

The following procedure assumes that all user- and application-level processes on all volumes, plexes, and/or subdisks that are located on the drive to be removed have been terminated.



---

**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.

---

### *Preparing to Replace the Disk Drive*

1. Back up your system.

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

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

```
# vxdisk list | grep cwtxdysz
```

For example, if the disk to be removed is c0t3d0, enter:

```
# vxdisk list | grep c0t3d0
c0t3d0s2      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.

### 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 for replacement” option.

When prompted for a disk name to replace, type the disk media name from Step 2.

`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. Non-redundant data is identified as unusable and must be recreated from backups.

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

### 5. Quit the `vxdiskadm` utility.

## *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/rdisk/clt3d0

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:

offlining: Drive in "macs3" rear slot 1

Hit any key after inserting/removing drives:
```

**2. You must physically remove the disk drive at this time. After the drive is removed, hit any key. The following is displayed:**

---

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

---

```
Drive in Box Name "macs3" rear slot 1
Removing Logical Nodes:
  Removing /dev/dsk/clt3d0s0
  Removing /dev/rdisk/clt3d0s0
  Removing /dev/dsk/clt3d0s1
  Removing /dev/rdisk/clt3d0s1
  Removing /dev/dsk/clt3d0s2
  Removing /dev/rdisk/clt3d0s2
  Removing /dev/dsk/clt3d0s3
  Removing /dev/rdisk/clt3d0s3
  Removing /dev/dsk/clt3d0s4
  Removing /dev/rdisk/clt3d0s4
  Removing /dev/dsk/clt3d0s5
  Removing /dev/rdisk/clt3d0s5
  Removing /dev/dsk/clt3d0s6
  Removing /dev/rdisk/clt3d0s6
  Removing /dev/dsk/clt3d0s7
  Removing /dev/rdisk/clt3d0s7
#
```

### *Installing the 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
Please hit <enter> when you have finished adding device(s):
```

2. You must physically insert the disk drive at this time. After the drive is installed, hit Return. The following is displayed:

```
Waiting for Loop Initialization to complete...
New Logical Nodes under /dev/es:
New Logical Nodes under /dev/dsk and /dev/rdisk :
    clt3d0s0
    clt3d0s1
    clt3d0s2
    clt3d0s3
    clt3d0s4
    clt3d0s5
    clt3d0s6
    clt3d0s7
#
```

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

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

To recreate 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 2 of “Preparing to Replace the Disk Drive” on page 47.

`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 non-redundant data is created and identified. Non-redundant data must be recovered from backing store.

See the `vxdiskadm` man pages for further details.

You have now completed the replacement of the failed drive.

## Removing a Disk Drive

This chapter contains information on 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.

The way in which you prepare to remove a disk drive depends on the application you are using. Each application is different, but requires that you

1. Select the disk drive
2. Remove the disk
3. Reconfigure the operating environment.

In all cases 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. Then you must 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 may result in data loss and/or data corruption.

---

## Unix File System (UFS)

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



---

**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.

---

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 `c1t3d0`, enter the following:

```
# mount | grep c1t3d0
/export/home (/dev/dsk/c1t3d0s7 ): 98892 blocks 142713 files
/export/home2 (/dev/dsk/c1t3d0s5 ): 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.

```
# luxadm remove_device /dev/rdisk/clt3d0

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:

offlining: Drive in "macs3" rear slot 1

Hit any key after inserting/removing drives:
```

**2. You must physically remove the disk drive at this time. After the drive is removed, hit any key. The following is displayed:**

---

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

---

```
Drive in Box Name "macs3" rear slot 1
Removing Logical Nodes:
  Removing /dev/dsk/clt3d0s0
  Removing /dev/rdisk/clt3d0s0
  Removing /dev/dsk/clt3d0s1
  Removing /dev/rdisk/clt3d0s1
  Removing /dev/dsk/clt3d0s2
  Removing /dev/rdisk/clt3d0s2
  Removing /dev/dsk/clt3d0s3
  Removing /dev/rdisk/clt3d0s3
  Removing /dev/dsk/clt3d0s4
  Removing /dev/rdisk/clt3d0s4
  Removing /dev/dsk/clt3d0s5
  Removing /dev/rdisk/clt3d0s5
  Removing /dev/dsk/clt3d0s6
  Removing /dev/rdisk/clt3d0s6
  Removing /dev/dsk/clt3d0s7
  Removing /dev/rdisk/clt3d0s7
#
```

## Sun Enterprise Volume Manager

The following procedure assumes that all user- and application-level processes on all volumes, plexes, and/or subdisks that are located on the drive to be removed have been terminated.



---

**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.

---

### *Preparing to Remove the Disk Drive*

1. **Back up your system.**
2. **Identify the disk media name for the disk you intend to remove.**

```
# vxdisk list | grep cwtxdysz
```

For example, if the disk to be removed is c0t3d0, enter:

```
# vxdisk list | grep c0t3d0
c0t3d0s2      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 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/rdisk/clt3d0

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:

offlining: Drive in "macs3" rear slot 1

Hit any key after inserting/removing drives:
```

**2. You must physically remove the disk drive at this time. After the drive is removed, hit any key. The following is displayed:**

---

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

---

```
Drive in Box Name "macs3" rear slot 1
```

```
Removing Logical Nodes:
```

```
Removing /dev/dsk/clt3d0s0  
Removing /dev/rdisk/clt3d0s0  
Removing /dev/dsk/clt3d0s1  
Removing /dev/rdisk/clt3d0s1  
Removing /dev/dsk/clt3d0s2  
Removing /dev/rdisk/clt3d0s2  
Removing /dev/dsk/clt3d0s3  
Removing /dev/rdisk/clt3d0s3  
Removing /dev/dsk/clt3d0s4  
Removing /dev/rdisk/clt3d0s4  
Removing /dev/dsk/clt3d0s5  
Removing /dev/rdisk/clt3d0s5  
Removing /dev/dsk/clt3d0s6  
Removing /dev/rdisk/clt3d0s6  
Removing /dev/dsk/clt3d0s7  
Removing /dev/rdisk/clt3d0s7
```

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