SPARC and Netra SPARC T5 Series Servers Administration Guide

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SPARC and Netra SPARC T5 Series Servers Administration Guide

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Contents

Using This Documentation

- **Overview** – Describes how to configure and administer the SPARC and Netra SPARC T5-series servers and server modules from Oracle.
- **Audience** – System administrators of SPARC and Netra SPARC T5-series servers and server modules.
- **Required knowledge** – Working knowledge of computer network concepts and terms, and advanced familiarity with the Oracle Solaris Operating System (Oracle Solaris OS).

Product Documentation Library

Documentation and resources for this product and related products are available at `http://www.oracle.com/technetwork/documentation/oracle-sparc-ent-servers-189996.html` or `http://www.oracle.com/goto/nebs-certified-systems/docs`.

Feedback

Provide feedback about this documentation at `http://www.oracle.com/goto/docfeedback`.

Understanding System Administration Resources

These topics provide a summary of common tools used to administer the server.

Related Information

Oracle ILOM Overview

Oracle ILOM is system management firmware that is preinstalled on most servers from Oracle. Oracle ILOM enables you to actively manage and monitor components installed in the server. Oracle ILOM provides a browser-based interface and a CLI, as well as SNMP and IPMI interfaces.

In the server's SP, Oracle ILOM runs independently of the server host and regardless of the server power state as long as AC power is connected to the server (or to the modular system that contains the server module). When you connect the server to AC power, the SP immediately starts up and begins monitoring the server. All environmental monitoring and control are handled by Oracle ILOM.

The `->` prompt indicates that you are interacting with the Oracle ILOM SP directly. This prompt is the first prompt you see when you log in to the server through the SER MGT port or NET MGT port, regardless of the host's power state. On a modular system, that prompt is also

present when you log in to a server module either directly or through Oracle ILOM on the CMM of the modular system.

You can also access the Oracle ILOM prompt (`->`) from the OpenBoot `ok` prompt.

The SP supports concurrent Oracle ILOM sessions per server. Multiple SSH or web connections are available through the NET MGT port, and one connection is available through the SER MGT port.

For more information about how to work with Oracle ILOM features that are common to all platforms managed by Oracle ILOM, refer to the Oracle ILOM documentation at:

http://www.oracle.com/goto/ilom/docs

Oracle ILOM operates on many platforms, supporting features that are common to all platforms. Some Oracle ILOM features belong to only a subset of platforms. For example, CMM features only apply to server modules, such as the SPARC and Netra SPARC T5-1B server modules.

To perform some procedures documented in the Oracle ILOM base documentation, you must create a serial connection to the server and activate the Physical Presence switch on the server. For information about creating a serial connection, refer to the installation guide for the server.

Related Information

- "Log In to Oracle ILOM" on page 17
- "Configuring Policy Settings" on page 57
- "OpenBoot Overview" on page 13

Oracle Solaris OS Overview

The Oracle Solaris OS includes commands and other software resources to use for server administration. For an introduction to these management tools refer to one of the following manuals in the documentation collection for your Oracle Solaris OS release:

- Oracle Solaris 11 OS – *Oracle Solaris Administration: Common Tasks*
- Oracle Solaris 10 OS – *Oracle Solaris Administration: Basic Administration*

Oracle Solaris software includes Oracle VTS software. Oracle VTS tests and validates Oracle hardware by verifying the connectivity and functionality of hardware devices, controllers, and peripherals.

In addition to the Oracle VTS information in the Oracle Solaris documentation, Oracle VTS documentation collections are available at:

http://www.oracle.com/goto/vts/docs

Related Information

- "OpenBoot Overview" on page 13

OpenBoot Overview

The OpenBoot firmware starts the OS, validates installed hardware, and can be used for other server administration tasks below the OS level. Some devices contain firmware written in the FCode language that enable additional commands that can be entered at the OpenBoot prompt (ok).

For more details about OpenBoot, refer to the *OpenBoot 4.x Command Reference Manual at:*

http://docs.oracle.com/cd/E23824_01

Related Information

- "Oracle Solaris OS Overview" on page 12

Oracle VM Server for SPARC Overview

A *logical domain* is a discrete logical grouping with its own operating systems, resources, and identity within a single computer system. Application software can run in logical domains. Each logical domain can be created, destroyed, reconfigured, and rebooted independently.

Oracle VM Server for SPARC software enables you to create and manage numerous logical domains on a server, depending on the hardware configuration of the server. You can virtualize resources and define network, storage, and other I/O devices as services that can be shared between domains.

The Oracle VM Server for SPARC configurations are stored on the SP. Using Oracle VM Server for SPARC CLI commands, you can add a configuration, list the configurations on the SP, and specify a configuration to be used. You can also specify an Oracle VM Server boot configuration with an Oracle ILOM command, as explained in "Configure the Host Boot Mode (Oracle VM Server for SPARC)" on page 49.

Oracle VM Server for SPARC is included in Oracle Solaris 11.1. If you use Oracle Enterprise Manager Ops Center, you can provision that management environment with a version of Oracle VM Server for SPARC that is compatible with your hardware.

Related Information

- Oracle VM Server for SPARC documentation at:

  http://www.oracle.com/goto/vm-sparc/docs
- "Oracle Enterprise Manager Ops Center Overview" on page 15
- "Power On a Server With Multiple Active Domains (Oracle VM Server for SPARC)" on page 26
- "Power Off a Server With Multiple Active Domains (Oracle VM Server for SPARC)" on page 27
- "Configuring Boot and Restart Behavior" on page 43

Multipathing Software Overview

Multipathing software enables you to define and control redundant physical paths to I/O devices such as storage devices and network interfaces. If the active path to a device becomes unavailable, the software can automatically switch to an alternate path to maintain availability. This capability is known as *automatic failover*. To take advantage of multipathing capabilities, you must configure the server with redundant hardware, such as redundant network interfaces or two host bus adapters connected to the same dual-ported storage array.

For the servers, three different types of multipathing software are available:

- Oracle Solaris IP Network Multipathing software provides multipathing and load-balancing capabilities for IP network interfaces. This software includes commands and other software resources for server administration. For instructions on how to configure and administer Oracle Solaris IP Network Multipathing, refer to one of the following manuals in the documentation collection for your Oracle Solaris OS release:
    - Oracle Solaris 11 OS – *Oracle Solaris Administration: Network Services and Network Virtualization*
    - Oracle Solaris 10 OS – *System Administration Guide: IP Services*
- VVM software includes a feature called DMP, which provides disk multipathing as well as disk load balancing to optimize I/O throughput. For information about VVM and its DMP feature, refer to the documentation provided with the VERITAS Volume Manager software.
- Oracle Solaris Multiplexed I/O (MPxIO) is an architecture fully integrated within the Oracle Solaris OS that enables I/O devices to be accessed through multiple host controller interfaces from a single instance of the I/O device. (Previously, this functionality was called StorageTek Traffic Manager.) For information about MPxIO, refer to *Oracle*

Solaris Administration: SAN Configuration and Multipathing Guide in Oracle Solaris OS documentation.

Related Information

- "Oracle Solaris OS Overview" on page 12
- "Oracle VM Server for SPARC Overview" on page 13

Oracle Hardware Management Pack Overview

The Oracle Hardware Management Pack provides tools to manage and configure Oracle servers from the host operating system. To use these tools, you must install the Oracle Hardware Management Pack software on the server.

Note - Oracle Hardware Management Pack software is included in Oracle Solaris, beginning with Oracle Solaris 11.2. If you are using that version or later of Oracle Solaris, update the Oracle Hardware Management Pack by updating Oracle Solaris.

You can download the Oracle Hardware Management Pack software at:

https://support.oracle.com

You can read and download documentation for the version of Oracle Hardware Management Pack you are using at:

http://www.oracle.com/goto/ohmp/docs

Related Information

- "Hot-Spare Drives in RAID Volumes (LSI)" on page 87

Oracle Enterprise Manager Ops Center Overview

Oracle Enterprise Manager Ops Center is a comprehensive system management solution for managing physical and virtual systems and devices. Through a single user interface, use the Oracle Enterprise Manager Ops Center software to monitor, patch, provision, virtualize, and support assets, such as operating systems, virtualization technologies, Oracle Servers, storage, and networks.

Oracle Enterprise Manager Ops Center can discover a server, its SP, the operating system, and logical domains already created by Oracle VM Server for SPARC. You can use the Oracle Enterprise Manager Ops Center to perform managing tasks on discovered assets, including creating logical domains and setting up RAIDs.

For more information about the software, refer to its product page and documentation library:

- Oracle Enterprise Manager Ops Center at:

  http://www.oracle.com/technetwork/oem/ops-center/index.html
- Oracle Enterprise Manager Ops Center Documentation at:

  http://www.oracle.com/technetwork/documentation/index.html#em

For instructions on deploying and managing the server using this software, refer to the *Discovering and Managing an Oracle SPARC T5 Server* How To guide. Find this guide, as well as guides on deploying Oracle VM Server for SPARC logical domains and Oracle Solaris Zones, by selecting the Deploy How Tos tab on the documentation library page. For example, this is the Deploy How Tos page for Oracle Enterprise Manager Ops Center 12c Release 2:

http://www.oracle.com/pls/topic/lookup?ctx=oc122&id=deployhowto

Related Information

- "Hardware RAID Support" on page 81

Accessing the Server

These topics include information on establishing low-level communication with the server using Oracle ILOM and the system console.

Related Information

▼ Log In to Oracle ILOM

This procedure assumes the SP is in the default configuration as described in the server's installation guide.

Note - For a server module, you can either log in directly to the server module's SP or you can start Oracle ILOM through the modular system's CMM. Refer to the server module's installation guide for instructions on both approaches.

● **Open an SSH session and connect to the SP by specifying its IP address.**

The Oracle ILOM default username is `root`, and the default password is `changeme`.

```
% ssh root@xxx.xxx.xxx.xxx
Password: password (nothing displayed as you type)
...
```

```
Oracle(R) Integrated Lights Out Manager
Version 3.2.1.0 r78841
Copyright (c) 2013, Oracle and/or its affiliates. All rights reserved.
->
```

You are now logged in to Oracle ILOM. Perform tasks as needed by entering commands at the Oracle ILOM prompt.

Note - The server is provided with a default Administrator account (`root`) and a default password (`changeme`) to enable first-time login and access to Oracle ILOM. To build a secure environment, you must change the default password of the default Administrator account as soon as possible after your initial login to Oracle ILOM. If you find this default Administrator account has already been changed, contact your system administrator to obtain an Oracle ILOM user account with Administrator privileges.

Related Information

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-

▼ Log In to the System Console

- **At the Oracle ILOM prompt, type:**

```
-> start /HOST/console [-option]
Are you sure you want to start /HOST/console (y/n) ? y
Serial console started. To stop, type #.
.
.
.
```

where *option* can be:

- `-f|force` – Enables a user with a console (`c`) role to take the console from any current user and force that user into view mode.
- `-script` – Bypasses the prompt for a yes or no confirmation.

When you reach the system console, you will see the OpenBoot prompt (`ok`) unless Oracle Solaris is running.

Related Information

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-
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▼ Obtain the OpenBoot Prompt Under Various Conditions

This procedure assumes the default system console configuration. The method you use depends on the state of the OS at the time you attempt to obtain the OpenBoot prompt.

⚠️ **Caution -** When possible, reach the OpenBoot prompt by performing a graceful shutdown of the OS. Any other method used might result in the loss of server state data.

1. **Set the Oracle ILOM `bootmode` property.**

   ```
   -> set /HOST/bootmode script="setenv auto-boot? false"
   ```

   This setting ensures that you will reach the OpenBoot prompt rather than having the OS boot automatically.

2. **Choose the appropriate method to shutdown the OS and reach the OpenBoot prompt.**

   Refer to the linked procedures after you select a method.

Server State	Method	Links
OS running and responsive	**Shut down the server beginning at the host prompt:**	"Shut Down the OS (`init` Command)" on page 36
	From a shell or command tool window, type an appropriate command (for example, the `shutdown` or `init 0` command), Additional ways of using these commands described in the Oracle Solaris system administration documentation.	"Shut Down the OS (`shutdown` Command)" on page 37 "Obtain the OpenBoot Prompt (Oracle Solaris)" on page 39
	Then take one of the following steps:	
	■ At the Oracle ILOM prompt, type: 　-> **stop /System** ■ Use the server Power button.	
OS unresponsive	**Reset the host.**	"Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39
	(Provided the operating system software is not running and the server is already under OpenBoot firmware control.)	"Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40
	At the Oracle ILOM prompt, type: -> **set /HOST send_break_action=break** Then type: -> **start /HOST/console**	

Server State	Method	Links
OS unresponsive and need to prevent auto-boot	**Shut down the server from Oracle ILOM.** At the Oracle ILOM prompt, type: -> `set /HOST/bootmode script="setenv auto-boot? false"` Press Enter. Then type: -> `reset /System` -> `start /HOST/console`	"Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39 "Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40

Related Information

- "Monitoring the Server" on page 93

▼ Display the Oracle ILOM Prompt

- **Display the Oracle ILOM prompt in one of these ways:**

  - **From the system console, type the Oracle ILOM escape sequence (#.).**

  - **Log in to Oracle ILOM directly from a device connected to the SER MGT port or NET MGT port.**

  - **Log in to Oracle ILOM through an SSH connection. See "Log In to Oracle ILOM" on page 17.**

Related Information

- "Oracle ILOM Overview" on page 11
- "Log In to Oracle ILOM" on page 17
- "Obtain the OpenBoot Prompt Under Various Conditions" on page 19

▼ Redirect the System Console to a Local Graphics Monitor

You can redirect the system console to a local graphic monitor. You *cannot* use a local graphics monitor to perform the initial server installation, nor can you use a local graphics monitor to view POST messages.

1. **Connect the monitor video cable to a video port on the server.**

   Tighten the thumbscrews to secure the connection. Refer to the server's installation guide for any special connection instructions that might apply to the server.

2. **Connect the monitor power cord to an AC outlet.**

3. **Connect the USB keyboard cable to one USB port.**

4. **Connect the USB mouse cable to another USB port on the server.**

5. **Display the OpenBoot prompt.**

   See "Obtain the OpenBoot Prompt Under Various Conditions" on page 19.

6. **At the OpenBoot prompt, set the following OpenBoot configuration variables:**

   ```
   ok setenv input-device keyboard
   ok setenv output-device screen
   ```

7. **Apply the configuration changes.**

   ```
   ok reset-all
   ```

   The server stores the parameter changes and boots automatically.

   Note - Instead of using the `reset-all` command to store the parameter changes, you can also power cycle the server using the Power button.

   You can now type system commands and view system messages using your local graphics monitor. To activate the GUI interface, continue to the next step.

8. **Activate the Oracle Solaris GUI interface.**

   Once Oracle Solaris is installed and booted, type the following commands to display the GUI login screen:

   ```
   # ln -s /dev/fbs/mga0 /dev/fb
   # fbconfig -xserver Xorg
   # reboot
   ```

   ### Related Information

   - "Obtain the OpenBoot Prompt Under Various Conditions" on page 19.
   - "OpenBoot Configuration Parameters" on page 47
   - "Oracle ILOM Remote Console" on page 22

Oracle ILOM Remote Console

Oracle ILOM Remote Console is a Java application that enables you to remotely redirect and control the following devices on the host server. This group of devices is commonly abbreviated as KVMS.

- Keyboard
- Video console display
- Mouse
- Serial console display
- Storage devices or images (CD/DVD)

Oracle ILOM Remote Console is documented in the *Configuration and Maintenance Guide* for the Oracle ILOM release.

Related Information

- "Oracle ILOM In-band (Sideband) Management" on page 65

Controlling the Server

These topics include procedures for controlling basic server operations.

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Related Information

-

Powering the Server On and Off

There are several ways to power the server on and off. Use the tasks that best suit your situation.

Description	Links
Power the server on or off using the Oracle ILOM CLI.	"Power On the Server (Oracle ILOM CLI)" on page 24
	"Power Off the Server (Oracle ILOM CLI)" on page 24
Power the server on or off using the Oracle ILOM web interface.	"Power On the Server (Oracle ILOM Web Interface)" on page 25
	"Power Off the Server (Oracle ILOM Web Interface)" on page 26
Power the server on or off when the server is running Oracle VM for SPARC.	"Power On a Server With Multiple Active Domains (Oracle VM Server for SPARC)" on page 26
	"Power Off a Server With Multiple Active Domains (Oracle VM Server for SPARC)" on page 27

Related Information

-

▼ Power On the Server (Oracle ILOM CLI)

Note - By default, the host automatically attempts to boot when the host is reset or powered on. To learn about the parameters that control this action, see "Configuring Boot Parameters" on page 43.

1. **Log in to Oracle ILOM.**
   See "Log In to Oracle ILOM" on page 17.

   Note - If you have a modular system, ensure that you are logged in to the desired server module.

2. **At the Oracle ILOM prompt, type:**

   ```
   -> start /System
   Are you sure you want to start /System (y/n) ? y
   Starting /System
   ```

   Note - To skip being prompted for confirmation, use the `start -script /System` command.

3. **Switch to the host console to view host output.**

   ```
   -> start /HOST/console
   Are you sure you want to start /HOST/console (y/n)? y
   ```

   ### Related Information

   - "Power On the Server (Oracle ILOM CLI)" on page 24
   - "Reset the Server (Oracle Solaris)" on page 29
   - "Reset the Server (Oracle ILOM)" on page 30

▼ Power Off the Server (Oracle ILOM CLI)

1. **Log in to Oracle Solaris as a user with root privileges.**

2. **Shut down Oracle Solaris.**
   See one of these procedures:

   - "Shut Down the OS (`init` Command)" on page 36
   - "Shut Down the OS (`shutdown` Command)" on page 37

3. **Switch from the system console prompt to the SP console prompt.**

```
{0} ok #.
->
```

4. **From the Oracle ILOM prompt, type:**

```
-> stop /System
Are you sure you want to stop /System (y/n)? y
Stopping /System

->
```

Note - To perform an immediate shutdown, use the `stop -script /System` command. Ensure that all data is saved before typing this command.

Related Information

- "Power On the Server (Oracle ILOM Web Interface)" on page 25
- "Reset the Server (Oracle Solaris)" on page 29
- "Reset the Server (Oracle ILOM)" on page 30

▼ Power On the Server (Oracle ILOM Web Interface)

Note - By default, the host automatically attempts to boot when the host is reset or powered on. To learn about the parameters that control this action, see "Configuring Boot Parameters" on page 43.

1. **Log in to the Oracle ILOM web interface.**
   See "Log In to Oracle ILOM" on page 17.

   Note - If you have a modular system, ensure that you are logged in to the desired server module.

2. **On the Summary page, in the Actions panel, click the Power State Turn On button.**

3. **When prompted, click OK to confirm the action.**

Related Information

- "Power On the Server (Oracle ILOM CLI)" on page 24

-
-

▼ Power Off the Server (Oracle ILOM Web Interface)

1. **Log in to Oracle Solaris as a user with root privileges.**

2. **Shut down Oracle Solaris.**

    See one of these procedures:

    - "Shut Down the OS (`init` Command)" on page 36
    - "Shut Down the OS (`shutdown` Command)" on page 37

3. **Log in to the Oracle ILOM web interface.**

4. **On the Summary page, in the Actions panel, click the Power State Turn Off button.**

5. **When prompted, click OK to confirm the action.**

    Related Information

    - "Power On the Server (Oracle ILOM CLI)" on page 24
    - "Reset the Server (Oracle Solaris)" on page 29
    - "Reset the Server (Oracle ILOM)" on page 30

▼ Power On a Server With Multiple Active Domains (Oracle VM Server for SPARC)

If the server is configured with multiple Oracle VM Server for SPARC domains, use this procedure to power on the server and restart the domains.

1. **Log in to Oracle ILOM.**

    See "Log In to Oracle ILOM" on page 17.

    Note - If you have a modular system, ensure that you are logged in to the desired server module.

2. **Power on the host.**

```
-> start /System
Are you sure you want to start /System (y/n) ? y
Starting /System
-> start /HOST/console
Are you sure you want to start /HOST/console (y/n)? y
```

3. Log in to Oracle Solaris as a user with root privileges.

4. Start all of the nonprimary domains.

Starting a domain automatically binds the domain.

```
# ldm start-domain domain-name
< . . . >
```

5. Boot all of the nonprimary domains.

The method you use to access a domain depends on how you have configured the consoles for your domains.

Boot each domain the same way you boot a server. See "Boot the OS (Oracle ILOM)" on page 35.

Related Information

- "Power Off a Server With Multiple Active Domains (Oracle VM Server for SPARC)" on page 27

▼ Power Off a Server With Multiple Active Domains (Oracle VM Server for SPARC)

If the server is configured with multiple Oracle VM for SPARC domains, use this procedure to shut down the domains and power off the server.

1. If needed, ensure that the domain configurations are saved to the SP.

```
# ldm add-config config-name
```

2. Access and shut down the OS in all of the nonprimary domains.

The method you use to access a domain depends on how you have configured the consoles for your domains.

To shut down the OS, see "Shut Down the OS (init Command)" on page 36 or "Shut Down the OS (shutdown Command)" on page 37.

a. From the primary domain, list the domains and their states.

```
# ldm ls
```

Note which domains are non-I/O domains or active I/O domains.

b. Stop and unbind all the non-I/O domains.

```
# ldm stop-domain domain-name
< . . . >
# ldm unbind domain-name
```

c. Stop and unbind any active I/O domains.

```
# ldm stop-domain domain-name
< . . . >
# ldm unbind domain-name
```

d. Verify that the nonprimary domains are inactive.

```
# ldm ls
```

3. Shut down the primary domain.

To shut down the OS, see "Shut Down the OS (init Command)" on page 36 or "Shut Down the OS (shutdown Command)" on page 37.

4. Switch from the system console prompt to the Oracle ILOM prompt.

```
{0} ok #.
->
```

5. From the Oracle ILOM prompt, type:

```
-> stop /System
Are you sure you want to stop /System (y/n)? y
Stopping /System

->
```

Note - To perform an immediate shutdown, use the stop -force /System command. Ensure that all data is saved before typing this command.

Related Information

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Resetting the Server and SP

Use these topics to reset the server or SP.

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-
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Related Information

-

▼ Reset the Server (Oracle Solaris)

It is not necessary to power the server off and on to perform a reset.

> **Note -** By default, the host automatically attempts to boot when the host is reset or powered on. To learn about the parameters that control this action, see .

1. **Log in to Oracle Solaris as a user with root privileges.**

2. **To reset the server from the Oracle Solaris prompt, type one of the following commands:**

   - `# shutdown -g0 -i6 -y`

   - `# reboot`

Related Information

-
-
-

▼ Reset the Server (Oracle ILOM)

The Oracle ILOM `reset` command generates a graceful or forced hardware reset of the server. By default, the `reset` command gracefully resets the server.

Note - By default, the host automatically attempts to boot when the host is reset or powered on. To learn about the parameters that control this action, see "Configuring Boot Parameters" on page 43.

1. **Log in to Oracle ILOM.**
   See "Log In to Oracle ILOM" on page 17.

   Note - If you have a modular system, ensure that you are logged in to the desired server module.

2. **Reset the server.**

   ■ **Perform a graceful reset.**

      `-> reset /System`

   ■ **If a graceful reset is not possible, perform a forced hardware reset.**

      `-> reset -force /System`

   Related Information

   ■ "Power On the Server (Oracle ILOM CLI)" on page 24
   ■ "Power On the Server (Oracle ILOM Web Interface)" on page 25
   ■ "Reset the Server (Oracle Solaris)" on page 29
   ■ "Override OpenBoot Settings to Reset the Server" on page 52

▼ Reset the SP

After the reset, your login session to the SP is terminated.

1. **Log in to Oracle ILOM.**
   See "Log In to Oracle ILOM" on page 17.

   Note - If you have a modular system, ensure that you are logged in to the desired server module.

2.   Reset the SP.

`-> ` **`reset /SP`**

Related Information

- "Log In to Oracle ILOM" on page 17

Booting and Shutting Down the OS

These topics include instructions for booting and shutting down the OS. Instructions for obtaining the OpenBoot prompt are inclucded, because some of these procedures are performed at that prompt.

Related Information

Booting and Shutting Down Oracle Solaris

There are several ways to boot and shut down the OS.

Description	Links
Learn about the boot sequence.	"Boot Sequence" on page 34
Boot a server that is configured to boot at power-on (the default configuration) using Oracle ILOM.	"Boot the OS (Oracle ILOM)" on page 35
Boot a server that is at the OpenBoot prompt.	"Boot the OS Manually (OpenBoot)" on page 35
Shut down the OS using an Oracle Solaris command.	"Shut Down the OS (`init` Command)" on page 36
	"Shut Down the OS (`shutdown` Command)" on page 37

Related Information

Boot Sequence

In addition to controlling the power state of the host, you can also control how and when the OS is booted.

When the host is powered on, it can be in one of these states:

- **Booted –** The OS is running in one of these levels:
    - **3 –** The OS is running in multiuser mode with all resources enabled.
    - **S –** The OS is running in singer-user mode, and some resources are not enabled.
- **At the OpenBoot prompt –** The OS is not running. You communicate with the OpenBoot firmware on the host. See "OpenBoot Prompt" on page 38.

By default, the host automatically attempts to boot when the host is reset or powered on. The host first seeks a local boot drive. If the host cannot boot from the drive, the host attempts to boot from the network. See "Boot the OS (Oracle ILOM)" on page 35.

These steps describe the high-level boot sequence:

1. A host reset is initiated.
2. OpenBoot runs and OpenBoot parameters are read.

    These are the primary OpenBoot parameters and default values that determine how the server boots (see "View All OpenBoot Parameters" on page 46):

    - `diag-switch? false`
    - `auto-boot? true`
    - `boot-device disk???net`
3. A boot block is read from the boot device to locate a boot program.
4. The boot program loads the kernel into memory.
5. The kernel is executed and takes control.

You can configure booting parameters from the OS or at the `ok` prompt. You can also affect the boot behavior through Oracle ILOM.

These resources provide more information about the boot process and how to configure booting in Oracle Solaris:

- Oracle Solaris 11 – *Booting and Shutting Down Oracle Solaris on SPARC Platforms*
- Oracle Solaris 10 – *System Administration Guide: Basic Administration*

Related Information

- "Boot the OS (Oracle ILOM)" on page 35
- "Boot the OS Manually (OpenBoot)" on page 35

▼ Boot the OS (Oracle ILOM)

By default, the host automatically attempts to boot when the host is reset or powered on.

1. **Log in to Oracle ILOM.**

   See "Log In to Oracle ILOM" on page 17.

   Note - If you have a modular system, ensure that you are logged in to the desired server module.

2. **If the OpenBoot parameters are configured with default values, boot the host using one of these methods:**

   - **Oracle ILOM web interface –** In Host Management > Power Control, select any of the reset, power on, or power cycle actions, and click Save.
   - **Oracle ILOM CLI –** Type:

     ```
     -> reset /System
     ```

   Note - If the OpenBoot parameters are not configured with default values, when you reset the host, the host might stop at the OpenBoot prompt. To boot from the OpenBoot prompt, see "Boot the OS Manually (OpenBoot)" on page 35.

   ### Related Information

   - "Boot the OS Manually (OpenBoot)" on page 35
   - "Boot Sequence" on page 34

▼ Boot the OS Manually (OpenBoot)

Use this procedure when you are at the OpenBoot prompt, and you want to boot the OS.

1. **Obtain the OpenBoot prompt.**

   See "Obtaining the OpenBoot Prompt" on page 37.

2. **Boot the host using one of these methods:**

   - **Boot from the devices specified in the OpenBoot `boot-device` parameter:**

     ```
     ok boot
     ```

- **Specify a device to boot from:**

  ok **boot** *boot_device*

  where *boot_device* is a valid device from which to boot. For a list of valid devices, see .

Related Information

-
-

▼ Shut Down the OS (`init` Command)

The `init` command is an executable shell script that terminates all active processes on a system and then synchronizes the disks before changing run levels. Specifying run level `0` shuts down the OS and displays the OpenBoot prompt.

1. **Log in to Oracle Solaris as a user with root privileges.**

2. **Shut down the OS.**

Note - This document applies to several server and server module products. The following example is based on the SPARC T5-1B server module. Your output might vary from the examples based on your product.

```
# init 0
# svc.startd: The system is coming down.  Please wait.
svc.startd: 126 system services are now being stopped.
Sep 21 13:31:31 systemA.xxxxx.com syslogd: going down on signal 15
svc.startd: Killing user processes.
Sep 21 13:31:37 The system is down.  Shutdown took 23 seconds.
syncing file systems... done
Program terminated
SUN BLADE 6000 MODULAR SYSTEM / SPARC T5-1B, No Keyboard
Copyright (c) 1998, 2012, Oracle and/or its affiliates. All rights reserved.
OpenBoot 4.35. 63 GB memory available, Serial #xxxxxxxx.
Ethernet address 0:xx:xx:xx:xx:xx, Host ID: xxxxxxxx.
{0} ok
```

Related Information

-

▼ Shut Down the OS (`shutdown` Command)

The `shutdown` command sends a warning message, then terminates active processes on a system to reach a specified run level. Specifying run level `0` shuts down the OS and displays the OpenBoot prompt.

1. **Log in to Oracle Solaris as a user with root privileges.**

2. **Shut down the OS.**

   In this example, these command options shut down the OS to the OpenBoot prompt:

   - `-g0` – Specifies a grace period of 0 seconds.
   - `-i0` – Specifies the run level 0, which is equivalent to the `init 0` command.
   - `-y` – Pre-answers the confirmation question so that the command runs without user intervention.

   Note - This document applies to several server and server module products. The following example is based on the SPARC T5-2 server. Your output might vary from the examples based on your product.

   ```
   # shutdown -g0 -i0 -y
   # svc.startd: The system is coming down. Please wait.
   svc.startd: 106 system services are now being stopped.
   Sep 12 17:52:11 systemA syslogd: going down on signal 15
   svc.startd: The system is down.
   syncing file systems...done
   Program terminated

   SPARC T5-2, No Keyboard
   Copyright (c) 1998, 2011, Oracle and/or its affiliates. All rights
   reserved.
   OpenBoot 4.33.1, 32256 MB memory available, Serial #xxxxxxxx.
   Ethernet address 0:xx:xx:xx:xx:xx, Host ID: xxxxxxxx.
   {0} ok
   ```

   ### Related Information

   -

Obtaining the OpenBoot Prompt

There are several ways to reach the OpenBoot prompt (`ok`).

- "OpenBoot Prompt" on page 38
- "Obtain the OpenBoot Prompt (Oracle Solaris)" on page 39
- "Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39
- "Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40

Related Information

- "Log In to Oracle ILOM" on page 17
- "Booting and Shutting Down Oracle Solaris" on page 33

OpenBoot Prompt

When the host is powered on but the OS is not booted, you communicate with the OpenBoot firmware. OpenBoot firmware displays `ok` as its prompt.

This table lists the common tasks that are performed at the `ok` prompt:

Task	For More Information
Boot the host.	"Boot the OS Manually (OpenBoot)" on page 35
Configure OpenBoot parameters.	"View All OpenBoot Parameters" on page 46
	"Change the Default Boot Device (OpenBoot)" on page 44
Run diagnostics.	Refer to detecting and managing faults in the service manual for the server.
Reset and power off the host.	At the OpenBoot prompt, type **help reset** to display details about the `reset` command.
Eject media.	At the OpenBoot prompt, type **help eject** to display details about the `eject` command.

For more details about OpenBoot, refer to the *OpenBoot 4.x Command Reference Manual* at:

http://docs.oracle.com/cd/E23824_01

Locate the document under Important Information From Previous Releases.

Related Information

- "Obtain the OpenBoot Prompt (Oracle Solaris)" on page 39
- "Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39

- "Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40

▼ Obtain the OpenBoot Prompt (Oracle Solaris)

Use this procedure when you want to shut down the OS and reach the ok prompt.

1. **Log in to Oracle Solaris as a user with root privileges.**

2. **Shut down the OS.**

   ```
   # shutdown -g0 -i0 -y

   Shutdown started.    Wed Sep 19 15:17:45 PDT 2012

   Changing to init state 0 - please wait
   Broadcast Message from root (console) on systemA.com Wed Sep 19 15:17:45...
   THE SYSTEM systemA.com IS BEING SHUT DOWN NOW ! ! !
   Log off now or risk your files being damaged

   root@systemA:~# svc.startd: The system is coming down.  Please wait.
   svc.startd: 126 system services are now being stopped.
   Sep 19 15:18:01 systemA.com syslogd: going down on signal 15
   svc.startd: Killing user processes.
   Sep 19 15:18:07 The system is down.  Shutdown took 22 seconds.
   syncing file systems... done
   Program terminated
   < . . . >
   {0} ok
   ```

   The OS is shut down and the OpenBoot prompt (ok) is displayed.

   ### Related Information

   - "OpenBoot Overview" on page 13
   - "Configuring Boot and Restart Behavior" on page 43
   - "Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39
   - "Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40

▼ Obtain the OpenBoot Prompt (Oracle ILOM CLI)

Use this procedure when the host is powered down and you are logged into Oracle ILOM.

1. **Log in to Oracle ILOM.**

See "Log In to Oracle ILOM" on page 17.

Note - If you have a modular system, ensure that you are logged in to the desired server module.

---

2. **Change the `auto-boot?` parameter to `false`.**

   `-> set /HOST/bootmode script="setenv auto-boot? false"`

   This command temporarily prevents the OS from booting before you obtain the OpenBoot prompt. This change applies only to a single reset and expires in 10 minutes if the power on the host is not reset.

3. **Reset the host.**

   `-> reset /System`

4. **Switch communication to the host.**

   ```
   -> start /HOST/console
   Are you sure you want to start /HOST/console (y/n)? y
   Serial console started. To stop, type #.
   ```

   The server might take several minutes to complete POST and then displays the OpenBoot prompt.

   ### Related Information

   - "OpenBoot Overview" on page 13
   - "Configuring Boot and Restart Behavior" on page 43
   - "Obtain the OpenBoot Prompt (Oracle Solaris)" on page 39
   - "Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40

▼ Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)

Use this procedure when the host is powered down, and you want to get to the ok prompt when the host is powered on.

1. **Log in to Oracle ILOM.**
   See "Log In to Oracle ILOM" on page 17.

Note - If you have a modular system, ensure that you are managing the desired server module.

2. **In the Oracle ILOM web interface, in the left navigation pane, select Host Management > Host Boot Mode.**

   The Host Boot Mode page is displayed.

3. **Apply these changes to the Host Boot Mode Settings:**

   a. **For State, select: Reset NVRAM**

      This setting applies a one-time NVRAM (OpenBoot) change based on the script setting, then resets the NVRAM to default settings on the next host reset.

   b. **For Script, type: `setenv auto-boot? false`**

      This setting configures the host to stop at the OpenBoot prompt instead of automatically booting the preinstalled OS.

   c. **Click Save.**

   Note - You have 10 minutes to perform the next step. After 10 minutes, the state automatically returns to normal.

4. **In the left navigation panel, click Host Management > Power Control.**

5. **Select Reset from the pull-down menu, and click Save.**

6. **In the left navigation panel, click Remote Control > Redirection.**

7. **Select Use Serial Redirection, and click Launch Remote Console.**

   As the host resets, messages are displayed in the serial console. The OpenBoot prompt is displayed when the reset activity completes.

   Related Information

   - "OpenBoot Overview" on page 13
   - "Configuring Boot and Restart Behavior" on page 43
   - "Obtain the OpenBoot Prompt (Oracle Solaris)" on page 39
   - "Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39

Configuring Boot and Restart Behavior

Use OpenBoot and Oracle Solaris commands to reconfigure the server's boot and restart behavior permanently or temporarily. Oracle ILOM boot mode properties can help specify how the host boots, enabling you to correct a problem with the current settings in OpenBoot or Oracle VM Server for SPARC.

- "Configuring Boot Parameters" on page 43
- "Boot Mode Overview (Oracle ILOM)" on page 49
- "Configure the Host Boot Mode (Oracle VM Server for SPARC)" on page 49
- "Change the Host Boot Mode Behavior at Reset (Oracle ILOM)" on page 50
- "Manage the Host Boot Mode Script (Oracle ILOM)" on page 51
- "Display the Host Boot Mode Expiration Date (Oracle ILOM)" on page 52
- "Override OpenBoot Settings to Reset the Server" on page 52
- "Server Restart Behavior Configuration (Oracle ILOM)" on page 52

Related Information

- "Booting and Shutting Down the OS" on page 33

Configuring Boot Parameters

These topics describe how to change the default boot configuration.

For more comprehensive information about customizing how the server boots, refer to the Oracle Solaris documentation for your release.

- "Change the Default Boot Device (OpenBoot)" on page 44
- "Enable or Disable Automatic Booting (OpenBoot)" on page 45
- "Enable or Disable Automatic Booting (Oracle Solaris)" on page 46
- "View All OpenBoot Parameters" on page 46
- "OpenBoot Configuration Parameters" on page 47

- ■ "printenv Output" on page 48

Related Information

- ■ "Booting and Shutting Down the OS" on page 33

▼ Change the Default Boot Device (OpenBoot)

Use this procedure to configure OpenBoot to boot from a specific device. This change is permanent but only takes effect after a reset.

1. **Obtain the `ok` prompt.**

   See one of these tasks:

   - ■ "Obtain the OpenBoot Prompt (Oracle Solaris)" on page 39
   - ■ "Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40
   - ■ "Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39

2. **Determine the name of the desired boot device.**

   To see names of devices, type:

   ```
   ok devalias
   ```

3. **Configure the `boot-device` parameter with your desired boot device.**

   ```
   ok setenv boot-device boot_device
   ```

   where *boot_device* is a valid device from which to boot.

4. **Verify the change.**

   ```
   ok printenv boot-device
   ```

5. **Reset the host.**

   ```
   ok reset-all
   ```

   Related Information

   - ■ "printenv Output" on page 48

▼ Enable or Disable Automatic Booting (OpenBoot)

Use this procedure to configure OpenBoot so that a host reset or power on either attempts to boot automatically, or not. This change is permanent but only takes effect after a host reset.

1. Obtain the `ok` prompt.

See one of these tasks:

- "Obtain the OpenBoot Prompt (Oracle Solaris)" on page 39
- "Obtain the OpenBoot Prompt (Oracle ILOM Web Interface)" on page 40
- "Obtain the OpenBoot Prompt (Oracle ILOM CLI)" on page 39

2. Set the OpenBoot `auto-boot?` parameter.

- `true` – (Default) The host automatically attempts to boot from the devices specified in `boot-device`.
- `false` – The host does not automatically boot. You can boot manually.

For example:

```
ok setenv auto-boot? false
```

3. Verify the change.

```
ok printenv auto-boot?
auto-boot? =            false
```

4. Reset the host.

```
ok reset-all
```

The host resets. After initialization, the host attempts to boot or not based on your configuration.

Related Information

- "`printenv` Output" on page 48
- "Enable or Disable Automatic Booting (Oracle Solaris)" on page 46

▼ Enable or Disable Automatic Booting (Oracle Solaris)

While running Oracle Solaris, use this procedure to configure OpenBoot so that a host reset or power on either attempts to boot automatically, or not. This change is permanent but only takes effect after a host reset.

1. **Log in to Oracle Solaris as a user with root privileges.**

2. **Set the OpenBoot `auto-boot?` parameter.**

   - `true` – (Default) The host automatically attempts to boot from the devices specified in boot-device.
   - `false` – The host does not automatically boot. You can boot manually.

   For example:

   ```
   # eeprom auto-boot?=false
   ```

3. **Verify the change.**

   ```
   # eeprom auto-boot?
   auto-boot?=false
   ```

4. **Reset the host.**

   ```
   # init 6
   ```

   The host resets. After initialization, the host attempts to boot or not based on your configuration.

   ### Related Information

   - "Enable or Disable Automatic Booting (OpenBoot)" on page 45

▼ View All OpenBoot Parameters

1. **View all of the OpenBoot parameters using one of these methods:**

   - From the OpenBoot prompt, type: `printenv`
   - From Oracle Solaris, type: `eeprom`

2. **View the value for an individual OpenBoot parameter using one of these methods:**

   ■ From the OpenBoot prompt, type: `printenv` *parameter*

   where *parameter* is a valid OpenBoot parameter.

   ■ From Oracle Solaris, type: `eeprom` *parameter*

   where *parameter* is a valid OpenBoot parameter.

   ### Related Information

   ■
   ■

OpenBoot Configuration Parameters

Parameter	Default Value	Description
auto-boot-on-error?	false	Controls whether or not the host attempts to boot after POST detects a nonrecoverable error. ■ `false` – Host does not attempt to boot and stops at the `ok` prompt. ■ `true` – Host automatically attempts to boot.
auto-boot?	true	Controls whether or not the host automatically boots after a system reset or when the power is turned on. ■ `true` – Host automatically attempts to boot from the devices specified in `boot-device`. ■ `false` – Host does not attempt to boot and stops at the `ok` prompt.
boot-command	boot	Specifies the command to be executed when `auto-boot?` is `true`. Valid boot commands: ■ `boot` – Boots kernel from devices specified in `boot-device`. ■ `boot net` – Boots kernel from the network. ■ `boot cdrom` – Boots kernel from the CDROM. ■ `boot disk1:h` – Boots from disk 1 partition h. ■ `boot tape` – Boots default file from tape. ■ `boot` *device-path* – Boots from the device specified as *device-path*. See "Locate Device Paths (OpenBoot)" on page 71.
boot-device	disk net	Contains the name of the default boot device that is used when OpenBoot is not in diagnostic mode.
boot-file		An optional parameter that provides boot arguments that are used when OpenBoot is not in diagnostic mode.
diag-switch?	false	If the value is `true`, runs in the Diagnostic mode.
network-boot-arguments		An optional parameter that enables you to set configuration parameters to be used by OpenBoot when you perform a WAN boot. Setting this parameter

Parameter	Default Value	Description
		takes precedence over any default boot parameter values. Refer to the eeprom(1M) man page for details.

Related Information

-

printenv Output

This output is a sample from the OpenBoot command printenv. The output for each server might be different.

```
{0} ok printenv
Variable Name          Value                    Default Value

ttya-rts-dtr-off       false                    false
ttya-ignore-cd         true                     true
keyboard-layout
reboot-command
security-mode          none                     No default
security-password                               No default
security-#badlogins    0                        No default
verbosity              min                      min
diag-switch?           false                    false
local-mac-address?     true                     true
fcode-debug?           false                    false
scsi-initiator-id      7                        7
oem-logo                                        No default
oem-logo?              false                    false
oem-banner                                      No default
oem-banner?            false                    false
ansi-terminal?         true                     true
screen-#columns        80                       80
screen-#rows           34                       34
ttya-mode              9600,8,n,1,-             9600,8,n,1,-
output-device          virtual-console          virtual-console
input-device           virtual-console          virtual-console
auto-boot-on-error?    false                    false
load-base              16384                    16384
auto-boot?             false                    true
network-boot-arguments
boot-command           boot                     boot
boot-file
boot-device            disk net                 disk net
multipath-boot?        false                    false
boot-device-index      0                        0
```

```
use-nvramrc?           false                     false
nvramrc
error-reset-recovery   boot                      boot
```

Related Information

- "OpenBoot Configuration Parameters" on page 47

Boot Mode Overview (Oracle ILOM)

Boot mode (`bootmode`) properties enable you to override the default method the server uses when it boots. This ability is useful to override particular OpenBoot or Oracle VM Server for SPARC settings that might be incorrect, to set up OpenBoot variables using a script, or to perform similar tasks.

For example, if the OpenBoot settings have become corrupt, you can set the `bootmode` state property to `reset_nvram`, then reset the server to its factory default OpenBoot settings.

Service personnel might instruct you to use the `bootmode` script property for problem resolution. The full extent of script capabilities are not documented and exist primarily for debugging.

Because `bootmode` is intended only to correct a problem with the OpenBoot or Oracle VM Server for SPARC settings, the new properties specified in this command take effect for a single boot only. Additionally, to prevent an administrator from setting a `bootmode` state property and forgetting about it, a `bootmode` state property expires if the host is not reset within 10 minutes of the `bootmode` state property being set.

Related Information

- "Reset the Server (Oracle Solaris)" on page 29
- "Reset the Server (Oracle ILOM)" on page 30
- "OpenBoot Overview" on page 13
- "Oracle VM Server for SPARC Overview" on page 13

▼ Configure the Host Boot Mode (Oracle VM Server for SPARC)

Note - You must use a valid Oracle VM Server configuration name for this task.

1. **Log in to Oracle ILOM.**

   See "Log In to Oracle ILOM" on page 17.

2. **Determine the valid Oracle VM Server configurations on your SP.**

   -> **show /HOST/domain/configs**

3. **Set the boot mode configuration at the Oracle ILOM prompt.**

   -> **set /HOST/bootmode config**=*configname*

   where *configname* is a valid named logical domain configuration.

   For example, if you created a Oracle VM Server configuration called ldm-set1:

   -> **set /HOST/bootmode config=ldm-set1**

   To return the boot mode config to the factory default configuration, specify factory-default:

   -> **set /HOST/bootmode config=factory-default**

   ### Related Information

   - "Reset the Server (Oracle ILOM)" on page 30
   - "Boot Mode Overview (Oracle ILOM)" on page 49
   - "Oracle VM Server for SPARC Overview" on page 13

▼ Change the Host Boot Mode Behavior at Reset (Oracle ILOM)

The /HOST/bootmode state property controls how OpenBoot NVRAM variables are used. Normally the current settings of these variables are retained. Setting /HOST/bootmode state=reset_nvram changes the OpenBoot NVRAM variables to their default settings at the next reset.

● **At the Oracle ILOM prompt, type:**

-> **set /HOST/bootmode state=**_value_

where *value* is one of the following:

- normal – At next reset, retains current NVRAM variable settings.
- reset_nvram – At next reset, returns OpenBoot variables to default settings.

Note - The `state=reset_nvram` property returns to normal after the next server reset or 10 minutes. (See "Display the Host Boot Mode Expiration Date (Oracle ILOM)" on page 52.) The `config` and `script` properties do not expire. Those two properties are cleared when the server resets or when you clear them manually by setting *value* to `""` (`""` indicates an empty script).

Related Information

- "Reset the Server (Oracle ILOM)" on page 30
- "Boot Mode Overview (Oracle ILOM)" on page 49
- "Oracle VM Server for SPARC Overview" on page 13

▼ Manage the Host Boot Mode Script (Oracle ILOM)

- **At the Oracle ILOM prompt, type:**

-> `set /HOST/bootmode script=`*value*

where `script` controls the host server's firmware OpenBoot method of booting.

`script` does not affect the current `/HOST/bootmode` setting.

value can be up to 64 bytes in length.

You can specify a `/HOST/bootmode` setting and set the script within the same command. For example:

-> `set /HOST/bootmode state=reset_nvram script="setenv diag-switch? true"`

After the server resets and OpenBoot reads the values stored in the script, OpenBoot sets the `diag-switch?` variable to the user-requested value of `true`.

Note - If you set `/HOST/bootmode script=""`, Oracle ILOM sets the `script` to empty.

Related Information

- "Reset the Server (Oracle ILOM)" on page 30
- "Boot Mode Overview (Oracle ILOM)" on page 49
- "Oracle VM Server for SPARC Overview" on page 13

▼ Display the Host Boot Mode Expiration Date (Oracle ILOM)

● **At the Oracle ILOM prompt, type:**

```
-> show /HOST/bootmode expires
    Properties:
        expires = Thu Oct 14 18:24:16 2010
```

where expires is the date and time when the current boot mode will expire.

Related Information

- "Reset the Server (Oracle ILOM)" on page 30
- "Boot Mode Overview (Oracle ILOM)" on page 49
- "Oracle VM Server for SPARC Overview" on page 13

▼ Override OpenBoot Settings to Reset the Server

Use this procedure to override the OpenBoot settings and initiate reboot of the control domain, which results in the host booting to the OpenBoot prompt.

● **At the Oracle ILOM prompt, type:**

```
-> set /HOST/domain/control auto-boot=disabled
-> reset /HOST/domain/control [-force] [-script]
```

The host reboots and stops at the OpenBoot prompt.

Related Information

- "Change the Host Boot Mode Behavior at Reset (Oracle ILOM)" on page 50
- "Configuring Boot and Restart Behavior" on page 43
- "Boot Mode Overview (Oracle ILOM)" on page 49
- "Oracle VM Server for SPARC Overview" on page 13

Server Restart Behavior Configuration (Oracle ILOM)

In addition to making temporary changes in boot behavior, you can also use Oracle ILOM to set how the host will behave when an error is encountered. For details on these options, refer to the

section on setting boot behavior on a SPARC host server in the *Configuration and Maintenance Guide* for your Oracle ILOM release.

Related Information

-

Changing Server Identification Information

These topics describe how to store information (for purposes such as inventory control or site resource management) on the SP and FRU PROMs using the Oracle ILOM CLI interface.

- "Change Customer Data on FRU PROMs" on page 55
- "Change Server Identifier Information" on page 55

Related Information

- "Turn On the Locator LED" on page 93

▼ Change Customer Data on FRU PROMs

Use the `/SP customer_frudata` property to store information in all FRU PROMs. This property can be used to identify a particular system to a third-party application, or for any other identifcation needs in your environment.

● **At the Oracle ILOM prompt, type:**

-> **set /SP customer_frudata="***data***"**

Note - You must enclose the data string (*data*) in quote marks.

Related Information

- "Log In to Oracle ILOM" on page 17
- "Change Server Identifier Information" on page 55

▼ Change Server Identifier Information

Use the `/SP system_identifier` property to store customer identification information. This string is encoded in all trap messages generated by SNMP. Assigning a unique system identifier can be useful in distinguishing which system generates which SNMP message.

- **At the Oracle ILOM prompt, type:**

  -> **set /SP system_identifier="***data***"**

  Note - You must enclose the data string (*data*) in quote marks.

  ### Related Information

  -
  -

Configuring Policy Settings

These topics describe managing configuration policies using Oracle ILOM.

Related Information

▼ Specify Cooldown Mode

Some servers support the host cooldown mode, but not all. Setting the `HOST_COOLDOWN` property to `enabled` causes the server to enter cooldown mode while the host is powering off. The cooldown mode directs Oracle ILOM to monitor certain components to ensure that they are below a minimum temperature, so as not to cause harm to the user if internal components are accessed.

Once the components are below the threshold temperature, power is removed from the server, which enables the cover interlock switch to release. If the monitored temperatures take longer than four minutes to reach the threshold, the host tuns off.

● **At the Oracle ILOM prompt, type:**

`-> set /SP/policy HOST_COOLDOWN=`*value*

where *value* can be:

- `enabled` – Server cools certain components before powering off.
- `disabled` – Component temperatures are not monitored during power off.

Related Information

- "Power Off the Server (Oracle ILOM Web Interface)" on page 26
- "Power Off the Server (Oracle ILOM CLI)" on page 24

▼ Restore the Host Power State at Restart

Use the `/SP/policy HOST_LAST_POWER_STATE` property to control the behavior of the server after an unexpected power outage. When external power is restored, the Oracle ILOM SP starts to run automatically. Normally, the host power is not turned on until you use Oracle ILOM to turn it on.

Oracle ILOM records the current power state of the server in nonvolatile storage. If the `HOST_LAST_POWER_STATE` policy is enabled, Oracle ILOM can restore the host to the previous power state. This policy is useful in the event of a power failure, or if you physically move the server to a different location.

For example, if the host server is running when power is lost and the `/SP/policy HOST_LAST_POWER_STATE` property is set to `disabled`, the host server remains off when power is restored. If the `/SP/policy HOST_LAST_POWER_STATE` property is set to `enabled`, the host server restarts when the power is restored.

● **At the Oracle ILOM prompt, type:**

`-> set /SP/policy HOST_LAST_POWER_STATE=enabled`

where *value* can be:

- `enabled` – When power is restored, returns the server to the state it was in before the power was removed.
- `disabled` – (Default) Keeps the server off when power is applied.

If you enable `HOST_LAST_POWER_STATE`, you should also configure `/SP/policy HOST_POWER_ON_DELAY`. See "Disable or Reenable the Host Power-On Delay" on page 59.

Related Information

- "Disable or Reenable the Host Power-On Delay" on page 59
- "Specify the Host Power State at Restart" on page 59

▼ Specify the Host Power State at Restart

Use the `/SP/policy HOST_AUTO_POWER_ON` property to power on the host when external power is applied to the server. If this policy is set to `enabled`, the SP sets `HOST_LAST_POWER_STATE` to `disabled`.

Note - For a server module, when `HOST_AUTO_POWER_ON` is enabled, you should also set `HOST_POWER_ON_DELAY` to enabled.

● **At the Oracle ILOM prompt, type:**

`-> set /SP/policy HOST_AUTO_POWER_ON=`*value*

where *value* can be:

■ `enabled` – When power is applied, automatically powers on the host when the SP has been booted.

■ `disabled` – (Default) Keeps the host power off when power is applied.

Related Information

■ "Restore the Host Power State at Restart" on page 58
■ "Disable or Reenable the Host Power-On Delay" on page 59

▼ Disable or Reenable the Host Power-On Delay

Use the `/SP/policy HOST_POWER_ON_DELAY` property to cause the server to wait for a short time before powering on automatically. The delay is a random interval of one to five seconds. Delaying the server power-on helps minimize current surges on the main power source. This power-on delay is important when multiple servers in racks or multiple server modules in a modular system power on after a power outage.

For a server module, when `HOST_AUTO_POWER_ON` is enabled, you should also set `HOST_POWER_ON_DELAY` to enabled.

● **At the Oracle ILOM prompt, type:**

`-> set /SP/policy HOST_POWER_ON_DELAY=`*value*

where *value* can be:

■ `enabled` – Causes the server to wait for a short time before powering on automatically.

- ■ `disabled` – (Default) Server powers on automatically without a delay.

Related Information

- ■

▼ Specify Parallel Boot of the SP and Host

The `/SP/policy PARALLEL_BOOT` property enables the host to boot and power on in parallel with the SP. When enabled, parallel booting occurs if an auto-power policy (`HOST_AUTO_POWER_ON or HOST_LAST_POWER_STATE`) was on or if a user presses the power button while the SP is in the process of booting. Oracle ILOM must be running in order to enable the host to power on in these situations. When this property is set to `disabled`, the SP boots first, then the host boots.

Note - Parallel boot is not supported on server modules.

● **At the Oracle ILOM prompt, type:**

-> **set /SP/policy PARALLEL_BOOT=***value*

where *value* can be:

- ■ `enabled` – SP and host boot concurrently.
- ■ `disabled` – SP and host boot serially.

Related Information

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- ■
- ■

▼ Specify Host Virtual Keyswitch Behavior

Use the `/HOST keyswitch_state` property to control the position of the virtual keyswitch.

● **At the Oracle ILOM prompt, type:**

-> **set /HOST keyswitch_state=***value*

where *value* can be:

- `normal` – (Default) The server can power itself on and start the boot process.
- `standby` – Powers off the host, and disables power on.
- `diag` – Host power on is allowed. This value overrides the settings of `/HOST/diag` *target*, resulting in Max POST being executed.
- `locked` – Host power on is allowed, however, you are prohibited from updating flash devices or setting `/HOST send_break_action=break`.

Related Information

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▼ Reset the Values in the SP to Default Values

If your SP becomes corrupt, or you want to reset the SP to the factory default values, you must change the `/SP reset_to_defaults` setting, then power off the host to implement the changes. This behavior is new. Previously you did not have to power off the host to reset default values to the SP.

You need administrator permissions to perform this task.

1. **Log in to Oracle ILOM.**

   See .

   Note - If you have a modular system, ensure that you are logged in to the desired server module.

   ---

2. **Reset the SP to the default values.**

   `-> set /SP reset_to_defaults=`*value*

   where *value* can be:

   - `all` – Removes all of the SP configuration data.
   - `factory` – Removes all of the SP configuration data and also all log files.

3. **Power off and restart the host to complete the setting change.**

```
-> stop /System
-> reset /SP
```

Related Information

-

Configuring SP and Host Network Addresses

These topics describe managing network addresses with Oracle ILOM.

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Related Information

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SP Network Address Options

You can access the SP on your system in multiple ways. Consider the following options and choose the access method that is best for your environment.

You can physically connect to the SP using a serial connection or a network connection. The network connection can be configured to use a static IP address or DHCP (the default). Optionally, the servers can use an in-band network connection to the SP, rather than the default out-of-band NET MGT port.

For more information on each option, refer to the following documentation:

- To use a serial connection to the SP, refer to the information about connecting a terminal or emulator to the SER MGT port in the installation guide for a server, or the information about communicating with the server module during startup in the installation guide for a server module.
- To assign a static IP address to the SP, refer to the information about assigning a static IP address to the SP in the installation guide for the server.
- To use an in-band connection to the SP, see "Oracle ILOM In-band (Sideband) Management" on page 65.

Related Information

- Oracle ILOM Documentation
-
-

▼ Disable or Reenable Network Access to the SP

● **At the Oracle ILOM prompt, type:**

```
-> set /SP/network state=value
```

where *value* can be:

- `enabled` (Default)
- `disabled`

Related Information

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-

▼ Display the SP Network Parameters

This procedure displays information such as the network address for the SP.

1. **At the Oracle ILOM prompt, type:**

```
-> show /SP/network
```

2. **Find the relevant property in the output.**

   - If you want the IP address of the SP, view the `ipaddress` property in the output. For example:

     ```
     ipaddress = 10.x.xx.xxx
     ```
   - If you want the IP address of the DHCP server that provided the dynamic IP address requested by the SP, view the `dhcp_server_ip` property in the output. For example:

     ```
     dhcp_server_ip = 10.x.x.x
     ```

Related Information

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▼ Display the Host MAC Address

The `/HOST macaddress` property is automatically configured by the server software, so you cannot set or change the property. The value is read and determined from the server's removable system configuration card (SCC PROM) or from the server module's ID PROM, and then stored as a property in Oracle ILOM.

The value displayed for `/HOST macaddress` is for the server's NET 0 port. For each additional port, the MAC addresses increments from that NET 0 value. For example, the MAC address for NET 1 is the NET 0 MAC address plus one (1).

● **At the Oracle ILOM prompt, type:**

```
-> show /HOST macaddress
```

Related Information

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Connecting to the SP (In-band)

These topics describe how to use an in-band, or sideband connection, to the SP.

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Related Information

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Oracle ILOM In-band (Sideband) Management

Note - In-band connection is not recommended for server modules.

By default, you connect to the server's SP using the out-of-band NET MGT port. The Oracle ILOM sideband management feature enables you to select either the NET MGT port or one of the server's Gigabit Ethernet ports (named NET *n*), which are in-band ports, to send and receive Oracle ILOM commands to and from the server SP. In-band ports are also called sideband ports.

The advantage of using a sideband management port to manage the server's SP is that one fewer cable connection and one fewer network switch port are needed. In configurations where numerous servers are being managed, such as data centers, sideband management can represent a significant savings in hardware and network utilization.

When sideband management is enabled in Oracle ILOM, the following conditions might occur:

- Connectivity to the server SP might be lost when the SP management port configuration is changed while you are connected to the SP using a network connection, such as SSH, web, or Oracle ILOM Remote Console.
- In-chip connectivity between the SP and the host operating system might not be supported by the on-board host Gigabit Ethernet controller. If this condition occurs, use a different port or route to transmit traffic between the source and destination targets instead of using L2 bridging or switching.
- Server host power cycles might cause a brief interruption of network connectivity for server Gigabit Ethernet ports that are configured for sideband management. If this condition occurs, configure the adjacent switch or bridge ports as host ports.

Related Information

- "Configure SP In-band (Sideband) Access" on page 66
- "SP Network Address Options" on page 63

▼ Configure SP In-band (Sideband) Access

This procedure describes how to access the SP from an in-band (or sideband) management port using a host network port.

If you perform this procedure using a network connection, you might lose connectivity to the server. Using a serial connection for this procedure eliminates the possibility of losing connectivity during sideband management configuration changes.

1. Log in to Oracle ILOM.

See "Log In to Oracle ILOM" on page 17.

2. If you logged in using the serial port, assign a static IP address.

For instructions, refer to the information about assigning a static IP address in the installation guide for the server.

3. **View the current network settings.**

    ```
    -> show /SP/network
    ```

    For example, in the output, you might find these properties:

    ```
    managementport = /SYS/MB/SP/MGMT
    ...
    pendingmanagementport = /SYS/MP/SP/MGMT
    ```

4. **Set the SP management port to a sideband port.**

    For server modules, *port* is `MGMT`, `NET0`, or `NET1`. For servers, *port* is `MGMT`, `NET0`, `NET1`, `NET2`, or `NET3`.

    ```
    -> set /SP/network pendingmanagementport=/SYS/MB/port
    -> set /SP/network commitpending=true
    ```

5. **Verify the change.**

    ```
    -> show /SP/network
    ```

    For example, in the output, you might find these new properties:

    ```
    managementport = /SYS/MB/NET0
    ...
    pendingmanagementport = /SYS/MP/NET0
    ```

Related Information

■ "Oracle ILOM In-band (Sideband) Management" on page 65
■ "SP Network Address Options" on page 63

Matching Devices to Device Names

These topics explain how to identify drives and other devices on the server with names that are recognized by or displayed by software and firmware. The same physical device is known by different types of names in different contexts.

Related Information

Importance of Matching a Physical Device to a Name

These are some situations when you must correlate a logical device name with the device's physical location.

- When downloading the OS over a network, you must specify the logical device name of the drive in slot 0 (the default boot device).
- When you use Oracle Solaris 10 Jumpstart, you must refer to drives with a specific syntax. The letters in the WWN portion of the drive name must be capitalized, while the c, t, and d initial characters are lower case (for example, `c0t5000C50033438DBBd0`).

- When you run the Oracle Solaris `format` command, you must select one of the logical device names presented in the output. To ensure that you select the correct drive for an operation, you must correlate these logical device names with the physical drives.
- When you see a system message that lists a drive's logical device name, you might need to identify the physical slot in which the drive is installed.

Related Information

WWN Syntax

Oracle Solaris uses the WWN (World Wide Name) syntax in place of the locally unique t*n* (target ID) field in logical device names. This change affects how device names can be mapped to specific SCSI devices. The following points are key to understanding the impact of this change:

- Before the change to WWN nomenclature, Oracle Solaris identified the default boot device as `c0t0d0`.
- With the change, the device identifier for the default boot device is now referred to as `c0t`*WWN*`d0`, where *WWN* is a hexadecimal value that is unique to this device throughout the world.
- This WWN value is assigned by the manufacturer of the device and, therefore, has a random relationship to the server's device tree structure.

Because WWN values do not conform to the traditional logical device name structure, you cannot directly identify a target device from its c*n*t*WWN*d*n* value. Instead, you can use one of the following alternative methods to map WWN-based device names to physical devices.

- When the OS is not running, you can analyze the output of the OpenBoot command `probe-scsi-all`.

  For example, you would analyze `probe-scsi-all` output when you want to identify a boot device.
- When the OS is running, you can analyze the output of the command `prtconf -v`. See "Identify a Disk Slot (Oracle Solaris)" on page 76 for more information.

Related Information

- ■
- ■

▼ Display Server Components (Oracle ILOM)

The Oracle ILOM `show components` command displays real-time information about the components installed in the server. This information includes the target name for each component.

● **At the Oracle ILOM prompt, type:**

Note - This is a sample of `show components` output. Specific components will vary based on each server.

```
-> show components
Target              | Property               | Value
--------------------+------------------------+-------------------
/SYS/MB/RISER0/     | component_state        | Enabled
PCIE0               |                        |
/SYS/MB/RISER0/     | component_state        | Disabled
PCIE3
/SYS/MB/RISER1      | component_state        | Enabled
PCIE1               |                        |
/SYS/MB/RISER1/     | component_state        | Enabled
/SYS/MB/NET         | component_state        | Enabled
/SYS/MB/NET1        | component_state        | Enabled
/SYS/MB/NET2        | component_state        | Enabled
```

Note - The target names displayed by Oracle ILOM commands might begin with `/System` or `/SYS`, depending on your situation.

Related Information

- ■

▼ Locate Device Paths (OpenBoot)

1. **Display the OpenBoot prompt.**

   See .

2. **From the OpenBoot prompt, type:**

> **Note -** This example represents `devalias` output for a sample T5 series server. The specific devices displayed will differ for different products.

```
ok devalias
screen          /pci@340/pci@1/pci@0/pci@4/display@0
disk1           /pci@300/pci@1/pci@0/pci@4/scsi@0/disk@p1
disk            /pci@300/pci@1/pci0/pci@4/scsi@0/disk@p0
disk0           /pci@300/pci@1/pci@0/pci@4/scsi@0/disk@p0
scsi            /pci@300/pci@1/pci@0/pci@4/scsi@0
scsi0           /pci@300/pci@1/pci@0/pci@4/scsi@0
net1            /pci@300/pci@1/pci@0/pci@2/network@0,1
net             /pci@300/pci@1/pci@0/pci@2/network@0
net0            /pci@300/pci@1/pci@0/pci@2/network@0
virtual-console  /virtual-devices/console@1
name            aliases
```

Related Information

- "Obtain the OpenBoot Prompt Under Various Conditions" on page 19
- "Prepare to Create a RAID Hardware Volume (FCode-based RAID Utility)" on page 85

▼ Correlate WWN Device Names With Physical Locations (`diskinfo` Command)

The `diskinfo` command is available in Oracle Solaris. If you are using Oracle Solaris 11, this command is effective for all T5 series servers. If you are using Oracle Solaris 10, this procedure is only effective for the server modules, so other servers require the procedure in "Correlate WWN Device Names With Physical Locations (`probe-scsi-all` Command)" on page 74. You also need to use that procedure if you do not have access to Oracle Solaris at the time you need to determine a name for a specific drive.

1. Log in to Oracle Solaris.

2. Display information about the drives on the server.

> **Note -** This document applies to several server and server module products. The following example is based on the SPARC T5-1B server module. Your output might vary from the examples based on your product.

For example, on a SPARC T5-1B server module running Oracle Solaris 10 1/13:

```
# diskinfo -a
```

```
Enclosure path:          0000000-0000000000-physical-hba-0
Chassis Serial Number:   0000000-0000000000-physical-hba-0
Chassis Model:               sun4v-platform

Label       Disk Name               Vendor    Product            Vers
----------- ----------------------- --------  ---------------- -----
/SYS/HDD0   c0t5000CCA01622AC64d0   HITACHI   H109030SESUN300G   A31A
/SYS/HDD1   c0t5000CCA01622B1F4d0   HITACHI   H109030SESUN300G   A31A
```

In Oracle Solaris 11.1, you see output with similar information when you type:

 # diskinfo -P SYS -o Rc

For further information, refer to the Oracle Solaris documentation or man page on the diskinfo command.

3. **Look at the output under the Label and Disk Name columns to correlate a drive's physical location with its corresponding logical device name.**

   In this example for a SPARC T5-1B server module:

   - /SYS/HDD0 represents a drive in slot 0.
   - /SYS/HDD1 represents a drive in slot 1.

   ### Related Information

   - diskinfo(1m) man page in Oracle Solaris
   - "Correlate WWN Device Names With Physical Locations (probe-scsi-all Command)" on page 74

probe-scsi-all Device Naming (OpenBoot)

The output displayed by probe-scsi-all lists all SCSI devices in the server and provides a basic set of information about each device. When analyzing the probe-scsi-all output, look for the following data fields that are different names for the same device. You must use a specific type of name in different commands.

Entity Name	Definition
Target	Each SAS or SATA drive is assigned a unique target ID.
SASDeviceName	The WWN value assigned to a SAS drive by the manufacturer. Oracle Solaris recognizes this name.
SASAddress	The WWN value assigned to a SCSI device that is recognized by the OpenBoot firmware.

Entity Name	Definition
`PhyNum`	A hexidecimal ID of the controller port that is attached to the target drive.
`VolumeDeviceName` (when a RAID volume is configured)	The WWN value assigned to a RAID volume that is recognized by Oracle Solaris. The `VolumeDeviceName` replaces the `SASDeviceName` of every SCSI device contained in the RAID volume. Use the `VolumeDeviceName` entity to determine the correct target in a RAID volume, or when the server is configured with an optional internal RAID HBA controller.
`VolumeWWID` (when a RAID volume is configured)	The WWN-based value assigned to a RAID volume that is recognized by the OpenBoot firmware. `VolumeWWID` replaces the `SASAddress` of every SCSI device contained in the RAID volume.

At a high level, the WWN mapping process consists of the following stages:

1. Identify the physical location of the hard drive that is to be the target of the operation.
2. Identify the controller port that is attached to that physical location.
3. Find the WWN-based device name of the drive attached to that controller port.

Note - Refer to the service manual for the server for a description of the physical drive slot organization.

Related Information

- "WWN Syntax" on page 70
- "Identify a Disk Slot (Oracle Solaris)" on page 76
- "WWN Syntax in an Oracle Solaris 10 Installation on an Individual Drive" on page 78
- "WWN Syntax in an Oracle Solaris 10 Installation on a RAID Volume" on page 78

▼ Correlate WWN Device Names With Physical Locations (`probe-scsi-all` Command)

Note - If you have access to Oracle Solaris, you might be able to use the `diskinfo` command instead as a way to determine the device names you need. See "Correlate WWN Device Names With Physical Locations (`diskinfo` Command)" on page 72.

1. **At the OpenBoot prompt, type:**

```
ok probe-scsi-all
/pci@400/pci@1/pci@0/pci@cLSI,sas@0

FCode Version 1.00.54, MPT Version 2.00, Firmware Version 5.00.17.00

Target 9
 Unit 0   Disk    SEAGATE   ST9300003SSUN3006 0B70   585937500 Blocks, 300 GB
 SASDeviceName 5000c50033438dbb  SASAddress 5000c50033438db9  PhyNum 0
Target b
 Unit 0   Dusj    SEAGATE   ST930003SSUN300G 0468    585937500 Blocks, 300 GB
 SASDeviceName 5000c50005c15803  SASAddress 5000c50005c15801  PhyNum 1
Target c
 Unit 0  Elcl Serv device   SUN     NEM Hydra II SOL 0308
 SASAddress 5080020000bb193d  PhyNum 24

/pci@400/pci@1/pci@0/pci@0/pci@0/usb@0,2/hub@3/storage@2
 Unit 0  Removable Read Only device   AMI     Virtual CDROM   1.00
```

2.   In this output, look for these disk identifiers:

- LSI,sas@0 – Disk controller (a REM in this example). If the server has more than one disk controller, the target drives associated with each controller are listed following that controller's information.

- SASDeviceName – WWN that Oracle Solaris recognizes.

- SASAddress – WWN that OpenBoot references.

- PhyNum – Physical slot that the drive occupies (the value 0 indicates a drive in HDD slot 0).

3.   Look at the values in this output to construct a logical device name in the c*n*t*WWN*d*n* format that is recognized by Oracle Solaris.

For this example, you construct a name like this to indicate the drive in slot 0.

- c*n* = c0

   n is the SAS controller number.

- t*WWN* = t5000c50033438dbb

   WWN is the SASDeviceName value.

- d*n* = d0

   n is 0 for all embedded SCSI devices.

The completed logical device name is c0t5000c50033438dbbd0.

Related Information

- "probe-scsi-all Device Naming (OpenBoot)" on page 73
- "Correlate WWN Device Names With Physical Locations (diskinfo Command)" on page 72

▼ Identify a Disk Slot (Oracle Solaris)

The examples in this procedure apply to a SPARC T5-4 server that has an eight-disk backplane configuration.

Note - This document applies to several server and server module products. The following example is based on the SPARC T5-4 server. Your output might vary from the examples based on your product.

---

1. **Type the `format` command.**

    ```
    # format
    Searching for disks...done

    AVAILABLE DISK SELECTIONS:
        0. c0t5000CCA00ABBAEB8d0 <SUN300G cyl 46873 alt 2 hd 20 sec 625>
           /scsi_vhci/disk@g5000cca00abbaeb8
        1. c0t5000C5001D40D7F7d0 <SUN300G cyl 46873 alt 2 hd 20 sec 625>
           /scsi_vhci/disk@g5000c5001d40d7f7
    [...]
    ```

    The remaining steps in this example identify the physical slot that corresponds to the device name `c0t5000CCA00ABBAEB8d0`.

2. **Type `prtconf -v` and search for the device link containing the device name `c0t5000CCA00ABBAEB8d0`.**

    For this example, the following portion of the output includes that device name:

    ```
    Device Minor Nodes:
        dev=(32,0)
            dev_path=/scsi_vhci/disk@g5000cca00abbaeb8:a
                spectype=blk type=minor
                dev_link=/dev/dsk/c0t5000CCA00ABBAEB8d0s0      <<=== Device link
                dev_link=/dev/sd3a
          dev_path=/scsi_vhci/disk@g5000cca00abbaeb8:a,raw
                spectype=chr type=minor
                dev_link=/dev/rdsk/c0t5000CCA00ABBAEB8d0s0     <<=== Device link
                dev_link=/dev/rsd3a
    ```

3. **Search the `prtconf` output for the `name='wwn'` entry that shows the WWN value `5000cca00abbaeb8`.**

    Note the `obp-path` value listed under WWN `5000cca00abbaeb8`.

    Refer to the following items to find the controller.

    - **Controller 0** – /pci@400/pci@1/pci@0/pci@0/LSI,sas@0/disk@w5000cca00abbaeb9,0

■ **Controller 1** – `/pci@700/pci@1/pci@0/pci@0/LSI,sas@0/disk@w5000cca00abbaeb9,0`

For SPARC T5-4 servers, the controller is identified in the first field. For servers with a four-processor configuration, `pci@400` is controller 0 and `pci@700` is controller 1.

The following output example shows the `obp-path` for a SPARC T5-4 server.

```
Paths from multipath bus adapters:
    mpt_sas#5 (online)
        name='wwn' type=string items=1
            value='5000cca00abbaeb8'            <<=== Hard drive WWN ID
        name='lun' type=int items=1
            value=00000000
        name='target-port' type=string items=1
            value='5000cca00abbaeb9'            <<=== Hard drive SAS address
        name='obp-path' type=string items=1
            value='/pci@400/pci@1/pci@0/LSI,sas@0/disk@w5000cca00abbaeb9,0'
        name='phy-num' type=int items=1
            value=00000000
        name='path-class' type=string items=1
            value='primary'
```

In this example, the `obp-path` is:

`/pci@400/pci@1/pci@0/pci@0/LSI,sas@0/disk@w5000cca00abbaeb9,0`

Based on the earlier name identification, this disk is on controller 0.

4. **Consult this port mapping table to determine which physical disk slot the `phy-num` value corresponds to.**

   This `phy-num` value corresponds to physical disk slot `0`.

SAS Controller	PhyNum	Disk Slot	SAS Controller	PhyNum	Disk Slot
0	0	0[†]	1	0	4
	1	1		1	5
	2	2		2	6
	3	3		3	7

[†]Default boot drive

Related Information

■ "WWN Syntax" on page 70
■ "`probe-scsi-all` Device Naming (OpenBoot)" on page 73
■ "WWN Syntax in an Oracle Solaris 10 Installation on an Individual Drive" on page 78
■ "WWN Syntax in an Oracle Solaris 10 Installation on a RAID Volume" on page 78

WWN Syntax in an Oracle Solaris 10 Installation on an Individual Drive

The following Oracle Solaris 10 Jumpstart profile example shows details of the WWN syntax for installing the operating system on a specific disk drive. In this example, the device name contains the WWN value `5000CCA00A75DCAC`.

> **Note -** All alpha characters in the WWN value must be capitalized when included in a Jumpstart profile.

```
#
install_type flash_install
boot_device c0t5000CCA00A75DCACd0s0     preserve

archive_location nfs ***.***.***.***:/export/install/media/solaris/builds/s10u9/flar/latest.flar

# Disk layouts
#
partitioning explicit
filesys rootdisk.s0        free /
filesys rootdisk.s1        8192 swap
```

Related Information

- "Importance of Matching a Physical Device to a Name" on page 69
- "WWN Syntax" on page 70
- "`probe-scsi-all` Device Naming (OpenBoot)" on page 73
- "Identify a Disk Slot (Oracle Solaris)" on page 76
- "WWN Syntax in an Oracle Solaris 10 Installation on a RAID Volume" on page 78

WWN Syntax in an Oracle Solaris 10 Installation on a RAID Volume

The following Oracle Solaris 10 Jumpstart profile example shows details of the WWN syntax for installing the OS on a RAID volume. When installing software on a RAID volume, use the virtual device's `VolumeDeviceName` instead of an individual device name. In this example, the RAID volume name is `3ce534e42c02a3c0`.

```
#
install_type flash_install
boot_device 3ce534e42c02a3c0      preserve

archive_location nfs ***.***.***.***:/export/install/media/solaris/builds/s10u9/flar/latest.flar

# Disk layouts
#
partitioning explicit
filesys rootdisk.s0          free /
filesys rootdisk.s1          8192 swap
```

Related Information

- "Importance of Matching a Physical Device to a Name" on page 69
- "WWN Syntax" on page 70
- "`probe-scsi-all` Device Naming (OpenBoot)" on page 73
- "Identify a Disk Slot (Oracle Solaris)" on page 76
- "WWN Syntax in an Oracle Solaris 10 Installation on an Individual Drive" on page 78

Configuring Hardware RAID

These topics describe how to configure and manage RAID disk volumes using the server's on-board SAS-2 disk controller.

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Related Information

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Hardware RAID Support

The servers provide hardware RAID support through on-board SAS2 RAID controllers. Each controller enables you to create up to two logical disk volumes consisting of two or more redundant disk drives. The following table identifies the hardware RAID controllers built into each server.

Server	Controller Description	Supported RAID Levels
SPARC T5-1B	One on-board SAS2 controller	0, 1
Netra SPARC T5-1B	One on-board SAS2 controller	0, 1
SPARC T5-2	Two on-board SAS2 controllers	0, 1, 1e, 10
SPARC T5-4	Two on-board SAS2 controllers	0, 1, 1e, 10

Server	Controller Description	Supported RAID Levels
SPARC T5-8	Two on-board SAS2 controllers	0, 1, 1e, 10

Note - RAID 1e and RAID 10 are functionally equivalent. RAID 1e requires an odd number of drives (minimum three). RAID 10 requires an even number of drives (minimum four).

Some servers also support REM controllers that provide hardware RAID capabilities. Documentation for Oracle's REM controllers is available at: `http://docs.oracle.com/cd/E19946-01/index.html`.

There are four sets of RAID management utilities you can use with the on-board SAS2 controllers provided in these servers.

FCode-Based RAID Utility

You can use FCode-based commands provided with the on-board controller to display targets and manage logical volumes on the server. You enter these commands at the OpenBoot prompt.

The examples of RAID shown in this document rely on the controller's FCode-based commands, unless otherwise specified.

`sas2ircu` Utility

You can use the LSI SAS2 2008 RAID Management Utility `sas2ircu` at the Oracle Solaris command prompt to manage RAID functionality for the on-board SAS2 controllers. The `sas2ircu` utility can configure RAID 0, RAID 1, RAID 1e, and RAID 10.

Note - With `sas2ircu`, when you specify RAID 1e, there must be an odd number of target drives (minimum three). When you specify RAID 10, there must be an even number of target drives (minimum four).

The `sas2ircu` utility for Oracle servers, together with user documentation, are available on the LSI website at:

`http://www.lsi.com/sep/Pages/oracle/index.aspx`

Caution - When you get firmware updates for the on-board SAS controllers, you *must* acquire them from Oracle's support site, `https://support.oracle.com`. Firmware applied to the on-board SAS controllers that was obtained from any other location or any vendor other than Oracle is not supported.

`raidconfig` Commands

You can use the `raidconfig` commands contained in the Oracle Hardware Management Pack. Use the Oracle Server CLI Tools component to create and manage RAID volumes on the server. To use these commands, download and install Oracle Hardware Management Pack software that supports the server. To install the software, refer to the *Oracle Hardware Management Pack Installation Guide* for your version at:

http://www.oracle.com/goto/ohmp/docs

RAID Capabilities in Oracle Enterprise Manager Ops Center

You can create RAIDs and manage existing RAIDs with Oracle Enterprise Manager Ops Center. If you reconfigure an existing RAID with Oracle Enterprise Manager Ops Center, the contents of the disks in the original RAID will be lost.

For more about Oracle Enterprise Manager Ops Center, see "Oracle Enterprise Manager Ops Center Overview" on page 15.

Related Information

- "Create a Hardware RAID Volume" on page 86
- "Prepare to Create a RAID Hardware Volume (FCode-based RAID Utility)" on page 85
- "Oracle Hardware Management Pack Overview" on page 15
- "Oracle Enterprise Manager Ops Center Overview" on page 15

Hardware RAID Guidelines

Caution - When you create a RAID volume using the on-board disk controllers, all data currently on the disks you include in the volume will be lost.

The following points are important to understand when configuring RAID volumes on a server:

- Before configuring and using RAID disk volumes on a server, ensure that you have installed the latest SRU or patches available for your operating system. Review the most recent product notes provided for your system for further guidance in keeping your OS up to date.

■ Volume migration (that is, relocating all RAID volume disk members from one server to another) is not supported. If you must perform this operation, contact your authorized Oracle service provider.

Related Information

■

FCode-Based RAID Utility Commands

These commands are provided through an FCode-based RAID utility provided with the on-board controllers. You can enter these commands at the OpenBoot prompt. For details on preparing to enter these commands to affect a specific controller, see .

FCode Command	Description
show-children	Lists all connected physical drives and logical volumes.
show-volumes	Lists all connected logical volumes in detail.
create-raid0-volume	Creates a RAID 0 volume (minimum two targets).
create-raid1-volume	Creates a RAID 1 volume (exactly two targets).
create-raid1e-volume	Creates a RAID 1e volume for an odd number of target drives (minimum three). **Note -** If you specify an even number of target drives (minimum four) with this command, those drives will be configured and identified as RAID 10. For an even number of drives, RAID 1e is the functional equivalent of RAID 10.
create-raid10-volume	Creates a RAID 10 volume for an even number of target drives (minimum four). For any other number of target drives, this command fails.
delete-volume	Deletes a RAID volume.
activate-volume	Reactivates a RAID volume after the motherboard has been replaced.

Related Information

■
■
■

▼ Prepare to Create a RAID Hardware Volume (FCode-based RAID Utility)

Perform this procedure to be ready to create a RAID volume using the FCode-based RAID utility. This procedure also enables you to use other FCode-based RAID utility commands on a specific controller.

1. **Perform the following procedure from an Xterm or an equivalent terminal window that supports scrolling.**

   Note - OpenBoot commands and FCode-based commands produce large amounts of detailed output. An Xterm or Gnome terminal window provides scroll bar functionality, which helps you view such output.

2. **Either apply power to the system or reset the system if power is already present, and disable `auto-boot` in the OpenBoot environment.**
   See "Obtain the OpenBoot Prompt Under Various Conditions" on page 19.

3. **Enter the OpenBoot environment.**

4. **List the device paths on the server.**
   For example, the output from the command might include these lines:

   ```
   ok show-devs
   ...
   /pci@300/pci@1/pci@0/pci@4/scsi@0
   /pci@300/pci@1/pci@0/pci@4/scsi@0
   ...
   ```

5. **Use the OpenBoot `select` command to specify the controller where you want to create a hardware RAID volume.**

   ```
   ok select /pci@300/pci@1/pci@0/pci@4/scsi@0
   ```

   Instead of using the entire device path for the controller, you can use a preconfigured alias for a controller. For example:

   ```
   ok select scsi_alias
   ```

   where *scsi_alias* corresponds to a preconfigured alias you had previously created for your path.

   Note - To view the preconfigured aliases on the server, use the OpenBoot `devalias` command. See "Locate Device Paths (OpenBoot)" on page 71.

6. **If you decide to select a different controller after performing Step 5, you must unselect the current controller.**

   ```
   ok unselect-dev
   ```

   Now you can select a different controller, as described in Step 5. You can then run other FCode-based RAID commands that apply to the selected controller.

7. **Continue to create a hardware RAID volume on the selected controller.**

   See "Create a Hardware RAID Volume" on page 86.

   ### Related Information

   - "Obtain the OpenBoot Prompt Under Various Conditions" on page 19
   - "FCode-Based RAID Utility Commands" on page 84
   - "Locate Device Paths (OpenBoot)" on page 71

▼ Create a Hardware RAID Volume

1. **Select the controller that will handle a new RAID volume.**

   See "Prepare to Create a RAID Hardware Volume (FCode-based RAID Utility)" on page 85. At this point you have obtained the OpenBoot prompt and have selected an on-board disk controller.

2. **List the physical drives on the selected controller.**

   Note the target name of each disk you will use in the RAID. In this example, the targets are named 9, a, b, and c.

   ```
   ok show-children
   ...
   Target 9
     Unit 0  Disk   HITACHI H109030SESUN300G A31A 585937500 Blocks, 300 GB
     SASDeviceName 5000cca01622ac64 SASAddress 5000cca01622ac65 PhyNum 0
   Target a
     Unit 0  Disk   HITACHI H109030SESUN300G A31A 585937500 Blocks, 300 GB
     SASDeviceName 5000cca01622b1f4 SASAddress 5000cca01622b1f5 PhyNum 1
   ok
   ```

3. **Select one of these commands to create a logical drive from several physical disks:**

   - `create-raid0-volume`
   - `create-raid1-volume`

- `create-raid1e-volume`
- `create-raid10-volume`

For example, to create a RAID 0 volume with targets 9 and a, type the targets first then type the command name:

`ok` **`9 a create-raid0-volume`**

To create a RAID 1e volume with three targets (a, b, and c), type:

`ok` **`a b c create-raid1e-volume`**

To create a RAID 10 volume with four targets (9, a, b, and c), type:

`ok` **`9 a b c create-raid10-volume`**

4. **Verify creation of the RAID volume.**

`ok` **`show-volumes`**

5. **(Optional) Create a second RAID volume to be handled by the present controller.**
   To do so, enter another command as described in Step 3.

6. **Unselect the controller.**

`ok` **`unselect-dev`**

Related Information

- "FCode-Based RAID Utility Commands" on page 84
- "Obtain the OpenBoot Prompt Under Various Conditions" on page 19

Hot-Spare Drives in RAID Volumes (LSI)

You can configure two global hot-spare drives to protect data on mirrored RAID volumes. If one of the drives in a RAID 1, RAID 1e, or RAID 10 mirrored volume fails, the on-board RAID controller will replace the failed drive automatically with a hot-spare drive and then resynchronize the mirrored data.

Use the `sas2ircu` LSI utility to add global hot-spare drives. You can also use the `raidconfig` utility included in the Oracle Hardware Management Pack. Refer to the *SAS2 Integrated RAID Solution User Guide* for more information about adding hot-spare drives.

Related Information

- "Hardware RAID Support" on page 81
- "Oracle Hardware Management Pack Overview" on page 15

Determining if a Drive Has Failed

These topics explain various ways to determine if a drive contained in a RAID volume has failed:

- "Service Required Drive LEDs" on page 88
- "Locate Error Messages Related to Drives in a RAID Volume" on page 88
- "Display Status (FCode-Based RAID Utility)" on page 89
- "Display Status (`sas2ircu` Utility, LSI)" on page 90

Related Information

- "Monitoring the Server" on page 93

Service Required Drive LEDs

When a fault occurs on a drive in a server, the amber Service Required LED lights on the front of the drive. This amber LED enables you to locate the faulted drive in the system. Additionally, the front and rear panel Service Action Required LEDs also light when the server detects a hard drive fault. Refer to the service manual for the server for the locations and descriptions of these LEDs.

Related Information

- "Turn On the Locator LED" on page 93

▼ Locate Error Messages Related to Drives in a RAID Volume

When a fault occurs on a drive, error messages are displayed on the system console about the drive and the RAID volume that includes that drive. For example, these messages on a system console display indicate that volume 905 has been degraded with the loss of PhysDiskNum 1:

```
Mar 16 16:28:26 hostname scsi: /pci@400/pci@2/pci@0/pci@e/scsi@0 (mpt_sas0):
Mar 16 16:28:26 hostname     PhysDiskNum 1 with DevHandle 0xc in slot 0 for
enclosure with handle 0x0 is now offline
Mar 16 16:28:26 hostname scsi: /pci@400/pci@2/pci@0/pci@e/scsi@0 (mpt_sas0):
Mar 16 16:28:26 hostname     PhysDiskNum 1 with DevHandle 0xc in slot 0 for
enclosure with handle 0x0 is now , active, out of sync
Mar 16 16:28:26 hostname scsi: WARNING: /pci@400/pci@2/pci@0/pci@e/scsi@0
(mpt_sas0):
Mar 16 16:28:26 hostname     Volume 905 is degraded
Mar 16 16:28:26 hostname scsi: /pci@400/pci@2/pci@0/pci@e/scsi@0 (mpt_sas0):
Mar 16 16:28:26 hostname     Volume 0 is now degraded
Mar 16 16:28:26 hostname scsi: WARNING: /pci@400/pci@2/pci@0/pci@e/scsi@0
(mpt_sas0):
Mar 16 16:28:26 hostname     Volume 905 is degraded
```

● **Display recent system console messages in the `/var/adm/messages` files.**

```
# more /var/adm/messages*
```

Refer to the information about these messages and others in the service manual for the server.

Related Information

- "Monitoring the Server" on page 93
- "Determining if a Drive Has Failed" on page 88

▼ Display Status (FCode-Based RAID Utility)

You can halt the system and then use the show-volumes command at the OpenBoot prompt to determine if a drive has failed.

1. **Halt the system and display the OpenBoot prompt.**
   See "Obtain the OpenBoot Prompt Under Various Conditions" on page 19.

2. **Select the SAS controller device for the RAID volume you think has failed.**
   For example:

   ```
   ok select /pci@300/pci@1/pci@0/pci@e/scsi@0
   ```

   See "Prepare to Create a RAID Hardware Volume (FCode-based RAID Utility)" on page 85 for more information.

3. **Display details about the RAID volumes and their associated disks that are handled by this controller.**

In the following example, the secondary disk in a RAID 1 volume is offline.

```
ok show-volumes
Volume 0 Target 389   Type RAID1 (Mirroring)
  Name raid1test   WWID 04eec3557b137f31
  Degraded   Enabled
  2 Members                                      2048 Blocks, 1048 KB
  Disk 1
    Primary  Optimal
    Target c     HITACHI   H101414SCSUN146G SA25
  Disk 0
    Secondary  Offline  Out Of Sync
    Target 0     HITACHI
```

4. **After you finish typing commands that apply to this controller, unselect it.**

```
ok unselect-dev
```

Related Info

- "Locate Device Paths (OpenBoot)" on page 71
- "Determining if a Drive Has Failed" on page 88

▼ Display Status (`sas2ircu` Utility, LSI)

- **Use the LSI `sas2ircu` utility to display the status of the RAID volume and its associated drives.**

  Refer to the *SAS2 Integrated RAID Solution User Guide* for more information about displaying and interpreting device status using the sas2ircu utility.

Related Information

- "Locate Device Paths (OpenBoot)" on page 71
- "Determining if a Drive Has Failed" on page 88

RAID Drive Replacement Strategies

When you replace a drive that has been included in a RAID volume, follow the drive replacement instructions in the service manual for the server. Keep in mind these differences if a RAID volume is involved.

- The `cfgadm` instructions in the service manual are for individual drives that are not part of RAID volumes. When a drive is part of a RAID volume, you do not need to unconfigure it before hot-swapping it with a new drive.

- If the failed drive was in a RAID 0 volume, you lose all data on that volume. Replace the failed drive with a new drive of the same capacity. Then recreate the RAID 0 volume (see "Create a Hardware RAID Volume" on page 86) and restore data from a backup.

- If the failed drive was in a RAID 1, RAID 1e, or RAID 10 volume, the new drive is automatically configured and synced with the RAID volume. Remove the failed drive and replace it with a new drive of the same capacity. Then allow the RAID volume to automatically incorporate the new drive.

Related Information

- "Determining if a Drive Has Failed" on page 88

Monitoring the Server

The servers provide many ways to monitor system activity and faulty behavior, including LEDs, Oracle ILOM, and POST. Log files, including system console activity, are maintained by Oracle Solaris and Oracle ILOM. For specific information about LEDs, fault reports, and log files, refer to the topics on detecting and managing faults in the service manual for the server.

Note - You can use Oracle Enterprise Manager Ops Center to monitor this sever along with other servers and assets. For more information, see "Oracle Enterprise Manager Ops Center Overview" on page 15.

When a problem is detected on a server, you can use the locator button and LED to identify the server that needs service attention at its physical location.

- "Turn On the Locator LED" on page 93
- "Turn Off the Locator LED" on page 94
- "Display the Locator LED State of the Server" on page 94

Related Information

- Detecting and managing faults, in the service manual for the server
- "Matching Devices to Device Names" on page 69

▼ Turn On the Locator LED

When a server must be serviced, lighting the system locator LED assists in easily identifying the correct server. You do not need administrator permissions to use the `set /System/locator_indicator` and `show /System/locator_indicator` commands.

1. **Log in to Oracle ILOM.**

   See "Log In to Oracle ILOM" on page 17.

2. **Illuminate the Locator LED.**

```
-> set /System/locator_indicator=on
```

Related Information

- "Turn Off the Locator LED" on page 94
- "Display the Locator LED State of the Server" on page 94

▼ Turn Off the Locator LED

After service of a server is completed, the Locator LED can be turned off. You do not need administrator permissions to use the set /System/locator_indicator command.

1. Log in to Oracle ILOM.

See "Log In to Oracle ILOM" on page 17.

2. Turn off the Locator LED.

```
-> set /System/locator_indicator=off
```

Related Information

- "Turn On the Locator LED" on page 93
- "Display the Locator LED State of the Server" on page 94

▼ Display the Locator LED State of the Server

You do not need administrator permissions to use the show /System/locator_indicator command.

1. Log in to Oracle ILOM.

See "Log In to Oracle ILOM" on page 17.

2. Display the state of the Locator LED:

```
-> show /System/locator_indicator
```

Related Information

- "Turn On the Locator LED" on page 93
- "Turn Off the Locator LED" on page 94

Updating the Firmware

These topics describe how to update the system firmware and view current versions of firmware for Oracle's SPARC and Netra SPARC T5 series servers.

-
-

Related Information

-

▼ Display the Firmware Versions

The `/HOST` property displays information about the firmware versions on the host. The output includes the overall system firmware version and the versions of firmware components, such as Oracle ILOM, OpenBoot, and POST.

1. **Display the current host property values.**

   ```
   -> show /HOST
   ```

   Refer to the *Oracle ILOM Administrator's Guide for Configuration and Maintenance* for more information about the `show /HOST` command.

2. **Examine the output to find the version listed for the system firmware or firmware component you wanted.**

   ### Related Information

   -

▼ Update the Firmware

You must install all the firmware for your server at the same time. You cannot install an individual system firmware component, such as Oracle ILOM.

1. **Download a copy of the system firmware for your server or server module.**

   Refer to the information about downloading product software and firmware in the product notes for your server or in the *Oracle ILOM Administrator's Guide for Configuration and Maintenance*.

2. **Update the firmware through the Oracle ILOM CLI or web interface.**

   Refer to the information about performing firmware updates in the *Oracle ILOM Administrator's Guide for Configuration and Maintenance*. Ensure that you perform the preparatory steps described in that document before updating the firmware.

Related Information

-

Glossary

A

ANSI SIS   American National Standards Institute Status Indicator Standard.

ASF   Alert standard format (Netra products only).

AWG   American wire gauge.

B

blade   Generic term for server modules and storage modules. *See* server module *and* storage module.

blade server   Server module. *See* server module.

BMC   Baseboard management controller.

BOB   Memory buffer on board.

C

chassis   For servers, refers to the server enclosure. For server modules, refers to the modular system enclosure.

CMA   Cable management assembly.

CMM   Chassis monitoring module (server modules only). The CMM is the service processor in the modular system that contains server modules. Oracle ILOM runs on the CMM, providing lights out management of the components in the modular system chassis. *See* modular system *and* Oracle ILOM.

CMP   Chip multiprocessor.

D

DHCP   Dynamic Host Configuration Protocol.

**disk module   Interchangeable terms for storage module. *See* storage module.
or disk blade**

DTE   Data terminal equipment.

E

EIA   Electronics Industries Alliance.

ESD   Electrostatic discharge.

F

FEM   Fabric expansion module (server modules only). FEMs enable server modules to use the 10GbE connections provided by certain NEMs. *See* NEM.

FRU   Field-replaceable unit.

H

HBA   Host bus adapter.

host   The part of the server or server module with the CPU and other hardware that runs the Oracle Solaris OS and other applications. The term *host* is used to distinguish the primary computer from the SP. *See* SP.

hot-pluggable   Describes a component that can be replaced with power applied, but the component must be prepared for removal.

**hot-   Describes a component that can be replaced with power applied, and no preparation is required.
swappable**

I

ID PROM   Chip that contains system information for the server or server module.

IP   Internet Protocol.

K

KVM   Keyboard, video, mouse. Refers to using a switch to enable sharing of one keyboard, one display, and one mouse with more than one computer.

L

LwA   Sound power level.

M

MAC   Machine access code.

MAC address   Media access controller address.

modular system   The rackmountable chassis that holds server modules, storage modules, NEMs, and PCI EMs (server modules only). The modular system provides Oracle ILOM through its CMM.

MSGID   Message identifier.

N

name space   Top-level Oracle ILOM target.

NEBS   Network Equipment-Building System (Netra products only).

NEM   Network express module (server modules only). NEMs provide Ethernet and SAS connectivity to storage modules.

NET MGT   Network management port. An Ethernet port on the server SP, the server module SP, and the CMM.

NIC   Network interface card or controller.

NMI   Nonmaskable interrupt.

O

OBP   OpenBoot PROM. Sometimes OBP is used in file names and messages to indicate a relationship to OpenBoot.

Oracle ILOM	Oracle Integrated Lights Out Manager. Oracle ILOM firmware is preinstalled on a variety of Oracle systems. Oracle ILOM enables you to remotely manage your Oracle servers regardless of the state of the host system.
Oracle ILOM CMM	Oracle ILOM that runs on the CMM (server modules only). *See* Oracle ILOM.
Oracle Solaris OS	Oracle Solaris operating system.

P

PCI	Peripheral component interconnect.
PEM	PCIe ExpressModule (server modules only). Modular components that are based on the PCI Express industry-standard form factor and offer I/O features such as Gigabit Ethernet and Fibre Channel.
POST	Power-on self-test.
PROM	Programmable read-only memory.
PSH	Predictive self healing.

R

REM	RAID expansion module (server modules only). Sometimes referred to as an HBA *See* HBA. Supports the creation of RAID volumes on drives.

S

SAS	Serial attached SCSI.
SCC	System configuration chip.
SER MGT	Serial management port. A serial port on the server SP, the server module SP, and the CMM.
server module	Modular component that provides the main compute resources (CPU and memory) in a modular system. Server modules also might have on-board storage and connectors that hold FEMs.
SP	Service processor. In the server or server module, the SP is a card with its own OS. The SP processes Oracle ILOM commands providing lights out management control of the host. *See* host.

SSD	Solid-state drive.
SSH	Secure shell.
storage module	Modular component that provides computing storage to the server modules.

T

TIA	Telecommunications Industry Association (Netra products only).
Tma	Maximum ambient temperature.

U

U.S. NEC	United States National Electrical Code.
UCP	Universal connector port.
UI	User interface.
UL	Underwriters Laboratory Inc.
UTC	Coordinated Universal Time.
UUID	Universal unique identifier.

W

WWN	World wide name. A unique number that identifies a SAS target.

Index