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## Platform Notes: Sun Enterprise 6x00/5x00/4x00/3x00 Systems

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

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# Preface

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This book describes software features that apply only to the Sun™ Enterprise™ 6x00/5x00/4x00/3x00 family of servers.

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## Related Documents

For detailed information on the software features described in this book, refer to the man pages for Solaris 7. For information on DR features, refer to the *Sun Enterprise 6x00, 5x00, 4x00, and 3x00 Systems Dynamic Reconfiguration User's Guide*.

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# Using UNIX Commands

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

See one or more of the following for this information:

- *Solaris Handbook for SMCC Peripherals*
- AnswerBook online documentation for the Solaris 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. Use <code>ls -a</code> to list all files. % You have mail.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output.	% <b>su</b> 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> . These are called <i>class</i> options. You <i>must</i> be <code>root</code> to do this. To delete a file, type <code>rm filename</code> .

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# Shell Prompts

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	<i>machine_name</i> %
C shell superuser	<i>machine_name</i> #
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

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# OpenBoot Commands

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This chapter describes the OpenBoot™ commands for Sun Enterprise 6x00/5x00/4x00/3x00 servers.

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## Environmental Monitoring

The following commands are used for environmental monitoring:

**TABLE 1-1** Environmental Monitoring Commands

Command	Usage	Purpose
<code>disable-environmental-monitor</code>	<code>disable-environmental-monitor ( -- )</code>	To stop monitoring power supply status, board temperatures, and board hot plug while the screen displays the <code>ok</code> prompt.
<code>enable-environmental-monitor</code>	<code>enable-environmental-monitor ( -- )</code>	To start monitoring power supply status, board temperatures, and board hot plug while the screen displays the <code>ok</code> prompt.

---

## Externally Initiated Reset XIR

If a hard failure occurs, use `XIR` to reset the system and get information about the system state at the time of the hard failure.

## ▼ To Initiate an XIR

- Use either the XIR button on the clock board or the remote console XIR sequence. When an XIR occurs, memory is cleared but some CPU state is saved.

## ▼ To Display this XIR Information

- Type the following command at the ok prompt immediately after the XIR:

```
ok .xir-state-all
```

The output displays the CPU state for each CPU:

```
#1 ok .xir-state-all
TL=1 TT=3
CPU ID#1
TPC=e0028688 TnPC=e0028688 TSTATE=9900001e06

CPU ID#5
TL=1 TT=3
TPC=e002755c TnPC=e0027560 TSTATE=4477001e03
#1 ok .xir-state-all
TL=1 TT=3
```

---

**Note** – The XIR does not override the NVRAM `auto-boot?` variable.

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Where:

<i>TL</i>	<i>Trap level</i>
<i>TT</i>	<i>Trap type</i>
<i>TPC</i>	<i>Trap program counter</i>
<i>TState</i>	<i>Trap state</i>

---

# Hardware Watchdog

The Sun Enterprise xx00 family of servers provide the ability to enable a hardware timer that will hard-reset the system if it times out. To enable the use of this feature, `watchdog_enable` must be set to 1 in `/etc/system`.

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# Flash PROM Management

The following OpenBoot 3.x commands are used in flash PROM management:

**TABLE 1-2** Environmental Monitoring Commands

Command	Usage	Purpose
<code>flash-update-system</code>	<code>flash-update-system ( -- )</code>	To download the default flash images on all the boards in the system.
<code>prom-copy</code>	<code>prom-copy ( src dst -- )</code>	To copy a flash PROM from board <code>src</code> to board <code>dst</code> . Source ( <code>src</code> ) and Destination ( <code>dst</code> ) are specified by slot number.
<code>update-proms</code>	<code>update-proms ( -- )</code>	To synchronize the latest copy of each type of PROM on all other boards of the same type.

---

# System Configuration and Diagnostic Information

To print system configuration and diagnostic information, use `prtdiag` instead of using an OpenBoot command. The diagnostic information displayed lists the failed field-replaceable units (FRUs) in the system. For more information on `prtdiag`, see the `prtdiag` man page.

## prtdiag(1M) Options

-v lists the most recent AC Power failure, the most recent hardware fatal error information, and, if applicable, environmental status.

-l logs its output to `syslogd(1M)` only if failures or errors exist in the system.

---

## TOD Clock Management

The following commands are used for time-of-day (TOD) clock management, which includes NVRAM.

**TABLE 1-3** Environmental Monitoring Commands

Command	Usage	Purpose
<code>copy-clock-tod-to-io-boards</code>	<code>flash-update-system ( -- )</code>	To download the default flash images on all the boards in the system.
<code>prom-copy</code>	<code>prom-copy ( src dst -- )</code>	To copy a flash PROM from board <code>src</code> to board <code>dst</code> . Source ( <code>src</code> ) and Destination ( <code>dst</code> ) are specified by slot number.
<code>update-proms</code>	<code>update-proms ( -- )</code>	To synchronize the latest copy of each type of PROM on all other boards of the same type.

---

# Specific NVRAM Variables

The following table lists specific NVRAM variables and their values::

**TABLE 1-4** Specific NVRAM Variables

<b>Variable Name</b>	<b>Value</b>	<b>Default Value</b>
configuration-policy	component	component
disabled-board-list		
memory-interleave	max	max
sbus-probe-default	d3120	N/A
sbus-specific-probe	1:d120	N/A



# Board Hot-Plug Software and Dynamic Reconfiguration

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This chapter explains how to use the board hot-plug capability and Dynamic Reconfiguration (DR), where applicable. Hot-plug is a hardware feature that allows the replacement of components while a server is running. However, the system cannot use the new component until the system is rebooted. The Dynamic Reconfiguration software enhancement allows replacement of certain I/O boards without needing to reboot the server.

For command information and examples, see *OpenBoot Commands*.

The board hot-plug procedures described in this chapter need to be followed by a Dynamic Reconfiguration (DR) restart procedure or by a system reboot.

---

**Note** – For the Solaris 7 software environment, DR applies to Sun Enterprise type 1, 2, 4, and 5 I/O boards. These boards include the Sbus, Graphics, Sbus+, and Graphics+ I/O boards. I/O boards with slots for PCI cards are not supported.

---

Refer to the online *Sun Enterprise 6x00, 5x00, 4x00, 3x00 Systems Dynamic Reconfiguration User's Guide* for information about preparing your server to use DR, and instructions for performing DR operations. Check with your Sun Sales representative or system engineer for information on the availability of DR for your system.

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## Disabled System Board

A system board can be disabled (not used by the operating system) in three ways:

- A self-test detects a failure and disables the board.
- The board is disabled manually by using `disabled-board-list`. For example:

```
ok setenv disabled-board-list 72
```

The above command disables boards in slots 7 and 2. See *Environmental Monitoring Commands* for more information.

- The board was inserted while the operating system was running.

## ▼ To Swap Out a Disabled Board

### 1. Verify that system precharge is OK.

Use the `prtdiag` command. For more information see *System Configuration and Diagnostic Information*.

### 2. Verify that hot-plug is available.

### 3. Make sure that the board is disabled (not in use by the operating system and the power light on the target board is off).

### 4. Remove the disabled board.



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**Caution** – If the yellow light is lit on the front panel, use `prtdiag` to determine the cause before installing a new board.

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### 5. Install a new board.

### 6. To activate the board:

- For PCI boards, reboot the system.
- For other I/O boards, use DR commands.

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## Activated System Board

The system board is activated when the following three conditions are met:

- The board is in place during system startup.
- The slot has not been disabled by `disabled-board-list`.
- The board passes self-test.



▼ To swap out an activated board if you are swapping a type three (PCI) board:

1. Halt the system.
2. Power off the system.
3. Remove and replace the board.
4. Reboot the system to activate the board.

▼ To swap out an activated board if your system supports DR:

1. Use the appropriate `cfgadm` command to unconfigure the board from the system. Refer to the Sun Enterprise 6x00, 5x00, 4x00, 3x00 Systems Dynamic Reconfiguration User's Guide for further information regarding this command.
2. Remove and replace the board.
3. To activate the board and reconfigure the board to the system, use DR commands.

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## Disabling Hardware

By using the `configuration-policy` command, you can disable

- A component—disables only the failing component
- A board—disables the board if any component on it fails
- A system—stops the system at the POST menu if there is a failure

Examples:

```
ok setenv configuration-policy board
```

or

```
# eeprom "configuration-policy=board"
```

## ▼ To Disable a Defective Board

If you suspect a board is defective and want to request that the system disable the board, perform the following procedure.

### 1. Isolate the board from the system:

- For a type three I/O board, use the `setenv` command at the `ok` prompt or the `eeeprom` command at the `#` prompt and then reboot the system.
- For all other boards, use DR commands.

In the examples that follow, 3 means slot 3.

```
ok setenv disabled-board-list 3
```

or

```
# eeeprom "disabled-board-list "=3
```

### 2. Remove the defective board and insert a new board.

### 3. To activate the board:

- For type 3 (PCI) I/O boards, clear the `disabled-board-list`, and then reboot the system.
- For all other boards, use DR commands.

See Environmental Monitoring Commands for more information.

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## Alternate Pathing

Alternate Pathing (AP) is a software enhancement that works in conjunction with DR and hot-plug. AP allows you to bypass a disabled disk or network adapter, avoiding unnecessary downtime. For additional information, refer to the Solaris on Sun Enterprise Servers AnswerBook module *Sun Enterprise Servers Alternate Pathing User's Guide*.

## CPU Over-Temperature Safeguard

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The CPU over-temperature safeguard (COS) is a Sun Enterprise xx00 platform feature for the Solaris 2.6 software environment and compatible versions available for servers with the proper firmware support. COS ensures that the temperature on any CPU/memory board *does not* exceed the safe operating range.

---

### COS Requirements

COS is *not* available if a Sun Enterprise xx00 server lacks enabling firmware. In this case, the system displays the following messages during the boot sequence:

```
WARNING: Firmware does not support CPU power off
WARNING: Automatic CPU shutdown on over-temperature disabled
WARNING: Firmware does not support CPU restart from power off
WARNING: The ability to restart individual CPUs is disabled
```

When equipped with the proper firmware, the system displays the following during the boot sequence. Later firmware will show a similar output..

```
Board 0:  OBP  3.2.8 1997/02/27 14:00  POST 3.5.1 1997/03/05 09:34
```

- **To check the firmware revision level, use the `prtdiag -v` command.**  
The correct firmware version for COS support is 3.2.8 or later.

---

# Factors in Overheating

Many external conditions can raise the CPU/memory board temperature and compound high temperature problems, including:

- Room air-conditioning set incorrectly
- Lateral cooling obstructed

Some Solaris software environment issues can also affect the CPU temperature, such as bound threads or having only one CPU/memory board in the system. These Solaris software environment issues can cause a fallback to the existing shutdown behavior.

The CPU over-temperature safeguard does not affect the Solaris software environment in any way. COS operates only when the temperature of a CPU/memory board exceeds the safe operating range.

---

# COS Operation

COS functions by monitoring the temperatures of all system CPUs. Warning messages are displayed in the system console if a CPU/memory board over-temperature condition occurs. The following example indicates an over-temperature condition for CPU/memory board 0:

```
WARNING: CPU/Memory board 0 is warm (temperature: 73C). Please
check system cooling
NOTICE: Processor 0 powered off.
NOTICE: Processor 1 powered off.
```

# Resolving an Over-Temperature Condition

When the COS feature detects a CPU over-temperature condition, it takes the CPU offline and powers it off.

The system continues to operate with the offending CPU powered off. The CPUs are the chief source of heat on a CPU/Memory board; removing that heat source lowers the temperature into the normal operating range. This prevents sudden down time to the production server.

## ▼ To Resolve an Over-Temperature Condition

### 1. Verify the new state with the `psrinfo` command

The `psrinfo` output reflects the new CPU state:

```
0      powered-off since 03/11/97 09:48:31
1      powered-off since 03/11/97 09:48:31
```

### 2. Without powering off the operating system, replace the defective power supply (containing cooling fans) with a working unit.

---

**Note** – You can also halt the server using `/etc/halt` or `init 0` at the root or superuser prompt before replacing the defective power supply.

---

### 3. Bring the CPU back to normal operation using the `psradm` command:

```
# psradm -n processor_id#
```

With the CPU over-temperature safeguard feature, if the temperature sensor again reports an over-temperature (the temperature is still out of range), then the attempt to bring the CPUs back into operation using the `psradm` command fails, an exit status of `-1` and an error message is returned.

If the CPU in question has returned to normal operating temperature, the console displays a message similar to the following.

```
NOTICE: CPU/Memory board 0 has cooled down (temperature: 72C), system OK.
```

## Failure to Disengage CPUs

In some instances, the CPU power control cannot disengage the affected CPU(s) from the Solaris software environment. For example, if the high temperature condition occurs when only one CPU/memory board with two processors is in the system, processor one will not go offline due to its being the last processor in the system.

## Failure to Power Off CPUs

If the attempted de-coupling of the problem CPU from the Solaris software environment fails, the temperature may continue to increase. When the temperature reaches the hard upper operational temperature limit, the system shuts down. In this case, a message similar to the following is displayed:

```
WARNING: CPU/Memory board 0 is very hot (temperature: 83C)
WARNING: System shutdown scheduled in 20 seconds due to over-temperature
condition on CPU/Memory board 0
WARNING: CPU/Memory board 0 still too hot (temperature: 83C). Overtemp shutdown
started
```