Netra™ 240 Server System Administration Guide

Sun Microsystems, Inc.
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Preface

The *Netra 240 Server System Administration Guide* is intended to be used by experienced system administrators. It provides a general description of the Netra™ 240 server diagnostics tools and various server administration tasks.

To use the information in this manual you must have a working knowledge of computer network concepts and terms, and advanced knowledge of the Solaris™ Operating System (Solaris OS).

Before You Read This Book

This book does not cover server installation and rack mounting. For detailed information about those topics, refer to the *Netra 240 Server Installation Guide* (part number 817-2698).

Before following any of the procedures described in this book, be sure you have read *Important Safety Information for Sun Hardware Systems (*part number 816-7190).

Using UNIX Commands

Use this section to alert readers that not all UNIX commands are provided. For example:

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. See the following for this information:

- Software documentation that you received with your system
- Solaris™ operating environment documentation, which is at

  `http://docs.sun.com`

Shell Prompts

Shell	Prompt
C shell	*machine-name*%
C shell superuser	*machine-name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Typographic Conventions

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

i The settings on your browser might differ from these settings.

Related Documentation

Application	Title	Part Number
Installation overview	*Netra 240 Server Quick Start Guide*	817-3904
Latest product updates	*Netra 240 Server Release Notes*	817-3142
Compliance and safety	*Important Safety Information for Sun Hardware Systems*	816-7190
	Netra 240 Server Safety and Compliance Manual	817-3511
Documentation web site location	*Sun Netra 240 Server Documentation*	817-2697
Installation	*Netra 240 Server Installation Guide*	817-2698
Lights-out management	*Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server*	817-3174
Servicing	*Netra 240 Server Service Manual*	817-2699

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Netra 240 Server System Administration Guide, part number 817-2700-xx

CHAPTER 1

Troubleshooting Tools

This chapter describes the diagnostics tools available to the Netra 240 server. The chapter contains the following sections:

Overview of Diagnostic Tools

Sun provides a range of diagnostic tools for use with the Netra 240 server, as summarized in the following table.

TABLE 1-1 Summary of Troubleshooting Tools

Diagnostic Tool	Type	Description	Accessibility and Availability	Remote Capability
ALOM	Hardware and software	Monitors environmental conditions, performs basic fault isolation, and provides remote console access.	Can function on standby power and without operating system.	Designed for remote access.
LEDs	Hardware	Indicate status of overall system and particular components.	Accessed from system chassis. Available anytime power is available.	Local, but can be viewed by means of ALOM.
Power-on self-test (POST)	Firmware	Tests core components of system.	Runs automatically on startup. Available when the operating system is not running.	Local, but can be viewed by means of ALOM.
OpenBoot commands	Firmware	Display various kinds of system information.	Available when the operating system is not running.	Local, but can be accessed by means of ALOM.
OpenBoot diagnostics	Firmware	Tests system components, focusing on peripherals and I/O devices.	Runs automatically or interactively. Available when the operating system is not running.	Local, but can be viewed by means of ALOM.
Solaris software commands	Software	Display various kinds of system information.	Requires operating system.	Local, but can be accessed by means of ALOM.
SunVTS™ software	Software	Exercises and stresses the system, running tests in parallel.	Requires operating system. Optional package.	Viewable and controllable over network.

System Prompts

The following default server prompts are used by the Netra 240 server:

- `ok`—OpenBoot PROM prompt
- `sc>`—Advanced Lights Out Manager (ALOM) prompt
- `#`—Solaris software superuser (Bourne and Korn shell) prompt

FIGURE 1-1 shows the relationship between the three prompts and how to change from one to the other.

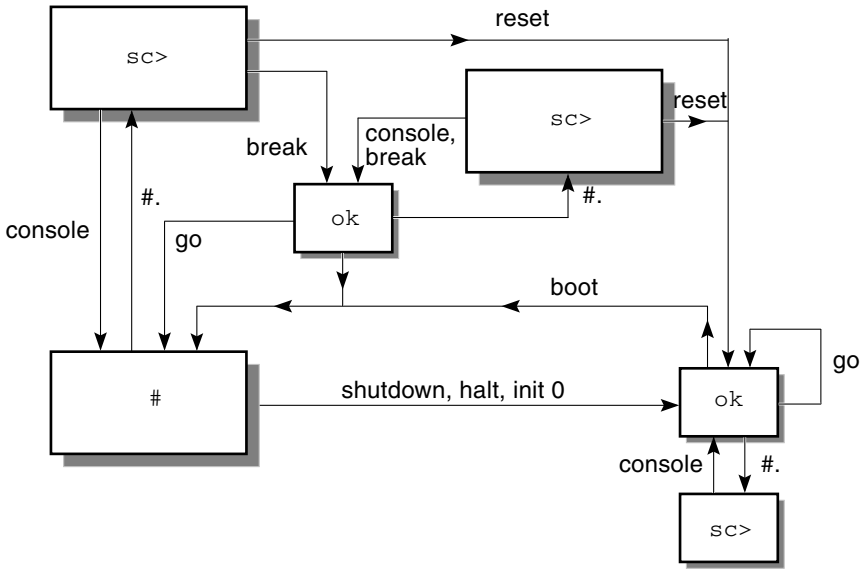

FIGURE 1-1 System Prompt Flow

The following commands are in the flow diagram in FIGURE 1-1:

- ALOM commands: `console`, `reset`, `break`
- Escape sequence: `#.`
- Solaris software commands: `shutdown`, `halt`, `init 0`
- OpenBoot commands: `go`, `boot`

Advanced Lights Out Manager

Sun™ Advanced Lights Out Manager (ALOM) for the Netra 240 server provides a series of LED status indicators. This section details the meaning of their status and how to turn them on and off. For more information on ALOM, see Chapter 3.

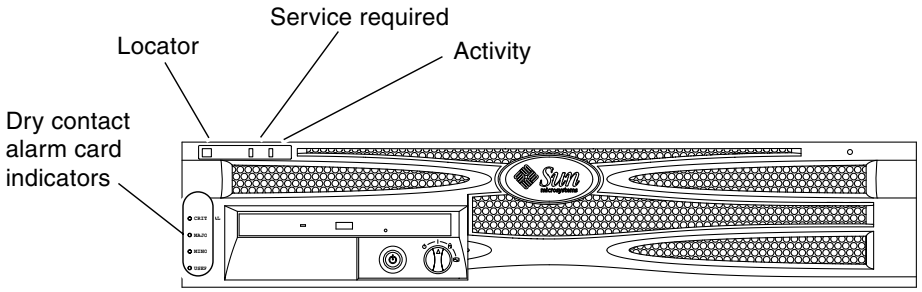

FIGURE 1-2 Location of Front Panel Indicators

Server Status Indicators

The server has three LED status indicators. They are located on the front bezel (FIGURE 1-2) and are repeated on the rear panel. A summary of the indicators is provided in TABLE 1-2.

TABLE 1-2 Server Status Indicators (Front and Rear)

Indicator	LED Color	LED State	Meaning
Activity	Green	On	The server is powered on and is running the Solaris OS.
		Off	Either power is not present or the Solaris OS is not running.
Service Required	Yellow	On	The server has detected a problem and requires the attention of service personnel.
		Off	The server has no detected faults.
Locator	White	On	A continuous light turns on and identifies the server from others in a rack, when the `setlocator` command is used.

You can turn the Locator LED on and off either from the system console or the ALOM command-line interface (CLI).

▼ To Display Locator LED Status

- **Do one of the following:**
  - **As superuser, type**:

```
# /usr/sbin/locator
```

  - **At the** ALOM **command-line interface, type:**

```
sc> showlocator
```

▼ To Turn the Locator LED On

- **Do one of the following:**
  - **As superuser, type:**

```
# /usr/sbin/locator -n
```

  - **At the** ALOM **command-line interface, type:**

```
sc> setlocator on
```

▼ To Turn the Locator LED Off

- **Do one of the following:**
  - **As superuser, type:**

```
# /usr/sbin/locator -f
```

  - **At the** ALOM **command-line interface, type:**

```
sc> setlocator off
```

Alarm Status Indicators

The dry contact alarm card has four LED status indicators that are supported by ALOM. They are located vertically on the front bezel (FIGURE 1-2). Information about the alarm indicators and dry contact alarm states is provided in TABLE 1-3. For more information about alarm indicators, see the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server* (part number 817-3174). For more information about an API to control the alarm indicators, see Appendix A.

TABLE 1-3 Alarm Indicators and Dry Contact Alarm States

Indicator and Relay Labels	Indicator Color	Application or Server State	Condition or Action	System Indicator State	Alarm Indicator State	Relay NC[iv] State	Relay NO[v] State	Comments
Critical (Alarm0)	Red	Server state (Power on/off and Solaris OS functional/ not functional)	No power input.	Off	Off	Closed	Open	Default state.
			System power off.	Off	Off[iii]	Closed	Open	Input power connected.
			System power turns on; Solaris OS not fully loaded.	Off	Off[iii]	Closed	Open	Transient state.
			Solaris OS successfully loaded.	On	Off	Open	Closed	Normal operating state.
			Watchdog timeout.	Off	On	Closed	Open	Transient state; reboot Solaris OS.
			Solaris OS shutdown initiated by user[i].	Off	Off[iii]	Closed	Open	Transient state.
			Lost input power.	Off	Off	Closed	Open	Default state.
			System power shutdown initiated by user.	Off	Off[iii]	Closed	Open	Transient state.
		Application state	User sets Critical alarm on[ii].	—	On	Closed	Open	Critical fault detected.
			User sets Critical alarm off[ii].	—	Off	Open	Closed	Critical fault cleared.

TABLE 1-3 Alarm Indicators and Dry Contact Alarm States *(Continued)*

Indicator and Relay Labels	Indicator Color	Application or Server State	Condition or Action	System Indicator State	Alarm Indicator State	Relay NC[iv] State	Relay NO[v] State	Comments
Major (Alarm1)	Red	Application state	User sets Major alarm on[ii].	—	On	Open	Closed	Major fault detected.
			User sets Major alarm off[ii].	—	Off	Closed	Open	Major fault cleared.
Minor (Alarm2)	Amber	Application state	User sets Minor alarm on[ii].	—	On	Open	Closed	Minor fault detected.
			User sets Minor alarm off[ii].	—	Off	Closed	Open	Minor fault cleared.
User (Alarm3)	Amber	Application state	User sets User alarm on[ii].	—	On	Open	Closed	User fault detected.
			User sets User alarm off[ii].	—	Off	Closed	Open	User fault cleared.

i The user can shut down the system using commands such as `init0` and `init6`. This does not include the system power shutdown.

ii Based on a determination of the fault conditions, the user can turn the alarm on using the Solaris platform alarm API or ALOM CLI. For more information about the alarm API see Appendix A, and for more information about the ALOM CLI, refer to the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server* (part number 817-3174).

iii The implementation of this alarm indicator state is subject to change.

iv NC state is the normally closed state. This state represents the default mode of the relay contacts in the normally closed state.

v NO state is the normally open state. This state represents the default mode of the relay contacts in the normally open state.

In all cases when the user sets an alarm, a message is displayed on the console. For example, when the critical alarm is set, the following message is displayed on the console:

```
SC Alert: CRITICAL ALARM is set
```

Note that in some instances when the critical alarm is set, the associated alarm indicator is not lit. This implementation is subject to change in future releases (see Footnote [iii] of TABLE 1-3).

Power-On Self-Test Diagnostics

Power-on self-test (POST) is a firmware program that helps determine whether a portion of the system has failed. POST verifies the core functionality of the system, including the CPU module(s), motherboard, memory, and some on-board I/O devices. The software then generates messages that can be useful in determining the nature of a hardware failure. You can run POST even if the system is unable to boot.

POST detects most system faults and is located in the motherboard OpenBoot PROM. You can program the OpenBoot software to run POST at power-on by setting two environment variables: the `diag-switch?` and the `diag-level` flag. These two variables are stored on the system configuration card (SCC).

Note – The SCC contains information about the system's identity, including the Host ID, MAC address and NVRAM settings. To increase the speed by which a system can be brought back online, your Sun Service representative might transfer the SCC and the drive on which it resides to another server, enabling it to inherit the old server's identity without being reconfigured. This procedure should only be done by trained Sun personnel.

POST runs automatically when the system power is applied, or following an automatic system reset, if all of the following conditions apply:

- `diag-switch?` is set to `true` (default is `false`).
- `diag-level` is set to `min`, `max` or `menus` (default is `min`).
- `post-trigger` matches the class of reset (default is `power-on-reset`).

If `diag-level` is set to `min` or `max`, POST performs an abbreviated or extended test, respectively.

If `diag-level` is set to `menus`, a menu of all the tests executed at power up is displayed.

POST diagnostic and error message reports are displayed on a console.

Controlling POST Diagnostics

You control POST diagnostics (and other aspects of the boot process) by setting OpenBoot configuration variables. Changes to OpenBoot configuration variables take effect only after the system is restarted. TABLE 1-4 lists the most important and

useful of these variables. You can find instructions for changing OpenBoot configuration variables in "To View and Set OpenBoot Configuration Variables" on page 27.

TABLE 1-4 OpenBoot Configuration Variables

OpenBoot Configuration Variable	Description and Keywords
`auto-boot`	Determines whether the operating system automatically starts up. Default is `true`. • `true`—Operating system automatically starts once firmware tests have finished running. • `false`—System remains at `ok` prompt until you type `boot`.
`diag-level`	Determines the level or type of diagnostics executed. Default is `min`. • `off`—No testing. • `min`—Only basic tests are run. • `max`—More extensive tests may be run, depending on the device. • `menus`— Menu-driven tests at POST levels can be individually run.
`diag-script`	Determines which devices are tested by OpenBoot diagnostics. Default is `none`. • `none`—No devices are tested. • `normal`—On-board (centerplane-based) devices that have self-tests are tested. • `all`—All devices that have self-tests are tested.
`diag-switch?`	Toggles the system in and out of diagnostic mode. Default is `false`. • `true`—Diagnostic mode: POST diagnostics and OpenBoot diagnostics tests are run. • `false`—Default mode: Do not run POST or OpenBoot diagnostics tests.
`post-trigger` `obdiag-trigger`[i]	These two variables specify the class of reset event that causes power-on self-tests (or OpenBoot diagnostics tests) to run. These variables can accept single keywords as well as combinations of the first three keywords separated by spaces. For details, see "To View and Set OpenBoot Configuration Variables" on page 27. • `error-reset`—A reset caused by certain nonrecoverable hardware error conditions. In general, an error reset occurs when a hardware problem corrupts system state data. Examples include CPU and system watchdog resets, fatal errors, and certain CPU reset events (default). • `power-on-reset`—A reset caused by pressing the On/Standby button (default). • `user-reset`—A reset initiated by the user or the operating system. • `all-resets`—Any kind of system reset. • `none`—No power-on self-tests (or OpenBoot diagnostics tests) are run.
`input-device`	Selects where console input is taken from. Default is `ttya`. • `ttya`—From built-in SERIAL MGT port. • `ttyb`—From built-in general purpose serial port (10101). • `keyboard`—From attached keyboard that is part of a graphics terminal.

TABLE 1-4 OpenBoot Configuration Variables *(Continued)*

OpenBoot Configuration Variable	Description and Keywords
`output-device`	Selects where diagnostic and other console output is displayed. Default is `ttya`. • `ttya`—To built-in SERIAL MGT port. • `ttyb`—To built-in general purpose serial port (10101). • `screen`—To attached screen that is part of a graphics terminal.[ii]

i The `post-trigger` and `obdiag-trigger` variables are obsolete in releases of OBP after 4.16.2.

ii POST messages cannot be displayed on a graphics terminal. They are sent to `ttya` even when `output-device` is set to screen.

Note – These variables affect OpenBoot diagnostics tests as well as POST diagnostics.

Once POST diagnostics have finished running, POST reports back the status of each test that was run to the OpenBoot firmware. Control then reverts back to the OpenBoot firmware code.

If POST diagnostics do not uncover a fault, and your server still does not start up, run OpenBoot diagnostics tests.

▼ To Start POST Diagnostics

1. **Go to the `ok` prompt.**
2. **Type:**

```
ok setenv diag-switch? true
```

3. **Type:**

```
ok setenv diag-level value
```

Where *value* is `min`, `max`, or `menus`, depending on the quantity of diagnostic information you want to see.

4. **Type:**

```
ok reset-all
```

The system runs POST diagnostics if `post-trigger` is set to `user-reset`. Status and error messages are displayed in the console window. If POST detects an error, it displays an error message describing the failure.

5. **When you have finished running POST, restore the value of `diag-switch?` to `false` by typing:**

```
ok setenv diag-switch? false
```

Resetting `diag-switch?` to `false` minimizes boot time.

OpenBoot Commands

OpenBoot commands are commands you type from the `ok` prompt. OpenBoot commands that can provide useful diagnostic information are as follows:

- `probe-scsi` and `probe-scsi-all`
- `probe-ide`
- `show-devs`

`probe-scsi` and `probe-scsi-all` Commands

The `probe-scsi` and `probe-scsi-all` commands diagnose problems with the SCSI devices.

Caution – If you used the `halt` command or the Stop-A key sequence to reach the `ok` prompt, issuing the `probe-scsi` or `probe-scsi-all` command can hang the system.

The `probe-scsi` command communicates with all SCSI devices connected to on-board SCSI controllers. The `probe-scsi-all` command also accesses devices connected to any host adapters installed in PCI slots.

For any SCSI device that is connected and active, the `probe-scsi` and `probe-scsi-all` commands display its loop ID, host adapter, logical unit number, unique world-wide name (WWN), and a device description that includes type and manufacturer.

The following sample output is from the `probe-scsi` command.

CODE EXAMPLE 1-1 `probe-scsi` Command Output

```
{1} ok probe-scsi
Target 0
  Unit 0   Disk     SEAGATE ST373307LSUN72G 0207
Target 1
  Unit 0   Disk     SEAGATE ST336607LSUN36G 0207
{1} ok
```

The following sample output is from the `probe-scsi-all` command.

CODE EXAMPLE 1-2 `probe-scsi-all` Command Output

```
{1} ok probe-scsi-all
/pci@1c,600000/scsi@2,1

/pci@1c,600000/scsi@2
Target 0
  Unit 0   Disk     SEAGATE ST373307LSUN72G 0207
Target 1
  Unit 0   Disk     SEAGATE ST336607LSUN36G 0207

{1} ok
```

`probe-ide` Command

The `probe-ide` command communicates with all Integrated Drive Electronics (IDE) devices connected to the IDE bus. This is the internal system bus for media devices such as the DVD drive.

Caution – If you used the `halt` command or the Stop-A key sequence to reach the `ok` prompt, issuing the `probe-ide` command can hang the system.

The following sample output is from the `probe-ide` command.

CODE EXAMPLE 1-3 `probe-ide` Command Output

```
{1} ok probe-ide
Device 0  ( Primary Master )
          Not Present

  Device 1  ( Primary Slave )
          Not Present

  Device 2  ( Secondary Master )
          Not Present

  Device 3  ( Secondary Slave )
          Not Present

{1} ok
```

`show-devs` Command

The `show-devs` command lists the hardware device paths for each device in the firmware device tree. CODE EXAMPLE 1-4 shows some sample output.

CODE EXAMPLE 1-4 `show-devs` Command Output

```
/pci@1d,700000
/pci@1c,600000
/pci@1e,600000
/pci@1f,700000
/memory-controller@1,0
/SUNW,UltraSPARC-IIIi@1,0
/memory-controller@0,0
/SUNW,UltraSPARC-IIIi@0,0
/virtual-memory
/memory@m0,0
/aliases
/options
/openprom
/chosen
/packages
/pci@1d,700000/network@2,1
/pci@1d,700000/network@2
/pci@1c,600000/scsi@2,1
/pci@1c,600000/scsi@2
/pci@1c,600000/scsi@2,1/tape
/pci@1c,600000/scsi@2,1/disk
```

CODE EXAMPLE 1-4 `show-devs` Command Output *(Continued)*

```
/pci@1c,600000/scsi@2/tape
/pci@1c,600000/scsi@2/disk
/pci@1e,600000/ide@d
/pci@1e,600000/usb@a
/pci@1e,600000/pmu@6
/pci@1e,600000/isa@7
/pci@1e,600000/ide@d/cdrom
/pci@1e,600000/ide@d/disk.........
```

▼ To Run OpenBoot Commands

1. **Halt the system to reach the `ok` prompt.**

   Inform users before you shut down the system.

2. **Type the appropriate command at the console prompt.**

OpenBoot Diagnostics

Like POST diagnostics, OpenBoot diagnostics code is firmware-based and resides in the Boot PROM.

▼ To Start OpenBoot Diagnostics

1. **Type:**

```
ok setenv diag-switch? true
ok setenv auto-boot? false
ok reset-all
```

2. **Type:**

```
ok obdiag
```

This command displays the OpenBoot diagnostics menu.

```
ok obdiag
```

```
                                o b d i a g

  1 flashprom@2,0          2 i2c@0,320              3 ide@d
  4 network@2              5 network@2              6 network@2,1
  7 network@2,1            8 rmc-comm@0,3e8         9 rtc@0,70
 10 scsi@2                11 scsi@2,1              12 serial@0,2e8
 13 serial@0,3f8

    Commands: test test-all except help what setenv set-default exit
```

Note – If you have a PCI card installed inside the server, additional tests appear on the `obdiag` menu.

---

3. **Type:**

```
obdiag> test n
```

Where *n* represents the number corresponding to the test you want to run.

A summary of the tests is available. At the `obdiag>` prompt, type:

```
obdiag> help
```

Controlling OpenBoot Diagnostics Tests

Most of the OpenBoot configuration variables you use to control POST (see TABLE 1-4) also affect OpenBoot diagnostics tests.

- Use the `diag-level` variable to control the OpenBoot diagnostics testing level.
- Use `test-args` to customize how the tests run.

By default, `test-args` is set to contain an empty string. You can modify `test-args` using one or more of the reserved keywords shown in TABLE 1-5.

TABLE 1-5 Keywords for the `test-args` OpenBoot Configuration Variable

Keyword	Description
`bist`	Invokes built-in self-test (BIST) on external and peripheral devices.
`debug`	Displays all debug messages.
`iopath`	Verifies bus and interconnect integrity.
`loopback`	Exercises external loopback path for the device.
`media`	Verifies external and peripheral device media accessibility.
`restore`	Attempts to restore original state of the device if the previous execution of the test failed.
`silent`	Displays only errors rather than the status of each test.
`subtests`	Displays main test and each subtest that is called.
`verbose`	Displays detailed status messages for all tests.
`callers=`*n*	Displays backtrace of *N* callers when an error occurs: `callers=0`—Displays backtrace of all callers before the error.
`errors=`*n*	Continues executing the test until *N* errors are encountered: `errors=0`—Displays all error reports without terminating testing.

If you want to customize the OpenBoot diagnostics testing, you can set `test-args` to a comma-separated list of keywords, as in this example:

```
ok setenv test-args debug,loopback,media
```

`test` and `test-all` Commands

You can also run OpenBoot diagnostics tests directly from the `ok` prompt. To do this, type the `test` command, followed by the full hardware path of the device (or set of devices) to be tested. For example:

```
ok test /pci@x,y/SUNW,qlc@2
```

To customize an individual test, you can use `test-args`, as follows:

```
ok test /usb@1,3:test-args={verbose,debug}
```

This syntax affects only the current test without changing the value of the `test-args` OpenBoot configuration variable.

You can test all the devices in the device tree with the `test-all` command:

```
ok test-all
```

CODE EXAMPLE 1-5 displays a sample OpenBoot diagnostics test report where all tests have passed.

CODE EXAMPLE 1-5 OpenBoot Diagnostics Test Report

```
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/flashprom@2,0 ..........................passed
Testing /pci@1e,600000/isa@7/i2c@0,320 ..............................passed
Testing /pci@1e,600000/ide@d ........................................passed
Testing /pci@1f,700000/network@2 ....................................passed
Testing /pci@1d,700000/network@2 ....................................passed
Testing /pci@1f,700000/network@2,1 ..................................passed
Testing /pci@1d,700000/network@2,1 ..................................passed
Testing /pci@1e,600000/isa@7/rmc-comm@0,3e8 ..........................passed
Testing /pci@1e,600000/isa@7/rtc@0,70 ...............................passed
Testing /pci@1c,600000/scsi@2 .......................................passed
Testing /pci@1c,600000/scsi@2,1 .....................................passed
Testing /pci@1e,600000/isa@7/serial@0,2e8 ...........................passed
Testing /pci@1e,600000/isa@7/serial@0,3f8 ...........................passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:25
```

If you specify a path argument to `test-all`, only the specified device and its children are tested. The following example shows the command to test the USB bus and all devices with self-tests that are connected to the USB bus:

```
ok test-all /pci@9,700000/usb@1,3
```

OpenBoot Diagnostics Error Messages

OpenBoot diagnostics error results are reported in a tabular format that contains a short summary of the problem, the hardware device affected, the subtest that failed, and other diagnostic information. CODE EXAMPLE 1-6 displays a sample OpenBoot diagnostics error message.

CODE EXAMPLE 1-6 OpenBoot Diagnostics Error Message

```
Testing /pci@1e,600000/isa@7/flashprom@2,0

   ERROR   : FLASHPROM CRC-32 is incorrect
   SUMMARY : Obs=0x729f6392 Exp=0x3d6cdf53 XOR=0x4ff3bcc1 Addr=0xfeebbffc
   DEVICE  : /pci@1e,600000/isa@7/flashprom@2,0
   SUBTEST : selftest:crc-subtest
   MACHINE : Netra 240
   SERIAL# : 52965531
   DATE    : 03/05/2003 01:33:59  GMT
   CONTR0LS: diag-level=max test-args=

Error: /pci@1e,600000/isa@7/flashprom@2,0 selftest failed, return code = 1
Selftest at /pci@1e,600000/isa@7/flashprom@2,0 (errors=1) .............
failed
Pass:1 (of 1) Errors:1 (of 1) Tests Failed:1 Elapsed Time: 0:0:0:27
```

Operating System Diagnostic Tools

When the system passes OpenBoot diagnostics tests, it attempts to boot the Solaris OS. Once the server is running in multiuser mode, you have access to the software-based diagnostic tools and the SunVTS software. These tools enable you to monitor the server, exercise it, and isolate faults.

Note – If you set the `auto-boot?` OpenBoot configuration variable to `false`, the operating system does *not* boot following completion of the firmware-based tests.

In addition to the tools just mentioned, you can refer to error and system message log files and to Solaris software information commands.

Error and System Message Log Files

Error and other system messages are saved in the `/var/adm/messages` file. Messages are logged to this file from many sources, including the operating system, the environmental control subsystem, and various software applications.

Solaris Software System Information Commands

The following Solaris software system information commands display data that you can use when assessing the condition of a Netra 240 server:

- `prtconf`
- `prtdiag`
- `prtfru`
- `psrinfo`
- `showrev`

This section describes the information that these commands give you. For more information about using these commands, refer to the appropriate man page.

`prtconf` Command

The `prtconf` command displays the Solaris software device tree. This tree includes all the devices probed by OpenBoot firmware, as well as additional devices, such as individual disks that only the operating system software recognizes. The output of `prtconf` also includes the total size of system memory. CODE EXAMPLE 1-7 shows an excerpt of `prtconf` output.

CODE EXAMPLE 1-7 `prtconf` Command Output

```
# prtconf

System Configuration:  Sun Microsystems  sun4u
Memory size: 5120 Megabytes
System Peripherals (Software Nodes):

SUNW,Netra-240
    packages (driver not attached)
        SUNW,builtin-drivers (driver not attached)
        deblocker (driver not attached)
        disk-label (driver not attached)
        terminal-emulator (driver not attached)
        dropins (driver not attached)
        kbd-translator (driver not attached)
        obp-tftp (driver not attached)
        SUNW,i2c-ram-device (driver not attached)
        SUNW,fru-device (driver not attached)
        ufs-file-system (driver not attached)
    chosen (driver not attached)
    openprom (driver not attached)
        client-services (driver not attached)
    options, instance #0
    aliases (driver not attached)
    memory (driver not attached)
    virtual-memory (driver not attached)
    SUNW,UltraSPARC-IIIi (driver not attached)
    memory-controller, instance #0
    SUNW,UltraSPARC-IIIi (driver not attached)
    memory-controller, instance #1
    pci, instance #0........
```

The `prtconf` command `-p` option produces output similar to that of the OpenBoot `show-devs` command. This output lists only those devices compiled by the system firmware.

prtdiag Command

The prtdiag command displays a table of diagnostic information that summarizes the status of system components. The display format used by the prtdiag command can vary depending on what version of the Solaris OS is running on your system. The following code example is an excerpt of some of the output produced by prtdiag on a functional Netra 240 server running Solaris software.

CODE EXAMPLE 1-8 prtdiag Command Output

```
# prtdiag
System Configuration: Sun Microsystems  sun4u Netra 240
System clock frequency: 160 MHZ
Memory size: 2GB
==================================== CPUs ====================================
                     E$          CPU     CPU       Temperature          Fan
       CPU  Freq     Size        Impl.   Mask     Die    Ambient   Speed   Unit
       ---  --------  ----------  ------  ----  --------  --------  -----   ----
     MB/P0  1280 MHz  1MB          US-IIIi   2.3     -      -
     MB/P1  1280 MHz  1MB          US-IIIi   2.3     -      -
================================ IO Devices ================================
     Bus   Freq
Brd  Type  MHz   Slot        Name                            Model
---  ----  ----  ----------  ------------------------------  --------------------
 0   pci    66            2  network-pci14e4,1648.108e.16+
 0   pci    66            2  network-pci14e4,1648.108e.16+
 0   pci    66            2  scsi-pci1000,21.1000.1000.1 +
 0   pci    66            2  scsi-pci1000,21.1000.1000.1 +
 0   pci    66            2  network-pci14e4,1648.108e.16+
 0   pci    66            2  network-pci14e4,1648.108e.16+
 0   pci    33            7  isa/serial-su16550 (serial)
 0   pci    33            7  isa/serial-su16550 (serial)
 0   pci    33            7  isa/rmc-comm-rmc_comm (seria+
 0   pci    33           13  ide-pci10b9,5229.c4 (ide)
========================== Memory Configuration ==========================
Segment Table:
--------------------------------------------------------------------
Base Address       Size       Interleave Factor  Contains
--------------------------------------------------------------------
0x0                1GB              1           GroupID 0
0x1000000000       1GB              1           GroupID 0
```

CODE EXAMPLE 1-8 `prtdiag` Command Output *(Continued)*

```
Memory Module Groups:
-------------------------------------------------
ControllerID   GroupID  Labels
-------------------------------------------------
0              0        MB/P0/B0/D0,MB/P0/B0/D1
Memory Module Groups:
-------------------------------------------------
ControllerID   GroupID  Labels
-------------------------------------------------
1              0        MB/P1/B0/D0,MB/P1/B0/D1
```

In addition to the information in CODE EXAMPLE 1-8, `prtdiag` with the verbose option (`-v`) also reports on front panel status, disk status, fan status, power supplies, hardware revisions, and system temperatures (see CODE EXAMPLE 1-9).

CODE EXAMPLE 1-9 `prtdiag` Verbose Output

```
-------------------------------------------------------------------
Location    Sensor      Temperature  Lo LoWarn HiWarn  Hi Status
-------------------------------------------------------------------
MB          T_ENC           22C     -7C   -5C   55C   58C   okay
MB/P0       T_CORE          57C     -       -    110C  115C okay
MB/P1       T_CORE          54C     -       -    110C  115C okay
PS0         FF_OT           -       -       -    -       -   okay
PS1         FF_OT           -       -       -    -       -   okay
```

In the event of an overtemperature condition, `prtdiag` reports an error in the Status column (CODE EXAMPLE 1-10).

CODE EXAMPLE 1-10 `prtdiag` Overtemperature Indication Output

```
-------------------------------------------------------------------
Location    Sensor      Temperature  Lo LoWarn HiWarn  Hi Status
-------------------------------------------------------------------
MB          T_ENC           22C     -7C    -5C    55C   58C okay
MB/P0       T_CORE         118C      -       -    110C  115C failed
MB/P1       T_CORE         112C      -       -    110C  115C warning
PS0         FF_OT           -       -       -    -       -   okay
PS1         FF_OT           -       -       -    -       -   okay
```

Similarly, if a particular component fails, `prtdiag` reports a fault in the appropriate status column (CODE EXAMPLE 1-11).

CODE EXAMPLE 1-11 `prtdiag` Fault Indication Output

```
Fan Speeds:
----------------------------------------
Location        Sensor      Status   Speed
----------------------------------------
MB/P0/F0        RS          failed   0 rpm
MB/P0/F1        RS          okay     3994 rpm
F2              RS          okay     2896 rpm
PS0             FF_FAN      okay
F3              RS          okay     2576 rpm
PS1             FF_FAN      okay
---------------------------------
```

`prtfru` Command

The Netra 240 server maintains a hierarchical list of all field-replaceable units (FRUs) in the system, as well as specific information about various FRUs.

The `prtfru` command can display this hierarchical list, as well as data contained in the serial electrically-erasable programmable read-only memory (SEEPROM) devices located on many FRUs. CODE EXAMPLE 1-12 shows an excerpt of a hierarchical list of FRUs generated by the `prtfru` command with the `-l` option.

CODE EXAMPLE 1-12 `prtfru -l` Command Output

```
# prtfru -l
/frutree
/frutree/chassis (fru)
/frutree/chassis/MB?Label=MB
/frutree/chassis/MB?Label=MB/system-board (container)
/frutree/chassis/MB?Label=MB/system-board/SC?Label=SC
/frutree/chassis/MB?Label=MB/system-board/SC?Label=SC/sc (fru)
/frutree/chassis/MB?Label=MB/system-board/BAT?Label=BAT
/frutree/chassis/MB?Label=MB/system-board/BAT?Label=BAT/battery (fru)
/frutree/chassis/MB?Label=MB/system-board/P0?Label=P0
/frutree/chassis/MB?Label=MB/system-board/P0?Label=P0/cpu (fru)
/frutree/chassis/MB?Label=MB/system-board/P0?Label=P0/cpu/F0?Label=F0
/frutree/chassis/MB?Label=MB/system-board/P0?Label=P0/cpu/F0?Label=F0/fan-unit
(fru)
/frutree/chassis/MB?Label=MB/system-board/P0?Label=P0/cpu/F1?Label=F1
/frutree/chassis/MB?Label=MB/system-board/P0?Label=P0/cpu/F1?Label=F1/fan-unit
(fru).....
```

CODE EXAMPLE 1-13 shows an excerpt of SEEPROM data generated by the `prtfru` command with the `-c` option. This output displays only the containers and their data and does not print the FRU tree hierarchy.

CODE EXAMPLE 1-13 `prtfru -c` Command Output

```
# prtfru -c
/frutree/chassis/MB?Label=MB/system-board (container)
   SEGMENT: SD
      /ManR
      /ManR/UNIX_Timestamp32: Mon Dec  2 19:47:38 PST 2002
      /ManR/Fru_Description: FRUID,INSTR,M'BD,2X1.28GHZ,CPU
      /ManR/Manufacture_Loc: Hsinchu,Taiwan
      /ManR/Sun_Part_No: 3753120
      /ManR/Sun_Serial_No: 000615
      /ManR/Vendor_Name: Mitac International
      /ManR/Initial_HW_Dash_Level: 02
      /ManR/Initial_HW_Rev_Level: 0E
      /ManR/Fru_Shortname: MOTHERBOARD
      /SpecPartNo: 885-0076-11
/frutree/chassis/MB?Label=MB/system-board/P0?Label=
P0/cpu/B0?Label=B0/bank/D0?La
bel=D0/mem-module (container)
/frutree/chassis/MB?Label=MB/system-board/P0?Label=
P0/cpu/B0?Label=B0/bank/D1?La
bel=D1/mem-module (container).....
```

Data displayed by the `prtfru` command varies depending on the type of FRU. In general, it includes the following:

- FRU description
- Manufacturer name and location
- Part number and serial number
- Hardware revision levels

`psrinfo` Command

The `psrinfo` command displays the date and time that each CPU is introduced online. With the verbose (`-v`) option, the command displays additional information about the CPUs, including their clock speed. CODE EXAMPLE 1-14 shows sample output from the `psrinfo` command with the `-v` option.

CODE EXAMPLE 1-14 `psrinfo -v` Command Output

```
# psrinfo -v
Status of processor 0 as of: 07/28/2003 14:43:29
  Processor has been on-line since 07/21/2003 18:43:37.
  The sparcv9 processor operates at 1280 MHz,
        and has a sparcv9 floating point processor.
Status of processor 1 as of: 07/28/2003 14:43:29
  Processor has been on-line since 07/21/2003 18:43:36.
  The sparcv9 processor operates at 1280 MHz,
        and has a sparcv9 floating point processor
```

`showrev` Command

The `showrev` command displays revision information for the current hardware and software. CODE EXAMPLE 1-15 shows sample output from the `showrev` command.

CODE EXAMPLE 1-15 `showrev` Command Output

```
# showrev
Hostname: vsp78-36
Hostid: 8328c87b
Release: 5.8
Kernel architecture: sun4u
Application architecture: sparc
Hardware provider: Sun_Microsystems
Domain: vsplab.SFBay.Sun.COM
Kernel version: SunOS 5.8 Generic 108528-18 November 2002
```

When used with the `-p` option, the `showrev` command displays installed patches. CODE EXAMPLE 1-16 shows a partial sample output from the `showrev` command with the `-p` option.

CODE EXAMPLE 1-16 `showrev -p` Command Output

```
Patch: 109729-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 109783-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 109807-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 109809-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 110905-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 110910-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 110914-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 108964-04 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsr
```

▼ To Run Solaris Platform System Information Commands

- **At a command prompt, type the command for the kind of system information you want to display.**

  For more information, see "Solaris Software System Information Commands" on page 19. See TABLE 1-6 for a summary of the commands.

TABLE 1-6 Solaris Platform Information Display Commands

Command	What It Displays	What to Type	Notes
`prtconf`	System configuration information	`/usr/sbin/prtconf`	—
`prtdiag`	Diagnostic and configuration information	`/usr/platform/sun4u/sbin/prtdiag`	Use the `-v` option for additional detail.
`prtfru`	FRU hierarchy and SEEPROM memory contents	`/usr/sbin/prtfru`	Use the `-l` option to display hierarchy. Use the `-c` option to display SEEPROM data.
`psrinfo`	Date and time each CPU came online; processor clock speed	`/usr/sbin/psrinfo`	Use the `-v` option to obtain clock speed and other data.
`showrev`	Hardware and software revision information	`/usr/bin/showrev`	Use the `-p` option to show software patches.

Recent Diagnostic Test Results

Summaries of the results from the most recent power-on self-test (POST) diagnostics tests are saved across power cycles.

▼ To View Recent POST Test Results

1. **Go to the `ok` prompt.**

2. **To see a summary of the most recent POST results, type:**

```
ok show-post-results
```

This command produces a system-dependent list of hardware components, along with an indication of which components passed and which failed POST diagnostics tests.

OpenBoot Configuration Variables

Switches and diagnostic configuration variables stored in the IDPROM determine how and when POST diagnostics and OpenBoot diagnostics tests are performed. This section explains how to access and modify OpenBoot configuration variables. For a list of important OpenBoot configuration variables, see TABLE 1-4.

Changes to OpenBoot configuration variables take effect at the next reboot.

▼ To View and Set OpenBoot Configuration Variables

- **Halt the server to display the `ok` prompt.**
  - To display the current values of all OpenBoot configuration variables, use the `printenv` command.

    The following example shows a short excerpt of this command's output.

```
ok printenv
Variable Name         Value                          Default Value

diag-level            min                             min
diag-switch?          false                           false
```

  - To set or change the value of an OpenBoot configuration variable, use the `setenv` command:

```
ok setenv diag-level max
diag-level =          max
```

- To set OpenBoot configuration variables that accept multiple keywords, separate keywords with a space.

Using the `watch-net` and `watch-net-all` Commands to Check the Network Connections

The `watch-net` diagnostics test monitors Ethernet packets on the primary network interface. The `watch-net-all` diagnostics test monitors Ethernet packets on the primary network interface and on any additional network interfaces connected to the system board. Good packets received by the system are indicated by a period (.). Errors such as the framing error and the cyclic redundancy check (CRC) error are indicated with an X and an associated error description.

- **To start the `watch-net` diagnostic test, type the `watch-net` command at the `ok` prompt (**CODE EXAMPLE 1-17**).**

CODE EXAMPLE 1-17 `watch-net` Diagnostic Output Message

```
{0} ok watch-net
Internal loopback test -- succeeded.
Link is -- up
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.............................
```

- **To start the `watch-net-all` diagnostic test, type `watch-net-all` at the `ok` prompt (**CODE EXAMPLE 1-18**).**

CODE EXAMPLE 1-18 `watch-net-all` Diagnostic Output Message

```
{0} ok watch-net-all
/pci@1f,0/pci@1,1/network@c,1
Internal loopback test -- succeeded.
Link is -- up
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
```

Automatic System Recovery

Note – Automatic System Recovery (ASR) is not the same as Automatic Server Restart, which the Netra 240 server also supports. For information about Automatic Server Restart, see Chapter 3.

Automatic System Recovery (ASR) consists of self-test features and an auto-configuring capability to detect failed hardware components and unconfigure them. By enabling ASR, the server is able to resume operating after certain nonfatal hardware faults or failures have occurred.

If a component is monitored by ASR and the server is capable of operating without it, the server automatically reboots if that component develops a fault or fails. This capability prevents a faulty hardware component from preventing the entire system from operating or causing the system to fail repeatedly.

If a fault is detected during the power-on sequence, the faulty component is disabled. If the system remains capable of functioning, the boot sequence continues.

To support this degraded boot capability, the OpenBoot firmware uses the 1275 Client Interface (by means of the device tree) to mark a device as either *failed* or *disabled*, by creating an appropriate status property in the device tree node. The Solaris OS does not activate a driver for any subsystem marked in this way.

As long as a failed component is electrically dormant (not causing random bus errors or signal noise, for example), the system reboots automatically and resumes operation while a service call is made.

Once a failed or disabled device is replaced with a new one, the OpenBoot firmware automatically modifies the status of the device upon reboot.

Note – ASR is not enabled until you activate it (see "To Enable ASR" on page 31).

Auto-Boot Options

The `auto-boot?` setting controls whether the firmware automatically boots the operating system after each reset. The default setting is `true`.

The `auto-boot-on-error?` setting controls whether the system attempts a degraded boot when a subsystem failure is detected. Both the `auto-boot?` and `auto-boot-on-error?` settings must be set to `true` to enable an automatic degraded boot.

- **To set the switches, type:**

```
ok setenv auto-boot? true
ok setenv auto-boot-on-error? true
```

Note – The default setting for `auto-boot-on-error?` is `false`. Therefore, the system does not attempt a degraded boot unless you change this setting to `true`. In addition, the system does not attempt a degraded boot in response to any fatal non-recoverable error, even if degraded booting is enabled. For examples of fatal non-recoverable errors, see "Error-Handling Summary" on page 30.

Error-Handling Summary

Error handling during the power-on sequence can be summarized in the following three ways:

- If no errors are detected by POST or OpenBoot diagnostics, the system attempts to boot if `auto-boot?` is `true`.
- If only nonfatal errors are detected by POST or OpenBoot diagnostics, the system attempts to boot if `auto-boot?` is `true` and `auto-boot-on-error?` is `true`.

Note – If POST or OpenBoot diagnostics detects a nonfatal error associated with the normal boot device, the OpenBoot firmware automatically unconfigures the failed device and tries the next-in-line boot device, as specified by the `boot-device` configuration variable.

- If a fatal error is detected by POST or OpenBoot diagnostics, the system does not boot regardless of the settings of `auto-boot?` or `auto-boot-on-error?` Fatal nonrecoverable errors include the following:
  - Failure of all CPUs
  - Failure of all logical memory banks
  - Failure of flash RAM cyclical redundancy check (CRC)
  - Failure of critical field-replaceable unit (FRU) PROM configuration data
  - Failure of critical application-specific integrated circuit (ASIC)

Reset Scenarios

Three OpenBoot configuration variables—`diag-switch?`, `obdiag-trigger`, and `post-trigger`—control how the system runs firmware diagnostics in response to system reset events.

The standard system reset protocol bypasses POST and OpenBoot diagnostics unless `diag-switch?` is set to `true`. The default setting for this variable is `false`. Because ASR relies on firmware diagnostics to detect faulty devices, `diag-switch?` must be set to `true` for ASR to run. For instructions, see "To Enable ASR" on page 31.

To control which reset events, if any, automatically initiate firmware diagnostics, use `obdiag-trigger` and `post-trigger`. For detailed explanations of these variables and their uses, see "Controlling POST Diagnostics" on page 8 and "Controlling OpenBoot Diagnostics Tests" on page 15.

▼ To Enable ASR

1. **At the system `ok` prompt, type:**

```
ok setenv diag-switch? true
ok setenv auto-boot? true
ok setenv auto-boot-on-error? true
```

2. **Set the `obdiag-trigger` variable to `power-on-reset`, `error-reset`, or `user-reset`.**

   For example, type:

```
ok setenv obdiag-trigger user-reset
```

3. **Type:**

```
ok reset-all
```

The system permanently stores the parameter changes and boots automatically if the OpenBoot variable `auto-boot?` is set to `true` (its default value).

Note – To store parameter changes, you can also power-cycle the system by using the front panel On/Standby button.

▼ To Disable ASR

1. **At the system** `ok` **prompt, type:**

```
ok setenv diag-switch? false
```

2. **Type:**

```
ok reset-all
```

The system permanently stores the parameter change.

Note – To store parameter changes, you can also power-cycle the system by using the front panel On/Standby button.

CHAPTER 2

SunVTS Software

This chapter describes SunVTS. The following topics are discussed in this chapter:

SunVTS Software Overview

The SunVTS 5.1 Patch Set 5 (PS5) software, and future compatible versions, are supported on the Netra 240 server.

The SunVTS software, the Sun Validation Test Suite, is an online diagnostics tool for verifying the configuration and functionality of hardware controllers, devices, and platforms. It runs in the Solaris OS and has the following interfaces:

- Command-line interface (CLI)
- Serial (`tty`) interface

The SunVTS software suite performs system and peripherals stress testing. You can view and control a SunVTS software session over a network. Using a remote machine, you can view the progress of a testing session, change testing options, and control all testing features of another machine on the network.

You can run SunVTS software in three test modes:

- *Connection mode* verifies the presence of device controllers. This typically takes no more than a few minutes and is a good way to run a "sanity check" on the system connections.
- *Functional mode* exercises only the specific subsystems you choose. This is the default mode.

- *Auto Config mode* automatically detects all subsystems and exercises them in one of two ways:
  - *Confidence testing* – Performs one pass of tests on all subsystems, and then stops. For typical system configurations, this requires one or two hours.
  - *Comprehensive testing* – Tests all subsystems repeatedly for up to 24 hours.

Since SunVTS software can run many tests in parallel and consume many system resources, you should take care when using it on a production system. If you are stress-testing a system using SunVTS software's Comprehensive test mode, do not run anything else on that system at the same time.

A server must be running the Solaris OS for SunVTS software to be able to test it. Since SunVTS software packages are optional, they may not be installed on your system. For instructions, see "To Determine Whether SunVTS Software Is Installed" on page 35.

SunVTS Tests

You can use the SunVTS software to view and control testing sessions on a remotely connected server. TABLE 2-1 lists some of the tests that are available.

TABLE 2-1 SunVTS Software Tests

SunVTS Software Test	Description
`cputest`	Tests the CPU.
`disktest`	Tests the local disk drives.
`dvdtest`	Tests the DVD-ROM drive.
`n240atest`	Tests the alarm card for alarm relays, LEDs, and FRU ID.
`fputest`	Tests the floating-point unit.
`nettest`	Tests the Ethernet hardware on the system board and the networking hardware on any optional PCI cards.
`netlbtest`	Performs a loopback test to check that the Ethernet adapter can send and receive packets.
`pmem`	Tests the physical memory (read only).
`sutest`	Tests the server's on-board serial ports.
`vmem`	Tests the virtual memory (a combination of the swap partition and the physical memory).

TABLE 2-1 SunVTS Software Tests *(Continued)*

SunVTS Software Test	Description
`env6test`	Tests the environmental devices.
`sptest`	Tests ALOM hardware devices.
`i2c2test`	Tests I^2C devices for correct operation.

SunVTS Software and Security

During SunVTS software installation, you must choose between basic or Sun Enterprise Authentication Mechanism™ (SEAM) security. Basic security uses a local security file in the SunVTS software installation directory to limit the users, groups, and hosts permitted to use SunVTS software. SEAM security is based on the standard network authentication protocol Kerberos and provides secure user authentication, data integrity, and privacy for transactions over networks.

If your site uses SEAM security, you must have the SEAM client and server software installed in your networked environment and configured properly in both Solaris software and SunVTS software. If your site does not use SEAM security, do not choose the SEAM option during SunVTS software installation.

If you enable the wrong security scheme during installation, or if you improperly configure the security scheme you choose, you may find yourself unable to run SunVTS software tests. For more information, see the *SunVTS User's Guide* and the instructions accompanying the SEAM software.

▼ To Determine Whether SunVTS Software Is Installed

- **Type:**

```
# pkginfo -l SUNWvts
```

- If SunVTS software is loaded, information about the package is displayed.
- If SunVTS software is not loaded, you see the following error message:

```
ERROR: information for "SUNWvts" was not found
```

Installing SunVTS Software

By default, the SunVTS software is not installed on the Netra 240 server. However, it is available on the Solaris OS supplement CD, and the latest revisions can be downloaded from the following web site:

http://www.sun.com/oem/products/vts/

Note – The SunVTS 5.1 Patch Set 5 (PS5) software, and future compatible versions, are supported on the Netra 240 server.

To find out more about using SunVTS software, refer to the SunVTS documentation that corresponds to the Solaris software release that you are running. You can also find additional information about the SunVTS software, as well as installation instructions, on the above web site.

Viewing SunVTS Software Documentation

The SunVTS Software documents are included on the software supplement CD that is part of each Solaris media kit release. These documents are also available at http://docs.sun.com.

For further information, you can also consult the following SunVTS software documents:

- *SunVTS User's Guide* explains how to install, configure, and run the SunVTS diagnostic software.
- *SunVTS Quick Reference Card* provides an overview of how to use the SunVTS interface.
- *SunVTS Test Reference Manual* provides details about each individual SunVTS test.

CHAPTER 3

Advanced Lights Out Manager

This chapter gives an overview of the Sun™ Advanced Lights Out Manager (ALOM) software. The chapter covers the following topics:

Advanced Lights Out Manager Overview

The Netra 240 server is shipped with the Sun Advanced Lights Out Manager installed. The system console is directed to ALOM by default and is configured to show server console information on start-up.

ALOM enables you to monitor and control your server over either a serial connection (using the SERIAL MGT port) or an Ethernet connection (using the NET MGT port). For information on configuring an Ethernet connection, refer to the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server* (817-3174).

Note – The ALOM serial port, labeled SERIAL MGT, is for server management only. If you need a general-purpose serial port, use the serial port labeled 10101.

You can configure ALOM to send email notification of hardware failures and other events related to the server or to ALOM.

The ALOM circuitry uses standby power from the server, with the following results:

- ALOM is active as soon as the server is connected to a power source and until the power cable is unplugged.
- ALOM firmware and software continue to be effective when the server operating system goes offline.

TABLE 3-1 lists the components that are monitored by ALOM and the information that the software provides for each component.

TABLE 3-1 Components Monitored by ALOM

Component	Information Provided
Hard drives	Presence and status
System and CPU fans	Speed and status
CPUs	Presence, temperature, and any thermal warning or failure conditions
Power supplies	Presence and status
System temperature	Ambient temperature and any thermal warning or failure conditions
Server front panel	Rotary switch position and LED status
Voltage	Status and thresholds
SCSI and USB circuit breakers	Status
Dry contact relay alarms	Status

ALOM Ports

The default management port is labeled SERIAL MGT. This port uses an RJ-45 connector and is for server management *only*; it supports only ASCII connections to an external console. Use this port the first time you operate the server.

Another serial port—labeled 10101—is available for general purpose serial data transfer. This port uses a DB-9 connector. For information about pinouts, refer to the *Netra 240 Server Installation Guide* (part number 817-2698).

In addition, the server has one 10BASE-T Ethernet management domain interface, labeled NET MGT. To use this port, ALOM configuration is required. For information, see the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server (*part number 817-3174).

Setting the `admin` Password

When you switch to the ALOM software after initial power-on, you see the `sc>` prompt. At this point, you can execute commands that require no user permissions. (Refer to the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server,* part number 817-3174, for a list of commands.) When you attempt to execute any command that requires user permissions, you are prompted to set a password for user `admin`.

- **If you are prompted to do so, set a password for the `admin` user.**

  The password must contain the following:

  - At least two alphabetic characters
  - At least one numeric or one special character
  - Between six and eight characters

  Once the password is set, the `admin` user has full permissions and can execute all ALOM CLI commands. The user is prompted to log in with the admin password when subsequently switching to ALOM.

Basic ALOM Functions

This section covers some basic ALOM functions. For comprehensive documentation, refer to the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server (*part number 817-3174) and the *Netra 240 Server Release Notes* (817-3142).

▼ To Switch to the ALOM Prompt

- **At a command prompt, type the following `#.` keystroke sequence:**

```
# #.
```

Note – When you switch to the ALOM prompt, you are logged in with the userid `admin`. See "Setting the `admin` Password" on page 39.

▼ To Switch to the Server Console Prompt

- **Type:**

```
sc> console
```

More than one ALOM user can be connected to the server console at a time, but only one user is permitted to type input characters to the console.

If another user is logged in and has write capability, you see the following message below after typing the `console` command:

```
sc> Console session already in use. [view mode]
```

▼ To Take Console Write Capability Away From Another User

- **Type:**

```
sc> console -f
```

Automatic Server Restart

Note – Automatic System Recovery (ASR) is not the same as Automatic Server Restart, which the Netra 240 server also supports.

Automatic Server Restart is a component of ALOM. It monitors the Solaris OS while it is running and, by default, syncs the file systems and restarts the server if it fails.

ALOM uses a watchdog process to monitor the kernel *only.* ALOM does not restart the server if a process hangs and the kernel is still running. The ALOM watchdog parameters for the watchdog patting interval and the watchdog timeout are not user configurable.

If the kernel hangs and the watchdog times out, ALOM reports and logs the event and performs one of three user configurable actions:

- xir—This default action causes the server to sync the file systems and restart. If the system hangs, ALOM reverts to a hard reset after 15 minutes.
- Reset—This is a hard reset and results in a rapid system recovery, but diagnostic data regarding the hang is not stored, and major damage may result.
- None—The system is left in the hung state indefinitely after the watchdog timeout has been reported.

For more information, see the `sys_autorestart` section of the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server* (part number 817-3174).

For instructions on using Automatic System Recovery (ASR), see Chapter 1.

Environmental Monitoring and Control

The Netra 240 server features an environmental monitoring subsystem designed to protect the server and its components against the following:

- Extreme temperatures
- Lack of adequate airflow through the system
- Operating with missing or misconfigured components
- Power supply failures
- Internal hardware faults

Monitoring and control capabilities are handled by the ALOM firmware, which ensures that monitoring capabilities remain operational even if the system has halted or is unable to boot. Also, monitoring the system from the ALOM firmware frees the system to dedicate CPU and memory resources to the operating system and application software.

The environmental monitoring subsystem uses an industry-standard I^2C bus. The I^2C bus is a simple two-wire serial bus used throughout the system to enable the monitoring and control of temperature sensors, fans, power supplies, status LEDs, and the front panel system control rotary switch.

The server contains three temperature sensors that monitor the ambient temperature of the server and the die temperature of the two CPUs. The monitoring subsystem polls each sensor and uses the sampled temperatures to report and respond to any overtemperature or undertemperature conditions. Additional I^2C devices detect component presence and component faults.

The hardware and software together ensure that the temperatures within the enclosure do no exceed predetermined "safe operation" ranges. If the temperature observed by a sensor falls below a low-temperature warning threshold or rises above a high-temperature warning threshold, the monitoring subsystem software lights the system Service Required LEDs on the front and back panels. If the temperature condition persists and reaches a high or low soft shut-down temperature threshold, the system initiates a graceful system shut down. If the temperature reaches a high or low hard temperature threshold, the system initiates a forced system shut down.

Error and warning messages are sent to the system console and are logged in the `/var/adm/messages` file, and Service Required LEDs remain lit after an automatic system shutdown to aid in problem diagnosis.

The types of messages that are sent to the system console and are logged in the `/var/adm/messages` file depend on how you set the `sc_clieventlevel` and `sys_eventlevel` ALOM user variables. For information about setting these variables, refer to the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server* (817-3174).

TABLE 3-2 Netra 240 Server Enclosure Temperature Thresholds

Temperature Threshold	Temperature	Server Action
Low-temperature, hard shut down	-11˚C	Server initiates a forced system shut down.
Low-temperature, soft shut down	-9˚C	Server performs a graceful system shut down.
Low-temperature warning	-7˚C	Server lights the system Service Required LED indicators on the front and back panels.

TABLE 3-2 Netra 240 Server Enclosure Temperature Thresholds *(Continued)*

Temperature Threshold	Temperature	Server Action
High-temperature warning	57°C	Server lights the system Service Required LED indicators on the front and back panels.
High-temperature, soft shut down	60°C	Server performs a graceful system shut down.
High-temperature, hard shut down	63°C	Server initiates a forced system shut down.

The monitoring subsystem is also designed to detect failures on the four-system blower. If any blower fails, the monitoring subsystem detects the failure and generates an error message to the system console, logs the message in the `/var/adm/messages` file, and lights the Service Required LEDs.

The power subsystem is monitored in a similar manner. Polling the power supply status occasionally, the monitoring subsystem indicates the status of each supply's outputs, inputs, and presence.

If a power supply problem is detected, an error message is sent to the system console and is logged in the `/var/adm/messages` file. Additionally, LEDs located on each power supply light to indicate failures. The system Service Required LED lights to indicate a system fault. The ALOM console alerts record power supply failures.

Use the `showenvironment` ALOM command to view the warning thresholds of the power subsystem and the fan speeds. For instructions on using this command, refer to the *Sun Advanced Lights Out Manager Software User's Guide for the Netra 240 Server* (part number 817-3174).

APPENDIX **A**

Alarm Relay Output Application Programming Interface

This appendix provides a sample program (CODE EXAMPLE A-1) that illustrates how to `get/set` the status of the alarms. The application can use `LOMIOCALSTATE` ioctl function to obtain the status of each alarm and the `LOMIOCALCTL` ioctl function to set the alarms individually. For more details on the Alarm Indicators, see the *Netra 240 Server Service Manual* (817-2699).

CODE EXAMPLE A-1 Example Program for `get/set` Status of the Alarms

```
#include <sys/types.h>
#include <string.h>
#include <stdlib.h>
#include <sys/unistd.h>
#include <fcntl.h>
#include "lom_io.h"

#define ALARM_INVALID   -1
#define LOM_DEVICE  "/dev/lom"

static void usage();
static void get_alarm(const char *alarm);
static int set_alarm(const char *alarm, const char *alarmval);
static int parse_alarm(const char *alarm);
static int lom_ioctl(int ioc, char *buf);
static char *get_alarmval(int state);
static void get_alarmvals();


main(int argc, char *argv[])
{

        if (argc < 3) {
                usage();
                if (argc == 1)
```

CODE EXAMPLE A-1 Example Program for `get/set` Status of the Alarms *(Continued)*

```
#include <sys/types.h>
                        get_alarmvals();
                exit(1);
        }

        if (strcmp(argv[1], "get") == 0) {
                if (argc != 3) {
                        usage();
                        exit (1);
                }
                        get_alarm(argv[2]);
        }
        else
        if (strcmp(argv[1], "set") == 0) {
                if (argc != 4) {
                        usage();
                        exit (1);
                }
                set_alarm(argv[2], argv[3]);
        } else {
                usage();
                exit (1);
        }
}

static void
usage()
{
        printf("usage: alarm [get|set] [crit|major|minor|user] [on|off]\n");
}

static void
get_alarm(const char *alarm)
{
        ts_aldata_t     ald;
        int altype = parse_alarm(alarm);
        char *val;

        if (altype  == ALARM_INVALID) {
                usage();
                exit (1);
        }

        ald.alarm_no = altype;
        ald.alarm_state = ALARM_OFF;

        lom_ioctl(LOMIOCALSTATE, (char *)&ald);
```

CODE EXAMPLE A-1 Example Program for `get/set` Status of the Alarms *(Continued)*

```
#include <sys/types.h>

        if ((ald.alarm_state != ALARM_OFF) &&
                        (ald.alarm_state != ALARM_ON)) {
                printf("Invalid value returned: %d\n", ald.alarm_state);
                exit(1);
        }

        printf("ALARM.%s = %s\n", alarm, get_alarmval(ald.alarm_state));
}

static int
set_alarm(const char *alarm, const char *alarmstate)
{
        ts_aldata_t     ald;
        int alarmval = ALARM_OFF, altype = parse_alarm(alarm);

        if (altype  == ALARM_INVALID) {
                usage();
                exit (1);
        }

        if (strcmp(alarmstate, "on") == 0)
                alarmval = ALARM_ON;
        else
        if (strcmp(alarmstate, "off") == 0)
                alarmval = ALARM_OFF;
        else {
                usage();
                exit (1);
        }

        ald.alarm_no = altype;
        ald.alarm_state = alarmval;

        if (lom_ioctl(LOMIOCALCTL, (char *)&ald) != 0) {
                printf("Setting ALARM.%s to %s failed\n", alarm, alarmstate);
                return (1);
        } else {
                printf("Setting ALARM.%s successfully set to %s\n", alarm,
alarmstate);
                return (1);
        }
}

static int
parse_alarm(const char *alarm)
```

CODE EXAMPLE A-1 Example Program for `get/set` Status of the Alarms *(Continued)*

```
#include <sys/types.h>
{
        int altype;

        if (strcmp(alarm, "crit") == 0)
                altype = ALARM_CRITICAL;
        else
        if (strcmp(alarm, "major") == 0)
                altype = ALARM_MAJOR;
        else
        if (strcmp(alarm, "minor") == 0)
                altype = ALARM_MINOR;
        else
        if (strcmp(alarm, "user") == 0)
                altype = ALARM_USER;
        else {
                printf("invalid alarm value: %s\n", alarm);
                altype = ALARM_INVALID;
        }

        return (altype);

}

static int
lom_ioctl(int ioc, char *buf)
{
        int fd, ret;

        fd = open(LOM_DEVICE, O_RDWR);

        if (fd == -1) {
                printf("Error opening device: %s\n", LOM_DEVICE);
                exit (1);
        }

        ret = ioctl(fd, ioc, (void *)buf);

        close (fd);

        return (ret);
}

static char *
get_alarmval(int state)
{
        if (state == ALARM_OFF)
```

CODE EXAMPLE A-1 Example Program for `get/set` Status of the Alarms *(Continued)*

```
#include <sys/types.h>
                return ("off");
        else
        if (state == ALARM_ON)
                return ("on");
        else
                return (NULL);
}
static void
get_alarmvals()
{
        get_alarm("crit");
        get_alarm("major");
        get_alarm("minor");
        get_alarm("user");

}
```

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