Platform Notes: Ultra™ Enterprise™ 3000, 4000, 5000, and 6000 Servers

Solaris™ Version 2.6
Contents

1. OpenBoot 3.x Commands 1
   Environmental Monitoring 1
       disable-environmental-monitor 1
       enable-environmental-monitor 2
   Messages Indicating Environmental Conditions 2
   Externally Initiated Reset XIR 3
   Flash PROM Management 3
       flash-update-system 4
       prom-copy 4
       update-proms 5
   POST Status Display 5
       show-post-results 5
   TOD Clock Management 9
       copy-clock-tod-to-io-boards 9
       copy-io-board-tod-to-clock-tod 10
   Specific NVRAM Variables 10
       configuration-policy 11
       disabled-board-list 11
       disabled-memory-list 11
memory-interleave 12
sbus-probe-default 12
sbus-specific-probe 13

2. Board Hot Plug Software Procedures 15
   Disabled System Board 15
   ▼ To Swap Out a Disabled Board 16
   Activated System Board 16
   ▼ To Swap Out an Activated Board 16
   Disabling Hardware 17
   ▼ To Disable a Defective Board 17

3. CPU Over Temperature Safeguard 19
   COS Requirements 19
   Overheating Factors 20
   COS Operation 20
   Resolving an Over Temperature Condition 20
   ▼ To Resolve an Over Temperature Condition 21
   Failure to Power Down CPUs 21
   Failure to Power Up CPUs 22

4. Enabling a Hardware Time 23
   Hardware Watchdog 23
   History Log Option of prtdiag(1M) 23
   Resetting and Power Cycling the System From a Remote Console 24
Preface

This book describes software features that apply only to the Ultra™ Enterprise™ 3000, 4000, 5000, and 6000 family of servers. Note that the CPU over temperature feature is a new software feature in the Solaris™ 2.6 software environment.

How This Book Is Organized

This manual is divided into four chapters:

Chapter 1, “OpenBoot 3.x Commands,” provides a description of the OpenBoot 3.x commands for the Ultra Enterprise family of x000 servers.


Chapter 3, “CPU Over Temperature Safeguard,” explains the CPU Over Temperature Safeguard (COS), which is new to the Solaris 2.6 software environment. This new feature ensures that temperature on any CPU/Memory board will not go above safe operating range.

Chapter 4, “Enabling a Hardware Time,” describes how to enable a hardware timer that will hard-reset the system if it times out.

Related Documents

For details on the options for the software features described in this book, refer also to the man pages for Solaris 2.6.
Typographic Conventions

The following table describes the typographic conventions used in this book.

TABLE P-1  Typographic Conventions

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

Shell Prompts

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-2  Shell Prompts

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

SunDocsSM is a distribution program for Sun Microsystems technical documentation. Contact SunExpress for easy ordering and quick delivery. You can find a listing of available Sun documentation on the World Wide Web.

<table>
<thead>
<tr>
<th>Country</th>
<th>Telephone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>02-720-09-09</td>
<td>02-725-88-50</td>
</tr>
<tr>
<td>Canada</td>
<td>1-800-873-7869</td>
<td>1-800-944-0661</td>
</tr>
<tr>
<td>France</td>
<td>0800-90-61-57</td>
<td>0800-90-61-58</td>
</tr>
<tr>
<td>Germany</td>
<td>01-30-81-61-91</td>
<td>01-30-81-61-92</td>
</tr>
<tr>
<td>Holland</td>
<td>06-022-34-45</td>
<td>06-022-34-46</td>
</tr>
<tr>
<td>Japan</td>
<td>0120-33-9096</td>
<td>0120-33-9097</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>32-2-720-09-09</td>
<td>32-2-725-88-50</td>
</tr>
<tr>
<td>Sweden</td>
<td>020-79-57-26</td>
<td>020-79-57-27</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0800-55-19-26</td>
<td>0800-55-19-27</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0800-89-88-88</td>
<td>0800-89-88-87</td>
</tr>
<tr>
<td>United States</td>
<td>1-800-873-7869</td>
<td>1-800-944-0661</td>
</tr>
</tbody>
</table>

World Wide Web: http://www.sun.com/sunexpress/

Sun Welcomes Your Comments

Please use the Reader Comment Card that accompanies this document. We are interested in improving our documentation and welcome your comments and suggestions.

If a card is not available, you can email or fax your comments to us. Please include the part number of your document in the subject line of your email or fax message.

- Email:—smcc-docs@sun.com
- Fax:—SMCC Document Feedback, 1-415-786-6443
OpenBoot 3.x Commands

This chapter describes the OpenBoot™ 3.x commands for the Ultra Enterprise 3000, 4000, 5000, and 6000 servers.

Environmental Monitoring

Use the following commands for environmental monitoring:

- disable-environmental-monitor
- enable-environmental-monitor

**disable-environmental-monitor**

**Usage**

disable-environmental-monitor（--）

**Purpose**

To stop monitoring power supply status, board temperatures, and board hot plug while the screen displays the ok prompt.
enable-environmental-monitor

Usage

enable-environmental-monitor

Purpose

To start monitoring power supply status, board temperatures, and board hot plug while the screen displays the ok prompt.

Note – This command is enabled by default.

Messages Indicating Environmental Conditions

The following system messages indicate environmental conditions:

- PROM NOTICE: Overtemp detected on board <n>.
- PROM NOTICE: System has cooled down.
- PROM WARNING: Board <n> is too hot.
- PROM NOTICE: Insufficient power detected.
- PROM NOTICE: Power supply restored.
- PROM NOTICE: Board insert detected.
- PROM NOTICE: Reset Initiated...

If a board temperature is above a predetermined temperature threshold for that board type, the OpenBoot PROM (OBP) initiates a reset. This results in POST disabling the faulty board.

If Insufficient power detected is not fixed in 30 seconds, then the OBP initiates a reset to enable POST to deconfigure the necessary boards.

If a board insert is detected, the OBP turns the reset flag on. This causes the boot command to reset the system and POST to attach the board to the system.
Externally Initiated Reset XIR

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

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 information similar to the following:

  ```
  #1 ok .xir-state-all
  CPU ID#1
  TL=1 TT=3
  TPC=e0028688 TnPC=e0028688 TSTATE=9900001e06
  
  CPU ID#5
  TL=1 TT=3
  TPC=e002755c TnPC=e0027560 TSTATE=4477001e03
  ```

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

Flash PROM Management

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

- flash-update-system
- prom-copy
- update-proms
flash-update-system

Usage

flash-update-system ( -- )

Purpose

To download the default flash images on all the boards in the system.

Note – The default device used is the one pointed to by “net.”

The default image names are described in TABLE 1-1.

<table>
<thead>
<tr>
<th>Board Type</th>
<th>Image File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU board PROMs</td>
<td>cpu.flash</td>
</tr>
<tr>
<td>I/O board Type 1</td>
<td>io2sbus.flash</td>
</tr>
<tr>
<td>I/O board Type 2</td>
<td>iolsbus.flash</td>
</tr>
</tbody>
</table>

Note – This command does not update boards in low power mode.

prom-copy

Usage

prom-copy ( src dst -- )

Purpose

To copy a flash PROM from board src to board dst.
**update-proms**

**Usage**

update-proms (−−)

**Purpose**

To synchronize the latest copy of each type of PROM on all other boards of the same type.

This command copies the latest version of each type of PROM (CPU and I/O boards) on all other boards of the same type. This results in all boards of the same type having the latest (same) PROM.

---

**POST Status Display**

**show-post-results**

**Usage**

show-post-results (−−)

**Purpose**

To display POST results at the ok prompt. The output looks similar to this:

```
ok  show-post-results
Slot 0 - Status=Okay, Type: CPU/Memory
       Cpu0=P  Cpu0-OK=P  FailCode=0  Cpu1=Not  x  x
       AC=P    FHC=P     SRAM=P     PROM=P    LabCon=Not  Ovtemp=Not
       Bank0=0  Banki=0   DTag0=P    DTag1=P    JTAG=P    CntrPl=P
       DC=ff
```
<table>
<thead>
<tr>
<th>Slot</th>
<th>Status</th>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Okay</td>
<td>IO board</td>
<td>Sysio0=P Sysio1=P FEPS=P FEPSFC=0 SOC=P Sbus0=P Sbus1=P Sbus2=P AC=P FHC=P SRAM=*** PROM=P LabCon=Not Ovtemp=Not TODC=P JTAG=P CntrPl=P DC=ff</td>
</tr>
<tr>
<td>3</td>
<td>Okay</td>
<td>IO board</td>
<td>Sysio0=P Sysio1=P FEPS=P FEPSFC=0 SOC=P FFB=P Sbus0=P Sbus2=P AC=P FHC=P SRAM=*** PROM=P LabCon=Not Ovtemp=Not TODC=P JTAG=P CntrPl=P DC=ff</td>
</tr>
<tr>
<td>6</td>
<td>Low Power</td>
<td>IO board</td>
<td>Sysio0=P Sysio1=P FEPS=P FEPSFC=0 SOC=P Sbus0=P Sbus1=P Sbus2=P AC=P FHC=P SRAM=*** PROM=P LabCon=Not Ovtemp=Not TODC=P JTAG=P CntrPl=P DC=ff</td>
</tr>
<tr>
<td>16</td>
<td>Fail</td>
<td>Clock</td>
<td>Clock=P Serial=P KbdMse=P PPS-DC=P DCReg0=P DCReg1=P AC=P ACFan=P KeyFan=P PSFail=0 Ovtemp=Not TODC=P RKFan=P</td>
</tr>
</tbody>
</table>

P = Present or Passed
*** = Failed Component
Not = Not present
ok
TABLE 1-1 and TABLE 1-2 describe the output.

### TABLE 1-2  
**CPU/Memory Board**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cpu0/Cpu1</td>
<td>CPU modules on the board</td>
</tr>
<tr>
<td>CPU[0,1]-OK</td>
<td>CPU module status</td>
</tr>
<tr>
<td>FailCode</td>
<td>Failure code (valid only if CPU failed)</td>
</tr>
<tr>
<td>AC</td>
<td>Address controller</td>
</tr>
<tr>
<td>FHC</td>
<td>Fire hose controller</td>
</tr>
<tr>
<td>SRAM</td>
<td>Static RAM</td>
</tr>
<tr>
<td>FPROM</td>
<td>Flash PROM</td>
</tr>
<tr>
<td>LabCon</td>
<td>Lab console</td>
</tr>
<tr>
<td>Ovtemp</td>
<td>Over temperature</td>
</tr>
<tr>
<td>Bank0</td>
<td>Bank0 status (a bit indicates a missing or failed SIMM)</td>
</tr>
<tr>
<td>Bank1</td>
<td>Bank1 status (a bit indicates a missing or failed SIMM)</td>
</tr>
<tr>
<td>DTag0</td>
<td>DTags0 status</td>
</tr>
<tr>
<td>DTag1</td>
<td>DTags1 status</td>
</tr>
<tr>
<td>JTAG</td>
<td>Jtag status</td>
</tr>
<tr>
<td>CntrPl</td>
<td>Centerplane status</td>
</tr>
<tr>
<td>DC</td>
<td>Data controllers (0 bit indicates a failed DC)</td>
</tr>
</tbody>
</table>

### TABLE 1-3  
**I/O Board**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sysio0</td>
<td>SysIO 0 status</td>
</tr>
<tr>
<td>Sysio1</td>
<td>SysIO 1 status</td>
</tr>
<tr>
<td>FEPS</td>
<td>Onboard FEPS chip</td>
</tr>
<tr>
<td>FEPSFC</td>
<td>FEPS fail code (valid only if failed)</td>
</tr>
<tr>
<td>SOC</td>
<td>Onboard SOC status</td>
</tr>
<tr>
<td>FFB</td>
<td>FFB card status</td>
</tr>
<tr>
<td>Sbus0</td>
<td>SBus0 slot status</td>
</tr>
<tr>
<td>Sbus1</td>
<td>SBus1 slot status</td>
</tr>
<tr>
<td>Sbus2</td>
<td>SBus2 slot status</td>
</tr>
</tbody>
</table>
### TABLE 1-3  I/O Board  
*Continued*

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Address controller</td>
</tr>
<tr>
<td>FHC</td>
<td>Fire hose controller</td>
</tr>
<tr>
<td>SRAM</td>
<td>Static RAM</td>
</tr>
<tr>
<td>FPROM</td>
<td>Flash PROMs</td>
</tr>
<tr>
<td>LabCon</td>
<td>Lab console</td>
</tr>
<tr>
<td>Ovtemp</td>
<td>Over temperature</td>
</tr>
<tr>
<td>TODC</td>
<td>Time-of-day clock</td>
</tr>
<tr>
<td>JTAG</td>
<td>JTAG status</td>
</tr>
<tr>
<td>CntrPl</td>
<td>Centerplane status</td>
</tr>
<tr>
<td>DC</td>
<td>Data controllers (0 bit indicates a failed DC)</td>
</tr>
</tbody>
</table>

### TABLE 1-4  Disk Board

<table>
<thead>
<tr>
<th>Hardware Device</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk0</td>
<td>Disk0 ID (valid only if disk present)</td>
</tr>
<tr>
<td>Disk1</td>
<td>Disk1 ID (valid only if disk present)</td>
</tr>
<tr>
<td>Disk0P</td>
<td>Disk0 present</td>
</tr>
<tr>
<td>Disk1P</td>
<td>Disk1 present</td>
</tr>
<tr>
<td>VDDOK</td>
<td>SCSI VDD status</td>
</tr>
<tr>
<td>Fan</td>
<td>Fan fail status</td>
</tr>
<tr>
<td>JTAG</td>
<td>JTAG status</td>
</tr>
</tbody>
</table>

### TABLE 1-5  Clock Board

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock</td>
<td>Clock running</td>
</tr>
<tr>
<td>Serial</td>
<td>Serial port</td>
</tr>
<tr>
<td>KBytes</td>
<td>Keyboard mouse status</td>
</tr>
<tr>
<td>PPS-DC</td>
<td>Peripheral PS OK (all DC levels OK)</td>
</tr>
<tr>
<td>AC</td>
<td>AC power status</td>
</tr>
<tr>
<td>ACFan</td>
<td>AC box fan status</td>
</tr>
<tr>
<td>KeyFan</td>
<td>KeySwitch fan status</td>
</tr>
</tbody>
</table>
TOD Clock Management

This section describes the following commands related to time-of-day (TOD) clock management, which includes NVRAM:

- `copy-clock-tod-to-io-boards`
- `copy-io-board-tod-to-clock-tod`

`copy-clock-tod-to-io-boards`

Usage

`copy-clock-tod-to-io-boards`
Purpose

To copy the contents of the clock board NVRAM and the contents of the TOD clock to all good I/O boards in the system.

This occurs automatically if all of the following conditions are true:

- There is a functioning clock board in the system.
- Its contents match that of at least one I/O board in the system.

`copy-io-board-tod-to-clock-tod`

Usage

`copy-io-board-tod-to-clock-tod (src -- )`

Purpose

To update the contents of a clock board (probably new) with the contents from one of the backup I/O board copies.

**Note** – This may have to be done if the clock board was replaced and the user wants to restore its original NVRAM.

---

### Specific NVRAM Variables

This section describes the following NVRAM variables:

- configuration-policy
- disabled-board-list
- disabled-memory-list
- memory-interleave
- sbus-probe-default
- sbus-specific-probe
configuration-policy

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Value</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>configuration-policy</td>
<td>component</td>
<td>component</td>
</tr>
</tbody>
</table>

This variable determines the configuration policy. When a faulty component is detected, the value options are as follows:

<table>
<thead>
<tr>
<th>Hardware Device</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component (default)</td>
<td>Disable only what failed.</td>
</tr>
<tr>
<td>System</td>
<td>Stop the system in POST if any component failed tests.</td>
</tr>
<tr>
<td>Board</td>
<td>Disable the entire board that contains the failed component.</td>
</tr>
</tbody>
</table>

disabled-board-list

**Note** – The master board (the CPU board in the lowest slot) will not be disabled if it is put in the disabled-board-list. The operating system displays a warning as follows: WARNING: Disabled board 0 was really active

This is a list of boards that are not to be used by the system. These boards are put in low power mode on the next reset and remain there until they are removed from this list on the following reset.

For example, to reset a list to null, type:

```
ok set-default disabled-board-list
```

disabled-memory-list

This command lists the boards with memory on them that will not be used. This variable takes effect on the next reset or power on. For both of the above variables, the list is a sequence of any number of boards 0 through 9 and a through f.
A valid example is:

```bash
setenv disabled-board-list 45  (disable boards in slots 4 and 5)
setenv disabled-board-list 7af  (disable boards in slots 7 and 10)
```

To reset a list to null, type:

```bash
ok set-default disabled-memory-list
```

### memory-interleave

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Value</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>memory-interleave</td>
<td>max</td>
<td>max</td>
</tr>
</tbody>
</table>

This variable determines how the memory on various boards is to be interleaved. The default value is maximum interleaving. When it is set to “min,” no interleaving is required. This takes effect on the next reset or power on.

### sbus-probe-default

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>sbus-probe-default</td>
<td>d3120</td>
</tr>
</tbody>
</table>

This variable defines the SBus device probe order on an I/O board per SBus, where:

- **d**: On-board SOC
- **3**: On-board FEPS
- **0-2**: SBus slots 0, 1, and 2
The device probe order on a Type 1 I/O board is as follows, since the five SBus devices are divided between two SBuses:

```
lo sbus       d, 1, 2
hi sbus       3, 0
```

However, on a Type 2 I/O board, since there is only 1 SBus, the probe order is:

```
lo sbus       absent   (UPA/FFB Port in its place)
hi sbus       d, 3, 2, 0 (no slot 1)
```

To change the default probe order to 123d0, type:

```
ok setenv sbus-probe-default 123d0
```

Remember that this changes the default probe order for all boards in the system. You can also use this to skip over an SBus slot, but don’t include it in the list of devices to probe. To change the probe order for a specific board, use the `sbus-specific-probe` variable.

**sbus-specific-probe**

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>sbus-specific-probe</td>
<td>1:d120</td>
</tr>
</tbody>
</table>

This variable controls the SBus probe order on a given list of boards. To set the probe order as 320 on I/O board 4, type:

```
ok setenv sbus-specific-probe 4:320
```

The number preceding the colon (:) is the slot number; the numbers following it are the SBus device numbers in the desired probe order. All unlisted I/O boards in the system use the default probe order as defined by the `sbus-default-probe` NVRAM variable.
Multiple boards can be defined by this variable as follows:

```bash
ok setenv sbus-specific-probe 4:320 6:d3210 7:0123d
```
CHAPTER 2

Board Hot Plug Software Procedures

This chapter explains how to use the board hot plug capability. For command information and examples, see Chapter 1, “OpenBoot 3.x Commands.” Also see Chapter 3, “CPU Over Temperature Safeguard.” The CPU over temperature feature ensures that the temperature on any CPU/memory board does not go above safe temperature operating range.

Disabled System Board

A system board can become 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 using disabled-board-list. In this case, the operator tells the system not to use the board. For example:

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

The above command disables boards in slots seven and two. See “disabled-board-list” on page 11 for more information.

■ The board was inserted while the operating system was running.
To Swap Out a Disabled Board

1. Make sure that the board is disabled (not in use by the operating system, power light off).
2. Remove the disabled board.
   
   Caution – If the yellow light is on, use prtdiag to determine the cause before installing a new board.

3. Install a new board.
   a. Verify that system precharge is OK.
   b. Verify that hot plug is available.
4. Reboot the system.

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

1. Halt the system.
2. Power off the system.
3. Remove and replace the board.
4. Reboot the system.
Disabling Hardware

By using the configuration-policy command, you can disable

- Component—Disables only the failing component.
- Board—Disables the board if any component on it fails.
- 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. Use the setenv command at the ok prompt or the eeprom command at the # prompt to prohibit the system from using the board. Examples:

```
ok setenv disable-board-list 3
```

or

```
# eeprom "disable-board-list"=3
```

where 3 = slot 3.

2. Reboot the system.

3. Remove the unused board and insert a new board.
4. Clear the disabled-board-list.  
   See “disabled-board-list” on page 11 for more information.

5. Reboot the system.
CHAPTER 3

CPU Over Temperature Safeguard

The CPU over temperature safeguard (COS) is a new Ultra Enterprise 3000, 4000, 5000, and 6000 platform safeguard feature for the Solaris 2.6 software environment. COS is an automatic feature available on the Ultra Enterprise family of x000 servers. It ensures that the temperature on any CPU/memory board does not go above the safe operating range.

COS Requirements

COS operation requires proper firmware support. COS is not available if an Ultra Enterprise x000 server lacks enabling firmware. In this case, the system displays these 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

To check the firmware revision level, use the `prtdiag -v` command.

The correct firmware version for COS support is 3.2.8 or above.

The system, when equipped with the required firmware, displays the following message during the boot sequence:

```
Board 0: OBP 3.2.8 1997/02/27 14:00  POST 3.5.1 1997/03/05 09:34
(or equivalent for later firmware)
```
Overheating Factors

Many external forces can affect the temperature and compound the CPU high temperature problem, including:

- Room air-conditioning is incorrectly set
- Lateral cooling is obstructed

There are also some Solaris software environment issues, 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. The technology operates only during over temperature conditions.

COS Operation

COS functions by monitoring the temperatures of all system CPUs. Warning messages are displayed in the system console when the over temperature occurs. For example:

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

The following procedure describes the steps to follow when one or more CPUs reach an over temperature condition.

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 CPUs regarded as 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 the 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:
   
<table>
<thead>
<tr>
<th>ID</th>
<th>Status</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>powered-off</td>
<td>03/11/97 09:48:31</td>
</tr>
<tr>
<td>1</td>
<td>powered-off</td>
<td>03/11/97 09:48:31</td>
</tr>
</tbody>
</table>

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

   **Note** – If desired, you can cleanly halt the server using `/etc/halt` or `init 0` at the root or superuser prompt before replacing the defective power supply.

3. Bring the CPUs 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, and a `-1` and an error message is returned.

   If the CPUs in question return to normal operating temperature, the console messages display a message similar to the following.

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

Failure to Power Down 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 with only one CPU/memory board with two processors in the system, processor 1 will not go to off-line due to its being the last processor in the system.
Failure to Power Up CPUs

If the attempted de-coupling of the problem CPUs from the Solaris software environment fails, the temperature continues to increase. When the temperature reaches the hard upper operational temperature limit, the system shuts down. You will see a message similar to the following:

```
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
```
Enabling a Hardware Time

This chapter explains how to do the following:

- Enable a hardware timer that will reset the system if it times out
- Display system configuration and diagnostic information
- Reset and power cycle the system from a remote console

Hardware Watchdog

The Ultra Enterprise x000 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`.

History Log Option of `prtdiag(1M)`

- To display system configuration and diagnostic information, use the `prtdiag(1M)` command.

  The `-l` option of `prtdiag(1M)` logs its output to `syslogd(1M)` only if failures or errors exist in the system.
Resetting and Power Cycling the System From a Remote Console

You can reset the system or power cycle from the remote console under these conditions:

■ The console must be connected to port A on the clock board.
■ The key switch must be in either the On or Diagnostic setting. If it is in the Secure or Off position, the remote key sequences and button resets are ignored.
■ Security features (such as OpenBoot security-mode) are disabled.
■ Type slowly, no faster than 0.5 seconds and no slower than 5 seconds between characters.

TABLE 4-1 lists the remote console commands, which are useful for resetting the system under general conditions. The remote XIR reset command is useful in software development and debugging. For a discussion of this command, see “Externally Initiated Reset XIR” on page 3” in Chapter 1.

**TABLE 4-1** Remote Console Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Keyboard Key Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote power off/on</td>
<td>Return Return ~ Control-Shift-p</td>
</tr>
<tr>
<td>Remote system reset</td>
<td>Return Return ~ Control-Shift-r</td>
</tr>
<tr>
<td>Remote XIR (CPU) reset</td>
<td>Return Return ~ Control-Shift-x</td>
</tr>
</tbody>
</table>

Key:
- Return = ASCII 0d hexadecimal
- ~ = ASCII 7e hexadecimal
- Control-Shift-p = 10 hexadecimal
- Control-Shift-r = 12 hexadecimal
- Control-Shift-x = 18 hexadecimal

**Note** – The remote console logic circuit continues to receive power, even if you have commanded system power off.

Since the remote console logic looks for certain patterns on the ttya line in the hardware that can be used to reset the machine, it is important that only authorized personnel have access to the ttya serial port.