Getting Started With Oracle® Solaris 11 Express

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Contents

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Exploring Oracle Solaris 11 Express

Welcome to Oracle Solaris 11 Express. This documentation is intended to help you with the installation and setup of the operating system and to make your initial experience with the software a successful one.

If you are a new user, review the following information:

- "Exploring the Oracle Solaris 11 Express Software" on page 8
- "Exploring the Oracle Solaris Live CD" on page 11

If you are already familiar with the operating system, go to "Installing From the Oracle Solaris Live CD – Quick Reference" on page 12.

Why Use Oracle Solaris 11 Express?

The Oracle Solaris 11 Express operating system (OS) offers a snapshot of features and capabilities in Oracle Solaris 11. As such, you can use Oracle Solaris 11 Express to evaluate the platform and prepare for future application and data center migrations to Oracle Solaris.

Oracle Solaris 11 Express includes, among other things, the GNOME Desktop Environment, GNU tools, and a network-based software management system. The OS also includes state-of-the art features: the Oracle Solaris ZFS file system, Oracle Solaris Dynamic Tracing (DTrace) framework, containers for running applications in protected environments, and advanced network virtualization capabilities.

Those who love technology, simply for technology's sake, will enjoy the many features that the operating system has to offer. However, from a practical standpoint, these features are meant to simplify, improve, and streamline your system management and application development .

Some examples include:

- Organizing and isolating workloads by using zones.
- Leveraging Oracle Solaris ZFS for unprecedented scalability, reliability, and management simplicity.
- Using sophisticated network virtualization capabilities to maximize resource control, network performance and utilization, utility computing, and server consolidation.
- Managing system services through the Service Management Facility (SMF), a Windows-like service management capability that supports managing service dependencies, service startup order, and service failures.
- Using the Time Slider feature of Oracle Solaris to easily browse and recover files from ZFS backup snapshots, without the assistance of a system administrator.
- Speeding up application development and debugging your system by using Oracle Solaris DTrace, a tracing infrastructure feature that provides visibility into system performance. By using built-in measurement points in the operating system, DTrace can display detailed performance characteristics about the operating system or user programs that are running in the operating system.

All of these capabilities are available through a simple installation. Alternatively, you can explore Oracle Solaris on a live CD, without actually installing it on your system. Or, you can run the OS in a virtual machine, for example VirtualBox or VMware.

Exploring the Oracle Solaris 11 Express Software

The Oracle Solaris distribution enables you to do the following:

- **Explore the operating system.**

  Oracle Solaris 11 Express provides a live CD ISO image for x86 platforms. The live CD ISO image includes a basic, core operating system and the GNOME desktop. You can explore the OS from the live CD, without actually installing it on your system. For more information, see "Exploring the Oracle Solaris Live CD" on page 11.

- **Install the operating system.**

  There are several installation options to choose from, depending on your system's environment and requirements:

  - **Use the live CD ISO image on x86 based systems.**

    On an x86 based system, you can view the Oracle Solaris 11 Express operating system by using a live CD ISO image, then install directly from that ISO image. (To install Oracle Solaris on your system, you must first burn the bootable image to a CD.) Or, you can download the live CD ISO image, and then install the OS in a virtual machine, directly from this image.

  - **Use the text installer for x86 or SPARC based systems.**

For systems that do not have a graphic display, you can use the text installer.

Note – Both the live CD GUI and text installers are capable of running with a minimum of 512 MB of memory. However, the minimum amount of memory that is required varies, depending on system specifications. If the GUI installer on the live CD ISO image does not work on your system, use the text installer.

- **Use the automated installer for x86 or SPARC based systems.**

  For installing multiple systems, use the automated installer, which provides simplified setup and configuration for multiple installations of the operating system.

  The automated installer enables system administrators to create an installation service that provides blueprints for specific x86 and SPARC based installations. The installation service includes a web server that stores manifest files with installation specifications that are defined by the administrator. To locate an installation blueprint that matches particular system specifications, clients can contact the web server and review the available services by using associated manifest files. When a matching blueprint or manifest file is found, the service installs the client with Oracle Solaris, according to the specifications in the manifest file. Note that the automated installer does not include a desktop or any interactive functions.

To download and install Oracle Solaris 11 Express, go to `http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`.

- **Add and update the software that is on your system.**

  After Oracle Solaris has been installed on your system, additional software packages, including developer tools, can be downloaded by using the Image Packaging System (IPS). IPS accesses software packages from networked repositories and then installs them on your system.

  IPS offers both the Package Manager graphical user interface (GUI) and command-line utilities, such as the `pkg` command, to install and manage the software packages on your installed system. Package Manager for IPS enables you to easily update and manage software packages that are on your system directly from the desktop.

  On an installed system, Package Manager can be started from the desktop by choosing System → Administration → Package Manager. You can also start the application by clicking the Package Manager icon that is located on the desktop.

  Use Package Manager or the IPS CLI to perform the following tasks:

  - Add new software packages to your system from networked repositories.
  - Update the existing software packages individually on your system.
  - Update all of the software packages on your system at once.

Note – You can use Package Manager and the IPS tools to perform several other types of tasks, including creating and managing boot environments, mirroring a repository, and creating and publishing packages.

- **Set up a customized application development environment on your system.**

  Oracle Solaris offers complete support for developing and deploying applications. Tools that are required for application development are available for download and installation through Package Manager. You can easily download and install tools, such as compilers, debugging tools, performance analyzers, NetBeans, source code management, and the `make` utility.

  You can also download and install Web Stack development tools, such as Apache web server, Hypertext Preprocessor (PHP), Lighttpd web server, and the Squid caching proxy. For more information, see Chapter 7, "Setting Up Your Application Development Environment."

- **Create and manage multiple boot environments on your system.**

  A boot environment (BE) is a bootable instance of the OS image, plus any other software packages that are installed into that image. You can maintain multiple boot environments on your system. Each boot environment can potentially have a different software version installed.

  With multiple BEs, the process of updating software becomes a low-risk operation, because you can create backup boot environments before making any software updates to your system. If necessary, you have the option of booting a backup boot environment. For more information, see "Managing Multiple Boot Environments" on page 62.

Exploring the Oracle Solaris Live CD

Oracle Solaris provides a live CD ISO image for x86 platforms that boots to a minimal operating system, with a GNOME desktop that includes the Firefox Web Browser, Thunderbird Mail/Calendar, and other core applications, features, and tools, including the following:

- The network auto-magic (NWAM) feature of Oracle Solaris, which is enabled by default during an installation. NWAM enables you to monitor network activity and manage network interfaces.
- The Device Driver Utility, a tool that provides information about devices in your native system and their corresponding drivers. This utility enables you to connect to the IPS repository and search your system for any devices that do not have drivers attached to them.

  When you boot your system from the live CD ISO image, and the desktop is displayed, the Device Driver Utility automatically launches and begins searching for missing device drivers. If the utility locates any such devices, a notification is displayed on the desktop. The missing driver is then automatically installed on your system from the Oracle Solaris repository.

  To manually launch the Device Driver Utility from the desktop when exploring with the live CD, choose Applications → System → Device Driver Utility.

  If you are performing an interactive installation in text or console mode, a new "Install additional driver" menu option is available on the startup menu. Use this option if you want to start the Device Driver Utility.

  Because NWAM is set up by default when the text installer boots, if you have chosen to configure your system by using the Dynamic Host Control Protocol (DHCP), no further network configuration is required to use the Device Driver Utility. However, if you are not using DHCP, select the "Shell" option during the installation, then use the appropriate commands to manually configure your network.

Note – The Device Driver Utility can require a minimum of 1.5 GB of memory. If your system has devices that are adequate for performing an installation, first complete the installation, then boot the installed hard disk before running the Device Driver Utility. This way, the utility can take advantage of the available swap space on the installed system.

To explore Oracle Solaris on the live CD ISO image, without affecting the existing OS that is installed on your system, refer to the following guidelines:

- A minimum of 512 MB of memory is required to run the Oracle Solaris Live CD and the interactive installer.
- You can download an ISO image of the current release's live CD, then burn this image to a CD and boot to it. Or, you can save the image on your system and then run it in a virtual machine. See "Preparing to Run Oracle Solaris 11 Express in a Virtual Machine" on page 24.

Live CD Options

The following are the Oracle Solaris live CD options:

- If you need to use accessibility features, you can select either the Magnifier or the Screen Reader boot options.

  Both the magnifier and screen reader boot options are displayed in the GRUB menu when you boot the live CD. Use the arrow key to select either boot option. Then, press Return to boot the system with the specified accessibility feature.
- If you are prompted to log in to the live CD, both the user name and password are `jack`.
- If you need to access the system as the `root` user, use the `su` command. The live CD `root` password is `solaris`.
- If you choose, you can install the OS on your system from the live CD ISO image. For instructions, see "Installing From the Oracle Solaris Live CD – Quick Reference" on page 12.

Note – Important: If you proceed to install the operating system, you will create a new user during the installation process. After the installation, log in to the system as that user. Your user password and the `root` password are initially the same. You will be prompted to create a new, unique `root` password after the installation.

To finish configuring your system, use the `su root` command to invoke a shell that includes privileges that are assigned to the `root` role or prepend privileged commands with the `sudo` command.

For more detailed information, see Chapter 5, "Understanding Users and Roles."

Installing From the Oracle Solaris Live CD – Quick Reference

The live CD ISO image includes an installer that enables you to install Oracle Solaris on your x86 based system.

To start the installer, select the Installer icon that is located on the live CD desktop.

When using the installer tool on the live CD, you have the following choices:

- Install Oracle Solaris as the *only* operating system on your system.
- Install Oracle Solaris on a partition that is separate from your existing OS.

Caution – Be aware that the installation overwrites all of the software and data on the selected partition.

- Install Oracle Solaris inside a virtual machine.

Related Information

For more information, see the following additional resources.

Topic	Where To Find More Information
Download Oracle Solaris 11 Express.	`http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`
Learn more about installing and using Oracle Solaris 11 Express.	*Getting Started With Oracle Solaris 11 Express*
Automate the installation of Oracle Solaris 11 Express on multiple systems.	*Oracle Solaris 11 Express Automated Installer Guide*
Keep your system up to date.	*Oracle Solaris 11 Express Image Packaging System Guide*
Manage boot environments.	*Managing Boot Environments With Oracle Solaris 11 Express*

◆ ◆ ◆ CHAPTER 2

Preparing to Install Oracle Solaris 11 Express

Before installing Oracle Solaris 11 Express, review the installation options and requirements in this chapter.

Oracle Solaris 11 Express Installation Options

There are a number of options for installing Oracle Solaris 11 Express on your system:

- Perform a new interactive installation of the OS from the live CD ISO image or from the text installer image.

  To decide whether to use the graphical user interface (GUI) installer on the live CD or the text installer, refer to the additional information in Chapter 3, "Installing Oracle Solaris 11 Express." For instructions, see "How to Prepare to Install Oracle Solaris From the Live CD or Text Installer" on page 22.

- Run Oracle Solaris 11 Express in a virtual machine.

  For instructions, see "Preparing to Run Oracle Solaris 11 Express in a Virtual Machine" on page 24.

- Upgrade a system that is running the OpenSolaris 2009.06 release to Oracle Solaris 11 Express. For detailed instructions, see *Oracle Solaris 11 Express Release Notes* .

- Install Oracle Solaris on multiple client systems by using the automated installer (AI).

  The AI essentially performs "hands-free" network installations on both x86 and SPARC based systems. Use this option for fast installations on multiple systems that do not require any customization.

  As another option, you can download a SPARC or x86 an AI image, then burn the image to removable media, such as a CD, DVD, or for x86 installations, a USB stick. Then, you can boot the AI media directly on each of your systems to initiate an automated installation. Note that each system requires network access because the installation process retrieves packages from a networked IPS repository. Installations that use AI media are non-interactive.

System Requirements for Installing Oracle Solaris

The following table outlines the various requirements for installing Oracle Solaris 11 Express.

Requirement	Description
Memory	The minimum memory requirement is 512 MB. **Note –** The live CD ISO image, and both the GUI and text installers, are capable of functioning with a minimum of 512 MB of memory. However, this minimum requirement varies, depending on system specifications. If your system does not have enough memory to run the GUI installer, use the text installer instead.
Disk space	The recommended size is at least 10 GB. A minimum of 4 GB is required.
x86 only: Support for multiple operating systems	If you are installing Oracle Solaris on an x86 based system that will have more than one operating system installed in it, you can partition your disk during the installation process. See "x86: Setting Up Partitions During an Interactive Installation" on page 20. Alternatively, you can use the `fdisk` command or a third-party partitioning tool to create a new partition or make adjustments to preexisting partitions prior to an installation. See "Guidelines for Partitioning a System Prior To Installation" on page 18. For more information about preparing an environment for the installation of specific operating systems, see "Preparing a Boot Environment That Supports the Installation of Multiple Operating Systems" on page 17.

Additional Installation Considerations

When installing Oracle Solaris 11 Express, consider the following information:

- The installer on the live CD ISO image is for 32-bit or 64-bit x86 platforms *only*.

  If you want to install the operating system on a SPARC based system, use the text installer or the AI tool.
- The Oracle Solaris 11 Express installers cannot upgrade your operating system. However, after you have installed Oracle Solaris 11 Express, you can update all of the packages on your system that have available updates by using the Image Packaging System. See "Updating Software Packages on Your System" on page 61.

  Note – You can upgrade from the OpenSolaris 2009.06 release to Oracle Solaris 11 Express by using a specific procedure. For instructions, see *Oracle Solaris 11 Express Release Notes* .

- The interactive installers can perform an initial installation on an Oracle Solaris x86 partition, or for the text installer, on a SPARC slice. Or, the installation can use the whole disk.

Caution – The installation overwrites all of the software and data on the targeted device.

Preparing a Boot Environment That Supports the Installation of Multiple Operating Systems

If you are installing Oracle Solaris as part of a multiple boot environment, review the specifications for the various operating systems in the following table.

TABLE 2–1 Multiple Operating System Environments

Existing Operating System	Description
Windows	If you have Windows installed, and you set up sufficient disk space for installing Oracle Solaris, the installation should be straightforward. All versions of Oracle Solaris for the x86 platform use the GNU Grand Unified Bootloader (GRUB). Oracle Solaris recognizes Windows and ensures that Windows partitions remain unchanged during an installation. When the installation completes, and the system reboots, the GRUB menu displays both the Windows and the Oracle Solaris boot entries.
Linux, or Windows and Linux	If you have the Linux operating system, or both Linux and Windows operating systems installed on your x86 based system, before installing Oracle Solaris, save a copy of the `menu.lst` file. After the installation, you will need to edit the `menu.lst` file to add the Linux information from the previous installation. For instructions, see "How to Add a Linux Entry to the GRUB Menu After Installing Oracle Solaris" on page 65. **Note –** When installing Oracle Solaris on a system that also has the Linux operating system installed, the Oracle Solaris partition *must* precede the Linux `swap` partition.
Oracle Solaris 10 OS	The installer on the live CD and the text installer cannot be used to boot multiple instances of Oracle Solaris. However, the installers can be used to replace the Solaris 10 1/06 and later releases on an existing system that has multiple instances of Oracle Solaris installed. **Note –** If you need to preserve a specific Solaris Volume Table of Contents (VTOC) slice in your current operating system, use the text installer.

TABLE 2–1 Multiple Operating System Environments *(Continued)*

Existing Operating System	Description
Extended partitions	If you have another operating system on an extended partition, the existing extended partition does not need to be changed during an installation. You can create, resize, or delete an extended partition when you install Oracle Solaris by using either the live CD GUI installer, the text installer, or the automated installer. You can also choose to install Oracle Solaris on a logical partition within an extended partition.

For interactive installer instructions, see "Installing Oracle Solaris 11 Express by Using an Interactive Installer" on page 29. For automated installer instructions, see the *Oracle Solaris 11 Express Automated Installer Guide*.

Guidelines for Partitioning a System Prior To Installation

When installing Oracle Solaris from the live CD ISO image or from the text installer image, you can use the entire disk, or you can install the operating system on an x86 partition. With the text installer, you can install the operating system on a SPARC slice.

On x86 based systems, the installer uses GRUB, which supports installing multiple operating systems on one drive. You can create a partition for installing Oracle Solaris prior to installation, as well as during an installation. After partitioning and installing the various operating systems, you can deploy any of them by selecting the appropriate menu entry in the GRUB menu at boot time.

▼ x86: How to Partition a System Prior to Installation

The following procedure describes how to partition an x86 based system prior to installation. For information about partitioning a system during an installation, see "Guidelines for Partitioning a System During an Interactive Installation" on page 19.

1 Back up your system.

Backing up your system is **strongly** recommended before partitioning your hard drive. The Ghost for UNIX (G4U) open-source tool was designed to back up x86 based systems.

2 On your hard drive, create a partition for installing the operating system.

Choose one of the following options:

- **Use the `fdisk` command to create or modify an Oracle Solaris `fdisk` partition.**

  For instructions, see "How to Create a Solaris fdisk Partition" in *System Administration Guide: Devices and File Systems*. See also the `fdisk`(1M) man page.

- **Use commercial products or open-source tools to partition your hard drive.**

  GParted is an open-source tool for disk partitioning. You can use this tool to create New Technology File System (NTFS) partitions. To access the GParted tool on the live CD desktop, double-click the GParted tool icon. To access the tool from the main menu, choose Applications → System Tools → GParted Partition Editor.

  Note – The GParted tool is not supported in the text installer media.

  If you create Linux-swap partitions by using the GParted tool, note that Linux-swap uses the same partition ID that Oracle Solaris uses. During the installation, in the disk partitioning step, you can change the Linux-swap partition to an Oracle Solaris partition.

3. **Use the installer to install the operating system on the Oracle Solaris `fdisk` partition.**

Guidelines for Partitioning a System During an Interactive Installation

On an x86 based system, you can select, create, or modify partitions during an interactive installation. For the text installer *only*, you can select, create, or modify Solaris VTOC slices during an interactive installation.

Note – Changes you make to disk partitioning or slices are not implemented until you finish making the installer panel selections and the installation begins. At any point prior to the installation, you can cancel your changes and restore the original settings.

When setting up x86 partitions or extended partitions during an interactive installation, keep the following in mind:

- Only one Solaris partition is allowed.
- A Solaris partition must be used for the installation.
- If there is an existing Solaris partition, that partition is selected by default. The partition can be a logical partition within an existing extended partition.
- If the existing partition table cannot be read, proposed partitioning information is displayed.

Caution – In this case, all of the existing data on the disk is destroyed during the installation.

- During the installation, if you select the "Partition the Disk" option, the panel displays the existing `fdisk` partitions for the selected disk. Up to four primary partitions are displayed in the same order that they are laid out on the disk. Unused disk space is displayed for these

primary partitions. The partition type, current size, and maximum available disk space for each partition are also displayed. If an extended partition exists, its logical partitions are also displayed in the disk layout order, within the extended partition.

x86: Setting Up Partitions During an Interactive Installation

For installations on the x86 platform, you can make changes to disk partitioning by directly editing the entries in the installation screens, as they are displayed. As you proceed through the installation, the recommended and minimum sizes for installing the software are also displayed.

The following table describes the disk partitioning options that you can choose from. Use this table to help you determine which option best suits your needs.

TABLE 2–2 Options for Partitioning a Disk During an Interactive Installation

Partitioning Option	Description and User Action (if required)
Use the existing Solaris partition.	This option installs Oracle Solaris 11 Express on the existing Solaris partition using its current size. Select the Partition a Disk option. No other changes are required.
Create a new Solaris partition.	If there is currently no existing Solaris partition on the system, you can create a new Solaris partition. To do so, select a primary partition or a logical partition and then change its type to Solaris. During an installation, this modification erases the existing partition contents.
Increase the space that is allocated to a Solaris partition and install on that partition.	If there is enough available disk space, you can increase the size that is allocated to a Solaris partition before installing the software on that partition. The available space contains any contiguous unused space before or after the selected partition. If you enlarge the partition, unused space after the partition is used first. Then, unused space before the partition is used, which changes the starting cylinder of the selected partition.
Install Oracle Solaris 11 Express on a different primary partition.	You can install the operating system on a different primary partition. To do so, you must first change the existing Solaris partition type to Unused. You can then select another partition and change its type to Solaris. During an installation, this modification erases the existing partition contents for both the previous Solaris partition and the new Solaris partition.

TABLE 2–2 Options for Partitioning a Disk During an Interactive Installation *(Continued)*

Partitioning Option	Description and User Action (if required)
Create a new Solaris partition within an extended partition.	You can create a new Solaris partition within an extended partition. If a Solaris partition already exists, change its type to Unused. Then, to create a new extended partition, change the partition type to Extended. You can resize the extended partition, then change one of the logical partitions in the extended partition to a Solaris partition. Also, you can enlarge the logical partition up to the size of the extended partition that contains that logical partition.
Delete an existing partition.	You can delete an existing partition by changing its type to Unused. During an installation, the partition is destroyed, and its space is made available when resizing adjacent partitions.

Setting Up Solaris VTOC Slices With the Text Installer

For text installations on the SPARC platform, you can modify VTOC slices during the installation. For text installations on the x86 platform, you can modify a slice within a partition, if that partition has not already been modified during the installation.

When setting up VTOC slices, keep the following in mind:

- The installer displays the existing slices. The slices are displayed in the order in which they are laid out. The current size and maximum available size for each slice are also displayed.
- Oracle Solaris must be installed in an Oracle ZFS root pool. By default, the slice that contains the root pool is labeled `rpool` by the installer. If you want to install the operating system on a slice that does *not* contain the root pool, change the type for that slice to `rpool` in the installer. During the installation, a ZFS root pool will be created on that slice.

  Note – Because there can only one ZFS pool named `rpool`, if there already is an `rpool` on the device, the installer names any new pool using the format `rpool#`.

- The size of a slice can be increased up to the maximum available size. You can change a slice to Unused, thereby making its space available to adjacent slices.
- If the slice is not explicitly altered, the content of the slice is preserved during the installation.

The following table describes the options for modifying slices during a text installation.

TABLE 2–3 Options for Modifying VTOC Slices During a Text Installation

Option	Description and User Action (if required)
Use an existing slice.	This option installs Oracle Solaris 11 Express on an existing VTOC slice using its current size. Select the target slice, then change its type to `rpool`.
Resize a slice.	You can only change the size of a newly created `rpool` slice. Type the new size in the field, up to the maximum size available.
Create a new slice.	Select an unused slice. For example, change its type from Unused to `rpool`.
Delete an existing slice.	You can delete an existing slice by changing its type to Unused. During the installation, the slice is destroyed and its space is made available when resizing adjacent slices.

▼ How to Prepare to Install Oracle Solaris From the Live CD or Text Installer

Before You Begin For x86 based systems, from the live CD, you can install the operating system either on your system or in a virtual machine.

Alternatively, for both SPARC and x86 based systems, you can install Oracle Solaris by using a text installer. The text installer can be used on systems that do not have graphics cards.

Note – Depending on your system configuration, the text installer may require less memory. If the GUI installer on the live CD does not work on your system, use the text installer instead.

You can download the live CD bootable image or the text installer image at `http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`.

You also have the option to download a USB image for x86 based systems.

1 After you download the image, do one of the following:

- **Copy the image to removable media, such as a CD, DVD, or USB stick, then continue to Steps 2 and 3.**
- **For the live CD ISO image or the text installer image, you can save the image to your system and then run it in a virtual machine. See "Running Oracle Solaris 11 Express in VirtualBox" on page 34.**

2. **Check the requirements and limitations for running the installer on your system:**

   a. **Verify that your system meets all of the necessary system requirements. See "System Requirements for Installing Oracle Solaris" on page 16.**

   b. **Review the "Additional Installation Considerations" on page 16.**

   c. **Verify that you have all of the necessary device drivers. See "Ensuring That You Have the Proper Device Drivers" on page 24.**

   Note – The Device Driver Utility can require at least 1.5 GB of memory. If your system has an adequate complement of devices to perform an installation, first complete the installation, then boot the installed hard disk before running the Device Driver Utility. Then, the utility can take advantage of the swap space on the installed system.

3. **Choose one of the following options for installing Oracle Solaris 11 Express:**

   - **If Oracle Solaris 11 Express is the only operating system that is to be installed on your system, see the instructions for "Installing Oracle Solaris 11 Express by Using an Interactive Installer" on page 29.**

   - **If you are setting up an environment that supports the installation of multiple operating systems, do the following:**

     a. **Review the specifications in "Preparing a Boot Environment That Supports the Installation of Multiple Operating Systems" on page 17.**

     

     Caution – If you already have an Oracle Solaris `fdisk` partition on your system, the installation overwrites this partition.

     b. **Back up your system.**

     When partitioning your system, this step is strongly recommended. For instructions, see Step 1 of "Guidelines for Partitioning a System Prior To Installation" on page 18.

     c. **If you plan to partition your system prior to installation, see "Guidelines for Partitioning a System Prior To Installation" on page 18.**

4. **Follow the instructions in "Installing Oracle Solaris 11 Express by Using an Interactive Installer" on page 29.**

Preparing to Run Oracle Solaris 11 Express in a Virtual Machine

The following are the various options for running Oracle Solaris in a virtual machine:

- Run the Oracle Solaris live CD ISO image as a "guest" in the VirtualBox software. For instructions, see "Running Oracle Solaris 11 Express in VirtualBox" on page 34.
- Use the distribution constructor to design and build your own pre-installed Oracle Solaris virtual machine.
- If you are installing Oracle Solaris 11 Express on a system that is running Mac OS X, and Parallels is also installed, see "Running Oracle Solaris on a Mac OS X System With Parallels Installed" on page 40.

Ensuring That You Have the Proper Device Drivers

Before installing Oracle Solaris, determine whether your system's devices are supported. The Hardware Compatibility List (HCL) at `http://www.sun.com/bigadmin/hcl/data/os/` provides information about hardware that is certified or reported to work with Oracle Solaris. The Solaris on x86 Platforms Device Support tool tells you which Oracle Solaris driver supports the various x86 components.

The following utilities can also be used to determine whether a device driver is available:

- **Device Driver Utility**

  The Device Driver Utility provides the same information as the Oracle Device Detection Tool. This utility is available on the Oracle Solaris 11 Express Live CD ISO image and also on the desktop of an installed system. The utility is also available through the text installer menu options.

- **Oracle Device Detection Tool**

  The Oracle Device Detection Tool reports whether the current release supports the devices that have been detected on your system. This tool runs on many different systems, including several different Oracle Solaris 10 releases, Windows, Linux, Mac OS X, and FreeBSD. There is a link to the Oracle Device Detection Tool on the HCL (`http://www.sun.com/bigadmin/hcl/data/os/`). For instructions on using the tool, see "How to Use the Oracle Device Detection Tool" on page 28.

▼ How to Use the Device Driver Utility

The Device Driver Utility provides information about the devices on your system and the drivers that manage those devices. The utility reports whether the currently booted operating system has drivers for all of the devices that are detected in your system. If a device does not have a driver attached, the Device Driver Utility recommends a driver package to install.

The Device Driver Utility runs automatically when you boot an installation image. You can also manually start the Device Driver Utility after you have installed Oracle Solaris.

You can also use the Device Driver Utility to submit your system information to the HCL at `http://www.sun.com/bigadmin/hcl/data/os/`. Your system and its components are then listed on the HCL as "Reported to Work".

1 Start the Device Driver Utility by using one of the following methods:

- **Boot the live CD installation image.**

  When you boot the live CD ISO image, the Device Driver Utility runs in the background. If a missing driver is found in an IPS package from the default publisher, the Device Driver Utility installs that driver package automatically. If any other drivers are missing, the Device Driver Utility displays a dialog that prompts you display the utility window, so that you can review the report and install any additional missing drivers.

- **Manually start the Device Driver Utility from the desktop of the live CD.**

  To manually start the Device Driver Utility from the desktop of the live CD, double-click the Device Driver Utility icon on the desktop. Or, choose Applications → System Tools → Device Driver Utility from the main menu.

- **Boot the Oracle Solaris text installer image.**

  To start the Device Driver Utility from the text installer, choose Install Additional Drivers from the initial menu.

  Note – The NWAM feature of Oracle Solaris is set up by default when the text installer boots. If you are using DHCP, no further network setup is necessary to use the Device Driver Utility. If you are not using DHCP, select the Shell option on the initial menu, then use the appropriate commands to manually configure your network settings before using the Device Driver Utility.

- **Start the Device Driver Utility on an installed system.**

  To start the Device Driver Utility from the desktop of an installed system, choose Applications → System Tools → Device Driver Utility from the main menu.

The Device Driver Utility scans your system and then displays a list of the devices that are detected. For each device that is detected, the list displays information, such as manufacturer, model, and the name of the driver that is currently managing the device. If the utility detects a device that does not have a driver attached, that device is selected on the device list. From here, you can display more information about the device and install the missing driver.

2 To display more details about a particular device:

a. Right-click the device, then select Show Details from the popup menu.

The Device and Driver Details window is displayed. The device name, vendor name, node name, driver name, and other detailed information about the device is displayed in this window.

b. To display more details about a missing driver, click the Info link for the selected device.

If no driver is currently managing the device, the Driver column of the device list displays a status for the driver of that device.

- If there is a missing driver in one of your configured IPS package repositories, the driver status for that device entry is `IPS`.
- If there is a missing driver in a System V Revision 4 package (SVR4), the driver status for that device entry is `SVR4`.
- If there is a missing driver in a DU package, the driver status for that device entry is `DU`.
- If the Device Driver Utility cannot locate an Oracle Solaris driver for this device, the driver status is `UNK`.

3 Install the missing drivers, as follows:

- **To install an IPS driver, do the following:**

a. Click the Info link in the corresponding row of the table to get information about the IPS package that contains the driver for the device.

When you click the Info link, the text field for the Package radio button is populated with the relevant package information. The correct publisher is selected from the drop-down menu.

b. Click the Install button to install the package.

- **If the Info link lists an IPS package from a publisher that is not configured, follow these steps:**

i. Select Add Repository from the repositories drop-down menu.

The Repositories manager window is displayed.

ii. Add the name and URI of the new repository, then click Add.

- **If the Package field is not populated, type the name of the IPS package from the Info link, then click Install.**

- **To install SVR4 or DU drivers, do the following:**
  - **If a URL for the package is provided, type the URL in the File/URL field, then click Install.**
  - **If you have a copy of the package on your system, use the Browse button to select the package, then click Install.**
- **If the driver status is displayed as UNK, do the following:**
  a. **Click the name of the device that you want this driver to manage.**
  b. **Type the relevant package information in either the Package field or the File/URL field, then click Install.**
  c. **(Optional) To share information about a driver that works for the device, click the Submit button.**

4 **(Optional) To list your system and its components as "Reported to work" on the HCL click the Submit button.**

The Submit Information To Hardware Compatibility List window opens. This window displays all of the information that was collected about your system.

a. **From the drop-down list, select the System Type.**

b. **Type the appropriate information in any of the fields that were not automatically populated.**

- The Manufacturer Name is the name of the system maker, for example, Toshiba, Hewlett-Packard, or Dell.
- Provide the complete model number.

  The BIOS/Firmware Maker is the information on the BIOS Setup screen that is usually displayed while the system is booting.
- The CPU Type is the name of the CPU maker.

c. **Provide your name and Email address.**

d. **In the General Notes field, add any additional comments, then click Submit.**

- **If you do not have Internet access, click the Save button, and submit the report later.**

For more information about using the Device Driver Utility, click the Help button.

▼ How to Use the Oracle Device Detection Tool

As an alternative to the Device Driver Utility, you can use the Oracle Device Detection Tool to determine whether the current release includes drivers for all of the devices on your system.

Before You Begin Review the information in the "System Requirements for Installing Oracle Solaris" on page 16 section.

1. **Open a web browser and go to `http://www.sun.com/bigadmin/hcl/hcts/device_detect.jsp`.**
2. **In the Using the Device Detection Tool section, click the Start Oracle Device Detection Tool option.**
3. **Accept the license agreement.**
4. **Click the ddtool download link.**
5. **Select the Open with JavaWS option, then select Run.**

   The tool runs, but it is not installed on your system.
6. **Select the Target Operating System for which you want to check driver availability.**

   For additional information, click the Help button.

Related Information

For more information, see the following additional resources.

Topic	Where To Find More Information
Find out more about performing an installation on multiple systems by using AI media.	*Oracle Solaris 11 Express Automated Installer Guide*
Find out more about using the Oracle Device Detection Tool.	`http://www.sun.com/bigadmin/hcl/hcts/device_detect.jsp`
Find out more about using the Device Driver Utility.	See the Device Driver Utility online help.
Find system administration tasks for managing disks and devices.	*System Administration Guide: Devices and File Systems*

◆ ◆ ◆ CHAPTER 3

Installing Oracle Solaris 11 Express

When installing Oracle Solaris 11 Express, you can choose from the following installation options:

Installing Oracle Solaris 11 Express by Using an Interactive Installer

You can install Oracle Solaris by using either the GUI installer on the live CD or the text installer option. Both installers can be used to install Oracle Solaris on the x86 platform. The text installer can also be used to install Oracle Solaris on the SPARC platform. Both installers are capable of functioning with a minimum of 512 MB of memory. Both installers enable you to select, create, or modify partitions during an installation.

The text installer has the following advantages over the GUI installer:

- Enables you to install the operating system on either SPARC or x86 based systems. The text installer enables you to select, create, or modify VTOC slices or partitions for use in the installation.
- Can be used on systems that do not have (or do require) graphics cards.
- Can require less memory than the GUI installer, depending on your system's specifications.

Note – If you use the text installer, be aware that it does *not* install all of the software packages that are included when installing from the live CD. In particular, the text installer does not install the GNOME desktop. You work from the command line on the installed system. To install additional packages after an installation with the text installer, see Appendix B, "Troubleshooting the Oracle Solaris 11 Express Release."

To download either the live CD ISO image or the text installer image, go to `http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`.

Interactive Installation Settings and Guidelines

Following are the default network and security settings that are used by the GUI installer on the live CD and by the text installer:

- Oracle Solaris is automatically networked by using DHCP, with Domain Name System (DNS) resolution.

  The DNS domain and server Internet Protocol (IP) addresses are retrieved from the DHCP server.
- IPv6 is disabled.
- The NFSv4 domain is dynamically derived.
- The `nwamd` daemon, which is controlled by the Service Management Facility (SMF), performs automatic network configuration.
- Kerberos is disabled.

When installing Oracle Solaris, note the following important information about disk partitioning:

- The installation overwrites the whole disk layout, if any of the following is true:
  - The disk table cannot be read.
  - The disk was not previously partitioned.
  - You select the entire disk for the installation.
- A maximum of 2 TB on a disk or a partition can be used for installing the OS, regardless of whether the disk or partition is larger than 2 TB. Disks that do not have enough space for a successful installation are labeled as such.
- If an existing Oracle Solaris `fdisk` partition is on a system, and you make no modifications to the existing partitions, the installation overwrites the Oracle Solaris `fdisk` partition *only*. Other existing partitions are not changed.

For more information about partitioning a system before an installation, see "Guidelines for Partitioning a System Prior To Installation" on page 18.

For information about partitioning a system during an interactive installation, see "Guidelines for Partitioning a System During an Interactive Installation" on page 19.

Performing an Interactive Installation

Whether you are using the GUI installer on the live CD or the text installer, you follow the same basic steps to perform an installation. However, the order in which the steps are performed and the details that are displayed on each installation panel might vary, depending on which installer you are using, and whether you are installing on the SPARC or x86 platform.

Review the following basic installation steps. For detailed instructions on what to do at a particular installer screen, see the online help for that screen.

TABLE 3–1 Interactive Installation Steps

Step	Instructions
1. Complete any preliminary tasks.	Review the guidelines in Chapter 2, "Preparing to Install Oracle Solaris 11 Express." In particular, if you are planning to set up and install Oracle Solaris on a partition or slice and have not done so yet, review the information in "x86: Setting Up Partitions During an Interactive Installation" on page 20. You can download either the live CD ISO image or the text installer image, then copy the image to removable media, such as a CD, DVD, or a USB stick. Alternatively, you can run the image inside VirtualBox. To download the Oracle Solaris Live CD ISO image or the text installer image, go to `http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`. **Note –** If you have previously installed the Linux operating system, you will need to save a copy of the existing `menu.lst` file to a USB drive for use after the installation. For instructions, see "Adding a Linux OS Entry From a Previous Installation to the GRUB Menu" on page 65.
2. Insert the installation media, boot the system, then make any preliminary language selections.	On the live CD, when the GRUB menu is displayed, select the Boot From CD option. ■ If you are prompted to log in to the live CD, the user name and password are `jack`. ■ The `root` password is `solaris`.
3. (Conditional) Install any missing drivers that are required for installation.	When you boot the live CD, if any drivers are missing, a prompt is displayed. Follow the instructions for accessing the Device Driver Utility to locate and install any drivers that are required for the installation. Alternatively, you can select option #2 on the initial text installer menu to install required drivers before selecting option #1 to install Oracle Solaris. For instructions on using the Device Driver Utility, see "How to Use the Device Driver Utility" on page 24.

TABLE 3–1 Interactive Installation Steps *(Continued)*

Step	Instructions
4. Initiate the installation.	■ On the live CD desktop, double-click the Install Oracle Solaris icon to start the GUI installer. ■ On the text installer initial menu, select option #1 to initiate an installation of Oracle Solaris.
5. Select an installation target. Optionally, you can modify the partition or slice layout.	In the series of Disks panels that is displayed, choose whether to install the operating system on the whole disk or on a partition or a slice on the disk. You can modify the partition or slice layout. For instructions, see "x86: Setting Up Partitions During an Interactive Installation" on page 20 and "Setting Up Solaris VTOC Slices With the Text Installer" on page 21. At any point during this phase of the installation, you can revert to the original settings. **Caution –** If the existing partition table cannot be read, the panel displays proposed partitioning. In this instance, all of the data on the disk is destroyed during the installation.
6. Complete date, time, and time zone settings.	Select the default date and time, then select a time zone or location. The installer uses the time zone from the system's internal settings as the default, if possible.
7. Select the language and locale.	The language and locale selections determine the language support and other data formats for the installed system. Note that for the text installer, language support is selected when the system boots, prior to running the installer. You can change either the default locale or the locale for that particular section any time that you log in to the system. To change the locale during login, click the Options button, then choose Select language.

TABLE 3–1 Interactive Installation Steps *(Continued)*

Step	Instructions
8. Complete the user settings.	To complete the user account setup, a login name and password are required. ■ Type a user name and password. ■ The login name must begin with a letter and can *only* contain letters and numbers. ■ For the text installer, provide a `root` password. If you do not create a user account during the installation, the `root` account is set up as a regular user account rather than a role. ■ For the GUI installer, you are not required to provide a `root` password during the installation. On an installed system, the initial `root` password defaults to the user account password that you entered during the installation. **Note –** The first time you use the `root` password, you are prompted to change the password. ■ Type a computer name or accept the default. This field cannot be blank. For the GUI installer, the computer name field is included in the user panel. For the text installer, this field is located in the network configuration panel.
9. **Text installer only:** Specify the network configuration information.	Specify how the network should be configured, as follows: ■ Allow DHCP to configure the connection automatically. ■ Skip the network configuration step during the installation, then configure the network settings after the installation.
10. Review the installation specifications.	Review the specifications in the Installation Summary screen. If necessary, go back and make any required changes before starting the installation.
11. Install the system using the specifications you have provided.	The Oracle Solaris installation process begins. **Caution –** Do not interrupt an installation that is in progress. An incomplete installation can leave a disk in an indeterminate state.
12. Review the installation logs.	The Installation Results panel provides access to installation logs that you can review.
13. Reboot the system, or quit the installer and shut down the system.	After a successful installation, reboot the system or exit the installer and shut down the system. Eject the live CD as the next system boot begins. Or, select the "Boot from Hard Disk" option in the GRUB menu. If the installation fails, you can view the installation log and exit the installer.
14. (optional) Perform any additional steps.	For further instructions, see "Related Information" on page 41.

Running Oracle Solaris 11 Express in VirtualBox

The following information pertains to running the live CD ISO image inside the VirtualBox software. You also have the option of running a text installer image inside VirtualBox.

VirtualBox is an application that runs on your operating system to provide a virtual environment, also called a *virtual machine*, that enables you to install other operating systems as "guests" inside the virtual machine.

Oracle Solaris provides improved host operating system support for VirtualBox. Depending on the configuration, the operating system can proxy USB devices that are plugged into the host operating system to the guest operating system.

Note – Oracle Solaris can be installed and run in other virtual applications, for example, VMware.

The following table describes the host operating systems that VirtualBox supports.

TABLE 3–2 VirtualBox Hosts

Host Operating Systems	Supported Versions
Oracle Solaris	All versions
Windows	■ Windows XP – All service packs ■ Windows Server 2003 ■ Windows Vista (32-bit and 64-bit)
Linux on 32-bit and 64-bit systems	■ Debian GNU/Linux 3.1 (at minimum) ■ Fedora Core 4 (at minimum) ■ Gentoo Linux ■ Mandriva 2007.1 and 2008.0 ■ OpenSuSE 10.1 (at minimum) ■ Red Hat Enterprise Linux 3 (at minimum) ■ SuSE Linux 9 (at minimum) ■ Ubuntu 5.10 (at minimum)
Mac OS X (Intel)	All versions

How to Download and Install VirtualBox for Use With Oracle Solaris

If you want to run Oracle Solaris inside VirtualBox, you must first install the VirtualBox software on your system. After VirtualBox is successfully installed, you can run the live CD ISO image as a virtual guest. Or, you can install Oracle Solaris inside VirtualBox, and then run the installed system as a virtual guest.

Note – A minimum of 10 GB of disk space is recommended to install the VirtualBox software and Oracle Solaris inside VirtualBox.

---

1. **Download the VirtualBox software that is appropriate for your operating system.**

   Save the application to your desktop or to a local disk.

2. **Download the live CD ISO image.**

   To download the image, go to `http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`. Note that the download can take several minutes to complete.

   For convenience, save the file to the same location that you stored your VirtualBox files.

   Note – The live CD ISO image requires approximately 685 MB of disk space on your hard drive.

   ---

3. **Following the instructions that are specific to your "host" operating system, install the appropriate version of VirtualBox.**

   - For instructions on installing VirtualBox on a Windows or Mac OS X (Intel) system, see "How to Install VirtualBox on Windows or a Mac OS X (Intel) System" on page 36.
   - For instructions on installing VirtualBox on a Linux system, see "How to Install VirtualBox on a Linux System" on page 36.

4. **Configure VirtualBox, per the instructions in "How to Configure VirtualBox For Use With the Oracle Solaris Software" on page 37.**

5. **Start Oracle Solaris, per the instructions in "How to Start Oracle Solaris 11 Express by Using VirtualBox" on page 39.**

▼ How to Install VirtualBox on Windows or a Mac OS X (Intel) System

1. **Navigate to the downloaded VirtualBox installation files or folder.**
   For Mac OS X, this is a `.dmg` image file.
2. **To start the installation, double-click the VirtualBox installation file, then lick Next or Continue.**
3. **Accept the license agreement, then click Next or Continue.**
4. **Choose a location to install the VirtualBox software.**
   The available choices are Accept the Default Location and Modify the Location.

   Note – To install both VirtualBox and the Oracle Solaris live CD ISO image, a minimum of 10 GB of disk space is required.
5. **Click Install.**
   If prompted, type your user password.
6. **When the installation completes, click Close or Finish.**

▼ How to Install VirtualBox on a Linux System

Before You Begin Even if your Linux distribution comes with a version of VirtualBox pre-installed, download the latest version of VirtualBox. The pre-installed VirtualBox software is usually the Open Source Edition (OSE), which might not be suitable for running with Oracle Solaris 11 Express. For instructions, see "How to Download and Install VirtualBox for Use With Oracle Solaris" on page 35.

1. **Open a terminal window and assume the `root` role or become the `root` user.**

```
$ su root
Password:
```

2. **Navigate to the downloaded VirtualBox installation file.**
3. **Depending on your Linux distribution, start the installation process by typing one of the following commands:**
   - **On rpm-based systems, such as Fedora, SuSE, or Red Hat, type the following command:**

     `# rpm -ihv` *filename*

- **On deb-based systems, like Debian, or Ubuntu, type the following command:**

  # dpkg -i *filename*

  In the previous commands, *filename* is the name of the downloaded installation file.

Note that you might need to install additional packages to fulfill certain dependencies.

The installer searches for a precompiled kernel module. If no precompiled kernel module is available for your system, the installer attempts to compile and install a kernel module.

Note – For the installer to build the kernel module, you need to have basic build utilities, such as `gcc`, `make`, `binutils`, and `kernel header`, installed. Typically, these utilities are part of the standard installation of your Linux system. If the utilities are not readily available, the installer is not able to build the kernel module. In this case, you will need to install the build utilities and then manually start the kernel module compilation by running the `/etc/init.d vboxdrv setup` command as the `root` user.

---

4 **Add the current user to the `vboxusers` group.**

   a. **In a terminal window, type:**

      # usermod -G vboxusers -a *username*

      where *username* is the name of the current user.

   b. **To apply the changes, log out and then log back in to the system.**

5 **To start VirtualBox, open a terminal window and type VirtualBox, then press Enter.**

6 **Accept the license agreement to continue.**

▼ How to Configure VirtualBox For Use With the Oracle Solaris Software

Before You Begin If you have an Oracle Solaris Live CD ISO image, boot your host operating system, then insert the live CD. To download the live CD ISO image, go to `http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`.

1 **Start VirtualBox by using one of the following methods:**

- **On Windows, click the Start button, then select VirtualBox from the list of programs.**
- **On Linux, open a terminal window, type `VirtualBox`, then press Enter.**
- **On Mac OS X, open Applications in the Finder, then double-click VirtualBox.**

2. **On the first start of VirtualBox, type your registration information, then click Confirm.**
   The main VirtualBox window is displayed.
3. **Click the New icon on the left side of the VirtualBox window.**
4. **In the popup menu, click Next.**
5. **Type a name for your virtual machine.**
6. **From the drop-down list, select Oracle Solaris as the operating system, then click Next.**
7. **Select the amount of Random Access Memory (RAM) to allocate to the Oracle Solaris installation inside VirtualBox, then click Next.**

   Note – If you have 2 GB or more of memory on your system, select 1 GB for optimal performance. The recommended minimum size is 512 MB.

8. **Add a Virtual Disk Image (`vdi`) by selecting a name or by adding a new name to the list.**
   For the initial installation:
   a. **Select New, then click Next.**
   b. **Accept the default Dynamically Expanding Image, then click Next.**
   c. **Accept the default name or type a path and name, then allocate space for the image.**
   d. **When you have completed the settings, click Next.**
   e. **Click Finish to create the disk image.**
9. **When the initial Virtual Disk Manager GUI is displayed, with your new `vdi` file selected, click Next.**
10. **In the Summary screen, click Finish.**
    The main VirtualBox window opens. Your virtual Oracle Solaris machine is displayed in the left panel and is ready to use as a virtual machine.
11. **In the Details tab, click the CD/DVD-ROM link.**

12 **Check Mount CD/DVD Drive, then do one of the following:**

- **If you are using the live CD ISO image, select Host CD/DVD Drive, then close the Settings screen.**

  You are done.

- **If you are using a downloaded Oracle Solaris Live CD ISO image, select the ISO Image File, then proceed to the next step.**

13 **From the drop-down list, select the downloaded Oracle Solaris ISO image.**

- **If the live CD ISO image is not displayed in the list, add the image, as follows:**

  a. **Click the Select icon from the drop-down list.**

  b. **Click the CD/DVD Images tab.**

  c. **Click the Add icon.**

  d. **Navigate to the downloaded Oracle Solaris ISO image file, then click Open.**

  e. **Click Select, then close the Settings screen.**

▼ How to Start Oracle Solaris 11 Express by Using VirtualBox

1 **Start VirtualBox by using one of the following methods:**

- **If you are running Windows, click the Start button. Then, from the list of programs, select VirtualBox.**

- **If you are running Linux, select VirtualBox from the System Tools menu on the GNOME desktop or the System menu on the KDE desktop.**

- **If you are running Mac OS X, open Applications in the Finder and double-click VirtualBox.**

2 **Double-click your virtual machine icon, or click the icon once, then click Start.**

3 **If you do not have the ISO image on a CD, click the CD/DVD-ROM link, then verify that the Oracle Solaris Live CD ISO image file is selected.**

4 **When the list of keyboard layouts is displayed, press Enter to accept the English default.**

- **Alternatively, you can type the number for your particular keyboard layout, then press Enter.**

Note – If your cursor becomes entrapped within the virtual desktop, you can release it by using the *host key*. This key is located in the lower right corner of the VirtualBox window. On a Windows or Linux system, the host key is the right Ctrl key. On a Mac OS X system, the host key is the left Cmd key.

---

5 **When the list of desktop languages is displayed, press Enter to accept the English default.**

- **Alternatively, you can type the number of another language, then press Enter.**

The application takes approximately one to two minutes to load.

When the desktop screen is displayed, you are "in the box", running Oracle Solaris.

6 **To install Oracle Solaris on your virtual hard disk, click the Install Oracle Solaris icon that is located on the desktop.**

Installing Oracle Solaris saves the configuration and enables you to install other programs in VirtualBox.

For installation instructions, see "Installing Oracle Solaris 11 Express by Using an Interactive Installer" on page 29.

Running Oracle Solaris on a Mac OS X System With Parallels Installed

The following procedure describes how to install Oracle Solaris on a system that is running Mac OS X, with Parallels installed.

▼ How to Install Oracle Solaris 11 Express on a System Using Parallels

Before You Begin See the "Solaris Network Driver Installation" instructions in the *Parallels Desktop for Mac User Guide* at `http://www.parallels.com/files/upload/Parallels_Desktop_for_Mac_User_Guide.pdf`.

1 **During the Parallels pseudo environment setup, set the networking choice to Ethernet bridge.**

2 **Using Parallels, boot the live CD ISO image.**

3. **Continue the installation.**

4. **After installing the operating system, install the network driver.**

Related Information

For more information, see the following additional resources.

Topic	Where To Find More Information
Find out more about how user accounts and roles are set up and managed.	Chapter 5, "Understanding Users and Roles"
Troubleshoot login and user account issues.	"Troubleshooting Login and User Account Issues" on page 72
Manually add a Linux OS entry from a previous installation to the GRUB menu after an installation.	"How to Add a Linux Entry to the GRUB Menu After Installing Oracle Solaris" on page 65.
Find system administration tasks for configuring your network.	*System Administration Guide: Network Interfaces and Network Virtualization*

◆ ◆ ◆ CHAPTER 4

Verifying and Finalizing Your Installed System

This chapter includes the following information to assist you in completing the setup of your installed system.

Managing Your Automatic Network Connection

The Network Auto-Magic (NWAM) feature of Oracle Solaris simplifies network configuration by addressing basic and moderate Ethernet and WiFi configurations, such as connecting to your wired or wireless network at startup and displaying notifications about the status of your network connection in the desktop. By default, NWAM is enabled on your system during the installation process. NWAM uses DHCP to obtain both an IP address and DNS name service configuration parameters. Static IP addresses and manual name service settings are also supported. NWAM uses different network configurations that are stored and activated, either manually or automatically, in response to changes in your network environment.

The `nwamd` daemon is the policy component of NWAM. This daemon functions in multiple roles to manage your system's network configuration. The `nwamd` daemon is managed by the Service Management Facility (SMF). For more information, see the `nwamd(1M)` man page.

Checking the Status of Your Network Connection

The quickest way to obtain essential information about your network is to check the Network Status panel icon that is displayed in the panel notification area of the GNOME desktop. The Network Status panel icon is the primary method for viewing information about your currently active network connection and for interacting with NWAM. Another way to display information about your currently active network connection is to hover your mouse over the

panel icon. To obtain more detailed information about your wireless network (if any), or to change the currently active network interface, right-click the Network Status panel icon to access additional menu options.

The Network Status panel icon's appearance changes, depending on the status of your enabled wired and wireless network interfaces. For example, the following figure shows how the icon appears if all enabled interfaces are *wireless* and *connected*, or active.

Whereas, the following figure shows how the icon appears if at least one enabled interface is *wired* and *disconnected*, or inactive.

Getting Additional Software

After installing Oracle Solaris 11 Express, you may find that some of the software applications that you use on a regular basis are not immediately available to you. You can install these software applications from a package repository, by using either the Package Manager GUI or the IPS command-line interface (CLI).

IPS is a framework that provides the capability for software lifecycle management, which includes installation, upgrade, and the removal of packages. IPS also provides you with the ability to upgrade all of those packages on your installed system that have available updates.

With IPS, you can do the following:

- Search for packages that are already installed on your system or packages that are available from a specified package repository.
- Add package sources (publishers) that can be searched.
- Get information about installing packages, such as package dependencies and any additional packages to be installed.
- Download and install packages with a single click.
- Update existing packages on a system.
- Remove (uninstall) existing packages.

Note that your system must be connected to the Internet to use the default package repository.

For more information, see the `pkg`(1) man page.

How to Install Software Packages by Using Package Manager

Package Manager is the GUI for IPS. Package Manager provides a subset of the functionality that is offered by using IPS commands. With Package Manager, you can search for and manage publishers, and administer boot environments. The following procedure provides basic instructions on how to use Package Manager to add software packages to your system. For more detailed instructions, refer to the Package Manager online help.

1. **Start Package Manager in one of the following ways:**
   - Click the Package Manger icon in the GNOME desktop tool panel.
   - Double-click the Package Manger icon that is located on the desktop.
   - From the main menu of the desktop, choose System → Administration → Package Manager.
2. **If prompted, type the `root` password.**

   The Package Manager window opens and catalogs of the publishers that you have defined are loaded.
3. **In the View drop-down menu, make sure the All Packages option is selected.**
4. **In the Publisher drop-down menu, select the publisher to search, or select the All Publishers (Search Ctrl-F) option.**

   Your newly installed Oracle Solaris system has one publisher (package source) configured, the `solaris` publisher. The repository for the `solaris` publisher is `http://pkg.oracle.com/solaris/release`. You can search for packages on this web site, as well as by using Package Manager or the `pkg` command.
5. **In the Search field, type a word from the name or description of the package that you want to install or update, then press Return (or Enter).**

   For example, to search for the OpenOffice package, type "office" in the Search field.

   - **Or, click the icon of the magnifying glass to the right of the Search field to search for packages with that name.**

   The Status column indicates whether the package is installed. The Status column also indicates whether there is an update currently available for an installed package.

   Tip – Hovering your mouse over the icon also displays the current status of the package.
6. **To select the package, click the check box next to the package name.**

   Note that you can select multiple packages at one time by selecting multiple check boxes.

7. **(Optional) To get more information about a package, click the package entry in the list to select the package.**

   - **To learn about dependencies for the currently selected package click the Dependencies tab in the Details panel.**

   The Details panel displays additional information about the package that is currently selected with your cursor. Although you can select multiple packages at one time (by selecting multiple check boxes), you can only view details about the one package that is currently selected.

8. **Click the Install/Update icon on the Package Manager toolbar to install the package (or packages).**

   Package Manager checks for and evaluates whether there are any package dependencies. The Install/Update Confirmation dialog displays the name, publisher, and summary about the package that is displayed in the package list.

9. **Click Proceed to install the package or update the listed packages, or click Cancel to cancel the installation.**

   - **If a license dialog box is displayed, accept the license agreement to install the package.**

   Package Manager downloads and installs (or updates) the packages that are listed in the Confirmation dialog box. The Install/Update window displays a log of the installation.

   When the installation has successfully completed, the Status column in the Package Manager package list displays the Installed icon (a plain box).

10. **(Optional) To update all of the packages that have available updates, click the Updates button.**

Managing Your Printing Environment

The Common UNIX Printing System (CUPS) is the default print service in Oracle Solaris 11 Express, replacing the LP print service. CUPS is a modular printing system that enables your system to function as both a print server and a print client. A system that is running CUPS becomes a host that can accept print requests from client systems, process those requests, then send them to the appropriate printer.

CUPS has both a web browser interface and a GUI. Each of these tools can be used to manage your printing environment. To access the web browser interface, type `http://localhost:631` in the location bar of your browser. To start CUPS Print Manager from the desktop, choose System → Administration → Print Manager.

Configuring Your System as a Local CUPS Server

Your local system can be configured as a CUPS server. To configure your system as a local CUPS server, you must specify certain server settings.

To begin, start CUPS Print Manager GUI by choosing System → Administration → Print Manager. Then, choose Server → Settings to display the Basic Server Settings dialog.

In the Basic Server Settings dialog select the following settings:

Show printers that are shared by other systems
: Enables other CUPS print queues to be visible to your local system.

Publish shared printers connected to this system
: Publishes a list of print queues that are configured on your system to other systems on a local area network (LAN).

Allow printing from the Internet
: Enables published print queues to be accessible beyond the LAN.

Allow remote printer administration
: Enables remote administration of the print queue.

Allow users to cancel any jobs (not just their own)
: Enables users to cancel any print jobs.

Save debugging information
: Enables the logging of debugging information for troubleshooting purposes.

▼ How to Set Up a New Local Printer by Using CUPS

1 **Connect the new printer to your system, then power it on.**

The newly attached printer is detected by the system, and the Printer configuration dialog opens, displaying information about the new printer.

To finish configuring the new printer, skip to Step 2.

- **If you are adding a new printer that was not automatically detected, do the following:**

  a. **Start CUPS Print Manager from the desktop by choosing System → Administration → Print Manager.**

     - **To start the CUPS Print Manager GUI from a terminal window, type the following command:**

       ```
       $ system-config-printer &
       ```

b. **In the Printer configuration dialog, choose Server → New → Printer from the main menu.**
   Alternatively, you can click the New icon that is located on the menubar.

c. **When prompted, type the `root` password.**
   The Printer configuration dialog opens, displaying all of the configured printers and the new printer.

2 **In the Select Device window, select the appropriate device, then click Forward.**
   By default, CUPS selects the USB device that is physically connected to your system or the device that was detected by the Hardware Abstraction Layer (HAL). Note that these two entries might be for the same printer.

3 **In the Choose Driver window, select a Make for your printer, then click Forward.**

4 **In the next screen, do one of the following:**

- **Use the default, Select Printer From Database, option.**
  If this option is used, the appropriate printer make is selected for you.
- **Provide your own PPD file by following these steps:**

  a. **Select the Provide PPD File option.**
     The Select a File window opens.

  b. **Locate the specified PPD file on your system, then click Open to associate the PPD file with the new printer.**

  Note – This procedure does not describe how to download and copy a PPD file to your system.

5 **From the left pane of the next Choose Driver window, select a printer Model.**

6 **From the right pane, select a printer driver, then click Forward.**
   By default, CUPS selects a "recommended" printer model and driver for your printer. However, you can optionally make another selection from the list of available drivers.

7 **In the Installable Options window, set or change any of the available options, then click Forward.**

8 **In the Describe Printer window, provide the following information about the printer:**

- Printer Name
- Description

- Location

9 **(Optional) To go back and make changes to a previous screen, click the Back button.**

10 **To save your changes, click Apply, and if prompted, type the `root` password.**

After you have saved the changes, the newly configured printer is displayed in the CUPS Print Manager window.

11 **To set the printer as the default, right-click the printer, then do the following:**

a. **Select the Set as Default option.**

b. **In the Set Default Printer window, choose one of the following options:**

- Set as the system-wide default printer (default)
- Set as my personal default printer

12 **Save the printer configuration.**

13 **Print a test page to verify that the printer is configured correctly and working.**

Related Information

For more information, see the following additional resources.

Topic	Where To Find More Information
Find about more about NWAM.	Chapter 1, "Introduction to NWAM," in *System Administration Guide: Network Interfaces and Network Virtualization*
Find out more about IPS.	*Oracle Solaris 11 Express Image Packaging System Guide*
Find out more about the Device Driver Utility.	See the Device Driver Utility online help.
Find system administration tasks for setting up and administering printers by using CUPS.	Chapter 3, "Setting Up and Administering Printers by Using CUPS (Tasks)," in *System Administration Guide: Printing*

◆ ◆ ◆ CHAPTER 5

Understanding Users and Roles

This chapter provides a general overview that describes the function of users, roles, and rights profiles in the Oracle Solaris operating system.

User Accounts, Roles, and Rights Profiles

The assignment of user accounts, roles, and rights profiles in Oracle Solaris conforms to Role-Based Access Control (RBAC) specifications. RBAC provides a more secure alternative to the all-or-nothing superuser model.

RBAC implements the security principle of least privilege. *Least privilege* means that a user has only those capabilities that are necessary to perform a specific job. Capabilities that are beyond regular user capabilities are grouped together into *rights profiles*. These profiles are assigned to special user accounts, called *roles*. A user assumes a role to perform a job that requires some of superuser's capabilities.

In the default Oracle Solaris system configuration, the user account that is created during installation is assigned the `root` role if you used the text installation method. If you did not create a user account during the installation, `root` is set up as an account. See "How User Accounts Are Set Up" on page 52.

To better understand the purpose and function of user accounts, roles, and rights profiles, review the following information:

- A user account is a login account. Regular users can log in and use the system, but cannot administer the system.
- A role is *not* a login account. For example, you cannot directly log in to the `root` role. Instead, you log in as your user name, then use the `su - root` command to assume the `root` role. A user can only assume roles that are assigned to the user's login account.
- A rights profile is a collection of administrative capabilities that is typically assigned to a role, but can be assigned to a user. The names of rights profiles indicate the capabilities of the profiles, such as System Administrator or Printer Management. Typically, the system

administrator creates a role with the same name as the rights profile and assigns the profile to that role. Also, rights profiles are hierarchical, that is, one rights profile can include other rights profiles. When a role is assigned a rights profile that includes other profiles, that role has the capabilities of all of those profiles.

Oracle Solaris provides predefined rights profiles. These profiles, listed in the `/etc/security/prof_attr`, can be assigned by the `root` role to any account. The `root` role is assigned all privileges and all authorizations, so can perform all tasks, just as `root` can when `root` is a user.

To perform administrative functions, you open a terminal and switch the user to `root`. In that terminal, you can then perform all administrative functions.

```
$ su - root
Password:      Type root password
#
```

When you exit the shell, `root` capabilities are no longer in effect.

How User Accounts Are Set Up

During the Oracle Solaris installation process, you are prompted to create a user account and password for your system.

For a GUI installation from the live CD ISO image, the user account and password information are fields that must be completed during an installation. The user password is also the initial `root` password for your system.

Note – During a text installation, you are prompted to create a user account and password, as well as a `root` password for the system. For this installation method, the `root` user is a role that you assume. However, if you do not create a user account during the installation, `root` is set up as an account rather than a role.

If you used the text installer to install Oracle Solaris, the user account and `root` specifications that are outlined in this chapter do *not* all apply.

Review the following login, user account, and `root` specifications:

- The `root` role cannot log in. You must log in as the user you created during the installation. After you log in, you can assume the `root` role to configure the system. To assume the role, open a terminal window and use the `su - root` command.

  If you try to log in to the installed system as `root`, an error message is displayed. Click OK and then log in as the user you created during the installation.
- After you install Oracle Solaris, you can change the installed system to permit `root` to log in. However, you must first remove `root` as an assigned role.

```
# usermod -R your-login
```

The preceding command removes all assigned roles from your login account.

- You can change the `root` role to a user account that can log in. To change `root` to a user, type the following command in a terminal window:

```
# rolemod -K type=normal root
```

This command cannot succeed if the `root` role is still assigned to a user.

- If you forget the local user name or password that you entered during the installation, boot the system in maintenance mode, as described in "How to Troubleshoot Your Login" on page 72.

Assigning Roles to User Accounts

Roles can be assigned to users *only*.

- To determine which roles are assigned to your user account, open a terminal window and type:

```
$ roles
root
```

- To assign an existing role to a user, use the `usermod` command.

```
# usermod -R zfssnap username
```

- To create and assign a role to a user, use the `roleadd` command to create the role, and the `usermod` command to assign the role to a user.

To create a role, use either of the following two methods:

```
# roleadd -K profiles="System Administrator" sysadmin
```

```
# roleadd sysadmin
# rolemod -P "System Administrator" sysadmin
```

To assign the role:

```
# usermod -R zfssnap,sysadmin username
```

For more informations, see Chapter 8, "Using Roles and Privileges (Overview)," in *System Administration Guide: Security Services*.

Related Information

For more information, see the following additional resources.

Topic	Where To Find More Information
Find out more about configuring and using RBAC.	"Configuring and Using RBAC" in *System Administration Guide: Security Services*
Find system administration tasks for setting up and managing user accounts and groups.	Chapter 1, "Managing User Accounts and Groups (Overview)," in *System Administration Guide: Basic Administration*

◆ ◆ ◆ CHAPTER 6

Managing System Services

In Oracle Solaris, services are managed exclusively by the Service Management Facility. This chapter provides basic instructions for identifying which services are enabled or disabled on your system and how to start and stop SMF services.

Managing Services on Your System

UNIX operating systems traditionally include a set of services or software programs that are not associated with any interactive user login. SMF provides an infrastructure that augments the traditional UNIX startup scripts, init run levels, configuration files, as well as other services and software programs.

Services listen for and respond to requests to perform certain tasks, for example:

- Delivering mail
- Responding to FTP requests
- Permitting remote command execution

SMF simplifies the management of these system services, by creating a supported, unified model for services and service management on each Oracle Solaris system.

The fundamental unit of administration in the SMF framework is the service instance. Each service instance is named with a Fault Management Resource Identifier (FMRI). The FMRI includes the service name and the instance name. For example, the FMRI for the `sendmail` service is `svc:/network/smtp:sendmail`, where `network/smtp` identifies the service and `sendmail` identifies the service instance.

Examples of other acceptable FMRIs include the following:

- `svc://localhost/system/system-log:default`
- `svc:/system/system-log:default`
- `system/system-log:default`

Services can be enabled from the GNOME desktop or by using the command line.

For more information, see the `smf`(5) man page.

Enabling Services From the Desktop

You can enable and disable some services that are installed on a system by using the Services application that is located in the GNOME desktop. Enabling and disabling services by using the Services application is equivalent to using the `svcadm` command.

The services that can be viewed and managed from the desktop depend on the authorizations that are assigned to the user account and the service itself.

▼ How to Enable SMF Services From the Desktop

To enable SMF services from the GNOME desktop, follow these steps:

1. **Choose System → Administration → Services.**

   The SMF Services window open, with the Enabled instances option (in the left pane) selected. The number of service instances that are enabled is also displayed. In the State column all enabled services are displayed as "online".

   - **To view all service instances and their statuses, click the All instances option in the left pane of the SMF Services window.**

     In this view, all service instances are listed. Online services are listed first, followed by offline and disabled services.

   - **To view unhealthy service instances, click the Unhealthy instances option in the left pane of the SMF Services window.**

2. **To disable or enable a service instance, do the following:**

   - **To disable a service instance:**

     a. **With the Enabled instances option selected, from the list of services that is displayed, locate the service to disable.**

        - **To search for the service, type the name (or part of the name) of the service in the Filter field at the top of the SMF Services window.**

     b. **Click the Disable button.**

        A message alerting you that the service has been disabled is displayed. Also displayed are instructions on how to enable the service from the command line.

- **To enable a service instance, do the following:**

  a. **Click the All instances option in the left pane of the SMF Services window.**

  b. **From the list of disabled services, locate the service to enable, then click the Enable button.**

     The service state transitions from disabled to offline, and eventually to an online state.

     - **If the service instance does not transition to an online state within a few seconds, click the Enabled instances option and search for the service instance.**

       The State column for the service should now display the service as "online.

Caution – Do not randomly disable or enable services from the desktop. Doing so can prevent a system from booting.

Enabling Services From the Command Line

The `svcs` command is used to identify which services are installed on a system. The `svcadm` command is used to administer or change the state of a service. To configure SMF services, you must assume a role with appropriate privileges, such as the `root` role.

For more information, see the `svcs`(1) and `svcadm`(1M) man pages.

▼ How to List the Services on an Installed System

1. **Open a terminal window.**

2. **To list all of the services that are installed and enabled on a system, type:**

   ```
   $ svcs
   ```

   - To list all of the services that are installed on the system, and the status of each service, use the `svcs` command with the `-a` option.

     ```
     $ svcs -a
     ```

     This command displays all of the services, including those that are disabled.

   - To display the status of a specific service, use the `svcs` command with the `-l` option.

     ```
     $ svcs -l FMRI
     ```

▼ How to Start a Service

If a program is managed by SMF, use the `svcadm` command to start it.

1. **Open a terminal window.**
2. **Type the command to start the service.**

   `$ svcadm enable` *FMRI*
3. **Verify that the service is running.**

   `$ svcs -a | grep` *FMRI*

▼ How to Stop a Service

1. **Open a terminal window.**
2. **Type the command to stop the service.**

   `$ svcadm disable` *FMRI*

Related Information

For more information, see the following additional resources.

Topic	Where To Find More Information
Find overview information about SMF.	Chapter 11, "Managing Services (Overview)," in *System Administration Guide: Basic Administration*
Find instructions on managing services by using SMF.	Chapter 12, "Managing Services (Tasks)," in *System Administration Guide: Basic Administration*

◆ ◆ ◆ CHAPTER 7

Setting Up Your Application Development Environment

Oracle Solaris provides flexibility and scalability for setting up a development environment that targets multiple platforms. This chapter describes the tools that are available for developing your application environment.

Installing Developer Tools

Oracle Solaris enables you to build applications and solutions in a variety of programming languages, including: C/C++, Java, PHP, Python, and Ruby.

You can download and install developer tools from IPS package repositories by using Package Manager or by using `pkg` commands.

If a tool is not available from an IPS package repository, you can download the tool directly from the product site. However, if the tool is available in an IPS package repository, obtain the tool from the repository and not from another site. The tool that is in the repository might be specifically configured for use with Oracle Solaris.

Available Developer Tools

Following are some of the Oracle Solaris developer tools that are available from the IPS package repositories:

- Apache Web Server
- Bluefish HTML editor
- Oracle Solaris DTrace Toolkit
- Eclipse
- GCC runtime libraries
- `gedit`
- High Performance Computing
- Java Development Kit (JDK)

- Lighttpd Web Server
- `memcached` distributed object caching framework
- Miscellaneous tools, for example the `make` utility
- MySQL Database Server
- NetBeans
- Oracle Solaris Modular Debugger
- Oracle Solaris Studio Development IDE for C/C++ and Fortran
- Oracle Solaris Workshop Compilers Bundled libC
- Perl
- PHP
- PostgreSQL
- Python
- Ruby
- Squid Web Proxy Cache
- Tomcat
- Web Stack

Related Information

For more information about these and other developer tools, go to `http://www.oracle.com/technetwork/index.html`.

◆ ◆ ◆ CHAPTER 8

Keeping Your System Up-To-Date

After you have installed Oracle Solaris, you can add, remove, and update packages on your system. You can update individual packages, or you can update all of those packages in an image that have updates available by using either the IPS GUI tools (Package Manager and Update Manager) or the IPS CLI.

Updating Software Packages on Your System

To keep your system up-to-date, you can update all of the packages on your system that have available updates. This action updates packages that you might not otherwise consider updating, for example, kernel components or other low-level system packages.

To display a list of all of the packages on your system that have available updates, use one of the following methods:

- In Package Manager, follow these steps:
  1. Choose Updates from the View menu.
  2. Choose All Publishers from the Publishers menu.
  3. From the list of packages that is displayed, click the Install/Update button or choose Package → Install/Update.

     To select all of the packages that are listed, click the selection icon in the column heading or choose the Edit → Select All option.
- In Package Manger, click the Updates button or choose Updates from the Package menu.

  The Updates window lists all of the packages that will be updated and gives you an opportunity to cancel or proceed with the updates.
- From the GNOME desktop menu, choose System → Administration → Update Manager.

  The Update Manager window lists all of the packages that will be updated and gives you an opportunity to cancel or proceed with the updates.
- To list packages with available updates, type the following command:

```
$ pkg list -u
```

- To update an image, type the following command:

  ```
  # pkg update --accept
  ```

  This command updates all of the installed packages in the current image to the newest version available and allowed. If a license agreement is required, the license agreement is accepted and the update continues. If you do not specify the `--accept` option, and one package requires you to accept its license, then no packages are updated.
- To display the packages to be updated, without actually installing them, type the following command:

  ```
  # pkg update -nv --accept
  ```

When certain key packages are updated, for example, some drivers and other kernel components, the system performs the following actions:

1. Creates a clone of the current boot environment (BE) that is a bootable image.
2. Updates the packages in the clone, but does not update any packages in the current BE.
3. Sets the new BE as the default boot choice the next time the system is booted. The current BE remains as an alternate boot choice.

Use the `beadm` command to create, rename, mount, unmount, activate, or destroy BEs. You can use the Package Manager to activate, rename, and delete BEs.

For more information, see "Related Information" on page 64.

Updating Individual Software Packages on Your System by Using pkg Commands

To update individual software packages on your system, use the `pkg install` command. You can also use Package Manager to update a specific package on your system. Any dependent packages are also updated at the same time.

For more information, see the `pkg`(1) man page.

Managing Multiple Boot Environments

A boot environment, also called a BE, is a bootable instance of the Oracle Solaris operating system image, plus any other application software packages that are installed on that image. You can maintain multiple boot environments on a single system, and each boot environment can have a different software version installed.

Upon the initial installation of the operating system, a boot environment is created on your system. Use the Boot Environment Management tool or the `beadm` command to administer additional boot environments on your system.

Why Use Multiple Boot Environments?

With multiple boot environments, the process of updating software becomes a low risk operation because you are able to create backup boot environments before making any software updates to your system. If necessary, you have can boot a backup BE.

Note – The process of creating backup boot environments does not create a backup of all the files on your system and is not the same as backing up a file system.

The ability to create different boot environments enables you to have different environments for different versions of tools that you use. Shared files are not affected by creating a new boot environment. If you modify files in a newer boot environment, and then boot to an older boot environment, the files are also modified for that boot environment. You cannot retrieve an older version of a shared file from an older boot environment.

You can maintain more than one boot environment on your system at the same time and perform various upgrades on each of them. For example, you can clone a boot environment by using the `beadm create` command. A clone is a bootable copy of a boot environment. Then, you can install, test, and update different software packages on the original boot environment and on its clone.

Although only one boot environment can be active at any given time, you can mount an inactive boot environment by using the `beadm mount` command. Then you can use the `pkg update` command to update all of the packages in that inactive, mounted environment that have available updates. Or, use the `pkg install` *package-name* command, with the `-R` option to update specific packages in that boot environment.

Managing Boot Environments by Using Package Manager

You can use Package Manager to manage your boot environments.

The following boot environment management tasks can be performed by using Package Manager:

- Display information about all of the boot environments on your installed system
- Delete old or unused boot environments
- Change the default boot environment on your system

- Activate a boot environment

Note – Using Package Manager to manage your boot environments from the desktop does not provide all of the options for managing your boot environments that are available by using the `beadm` command. For more information, see the `beadm(1M)` man page.

▼ How to Manage Boot Environments From the Desktop

1. **Start Package Manager by choosing System → Administration → Package Manager, or by clicking the Package Manager icon that is located on the desktop.**

2. **Choose File→ Manage Boot Environments.**

   The Boot Environment Management window opens, displaying all of the available boot environments that are on your installed system. Also displayed is the name of the operating system, the date the boot environment was created, and the size of the boot environment, in GB.

   - **To delete a boot environment, click Delete, then click OK.**
   - **To change the default boot environment, place a check mark next to the new default boot environment, then click OK.**
   - **To activate a new boot environment, click Active on Reboot, then click OK.**

     The new boot environment becomes active on the next system reboot.

Related Information

For more information, see the following additional resources.

Topic	Where To Find More Information
Find out more about keeping your system up-to-date by using Package Manager.	*Oracle Solaris 11 Express Image Packaging System Guide* See the Package Manager online help
Find our more about using Update Manager.	"Using Update Manager" in *Oracle Solaris 11 Express Image Packaging System Guide*
Find out more about managing boot environments.	*Managing Boot Environments With Oracle Solaris 11 Express*

◆ ◆ ◆ APPENDIX A

Managing the GRUB Menu in the Oracle Solaris Release

When you boot an x86 based system, the GRUB menu is displayed. This menu reflects the contents of the currently active `menu.lst` configuration file on the system. A boot entry for every OS instance that is installed on your system is listed.

When you install Oracle Solaris, or any new operating system, the `bootadm` command automatically updates the `menu.lst` file, adding an entry for the newly installed operating system. However, in certain cases, for example, if you previously installed Linux, the GRUB menu is not automatically updated after an installation to include the Linux entry from a previous installation.

Adding a Linux OS Entry From a Previous Installation to the GRUB Menu

If you are setting up a boot environment in such a way that you install Linux on one partition first and Oracle Solaris on another partition afterwards, you will need to follow special instructions to ensure that the GRUB menu information from the new installation does not erase the GRUB menu information from a previous installation. The following procedure describes how to manually update the `menu.lst` file to include a Linux entry from a previous installation.

▼ How to Add a Linux Entry to the GRUB Menu After Installing Oracle Solaris

These instructions assume that you have already installed Linux on your system, and then you installed Oracle Solaris.

Note – Instructions for installing the Linux operating system are not included in this task.

1. **At the completion of the Linux installation, copy the active `menu.lst` file to a USB drive, so you can reuse the information after you have completed the Oracle Solaris installation.**

   Typically, this file is `/boot/grub/menu.lst`.

   - **If you are unsure about the location of the active `menu.lst` file, use the `bootadm` command to locate the file:**

     ```
     # bootadm list-menu
     ```

   - **If you are unsure about the location of the USB drive, use the `mount` command, with no options, to determine where the USB drive is mounted. Then, copy the `menu.lst` file to that location.**

2. **After the installation has completed, edit the active `menu.lst` file, as follows:**

   a. **Open a terminal window and assume the `root` role or become the `root` user.**

      ```
      $ su root
      Password:
      ```

   b. **Using a text editor, edit the `menu.lst` file.**

      For example:

      ```
      # vi /pool-name/boot/grub/menu.lst
      ```

   c. **Using the USB drive that you copied the `menu.lst` file to in Step 1, copy the Linux `menu.lst` information from the original Linux installation to the end of new `menu.lst` file.**

      For example, the `menu.lst` file from an Ubuntu installation would look similar to the following:

      ```
      title        Ubuntu 8.04, kernel 2.6.24-18-generic
          root        (hd0,4)
          kernel        /vmlinuz-2.6.24-18-generic \
      root=UUID=1ed7fa17-6d77-4b49-be1a-22481310fd1b ro quiet splash
          initrd        /initrd.img-2.6.24-18-generic
          quiet

          title        Ubuntu 8.04, kernel 2.6.24-18-generic (recovery mode)
          root        (hd0,4)
          kernel        /vmlinuz-2.6.24-18-generic \
      root=UUID=1ed7fa17-6d77-4b49-be1a-22481310fd1b ro single
          initrd        /initrd.img-2.6.24-18-generic
      ```

Caution – Do not directly edit the original contents of the `menu.lst` file. Always add new information to the end of the file, or make changes by duplicating the existing content, then modify that content.

d. Save and exit the file.

3 Reboot the system.

When the system reboots, the GRUB menu should include entries for both the Linux and Oracle Solaris operating systems.

◆ ◆ ◆ APPENDIX B

Troubleshooting the Oracle Solaris 11 Express Release

This chapter provides troubleshooting information for some common problems that you might encounter when installing or using Oracle Solaris 11 Express.

If you encounter a problem, do the following:

- Review the troubleshooting information in this appendix.
- Review the *Oracle Solaris 11 Express Release Notes* .

Tips on Troubleshooting an Oracle Solaris Startup

Use the following information to help you troubleshoot potential startup issues.

What to Do If Your System Boots in Console Mode

If your system's graphics card is not supported by the live CD, or your system does not have a graphics card, the system boots in console mode when you insert the live CD. In this case, you cannot perform a GUI installation.

Your two alternatives are as follows:

- Use the text installer image instead of the live CD ISO image.

  You can run the text installer on the local console without network access. To download the text installer image, go to `http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html`.

- Perform a remote installation.

  If you use this option, you do not need to download the text installer image. However, note that this option requires remote `ssh` access and a target system that has an X server running. For instructions, see "How to Install Oracle Solaris From the Live CD If Your System Boots in Console Mode" on page 71.

How to Add Additional Software Packages After an Installation With the Oracle Solaris Text Installer

If you use the text installer, your installed system does not include all of the software packages that are included in a live CD installation. In particular, the installed system does not include the GNOME desktop. If you want your system to contain all of the software packages that are included in a live CD installation, including the GNOME desktop, use the following procedure to add the necessary additional packages to your installed system.

Note – To perform the following procedure, your system must have network access, so that you can download software packages from an IPS networked repository.

---

1 Assume the `root` role or become the `root` user.

```
$ su -
password:
#
```

2 Create a new boot environment (BE) to install the additional packages.

```
# beadm create be-name
```

Note – By creating a new BE and installing the additional packages there, you retain your originally installed system and can revert back to it, if necessary.

---

3 Mount the newly created BE on the temporary mount point, `/tmp/a`.

```
# beadm mount be-name /tmp/a
```

4 Add the `slim_install` software package to the new BE.

```
# pkg -R /tmp/a install slim_install
```

The `slim_install` package is a large group of packages that includes specific packages for the GNOME desktop.

5 Remove the software package.

```
# pkg -R /tmp/a uninstall slim_install
```

Note – The `slim_install` package is a group package. Removing the `slim_install` group container enables you to individually manage all of the packages that were installed as part of that group.

---

6 Update the boot archive on the new BE.

```
# bootadm boot-archive -R /tmp/a
```

7 **Unmount the newly created BE.**

```
# beadm unmount be-name
```

8 **Activate the new BE.**

```
# beadm activate be-name
```

9 **Reboot the system.**

```
# reboot
```

▼ How to Install Oracle Solaris From the Live CD If Your System Boots in Console Mode

Before You Begin For this procedure, two networked systems are required: the system on which the live CD was booted (target system) and a remote system, from which the installation will be performed. Both systems must have network access. It is not required that the two systems be on the same subnet. However, the target system must be reachable from the remote system. Also, the remote system must be running an OS that supports a graphical desktop.

1 **On the system to be installed, insert the Live CD, then boot the system.**

2 **At the console login, type the default login and password.**

The default user login and password for Oracle Solaris is `jack`.

3 **Become the `root` user.**

```
$ su root
Password: solaris
```

The `root` password is `solaris`.

4 **Enable the service for the `ssh` remote login program.**

```
# svcadm enable ssh
```

5 **Display the IP address that is assigned by DHCP to the target system.**

```
# ifconfig -a
```

6 **On the remote system, open a terminal window, then type:**

```
$ ssh -X ip-address-of-target -l jack
```

where *ip-address-of-target* is the output of the `ifconfig -a` command that you ran on the target system.

Running this command on the remote system opens a secure shell, enabling you to access the target system to use the GUI installer.

7 **Become the `root` user.**

```
$ su root
Password: solaris
```

8 **Run the GUI installer:**

```
# /bin/gui-install
```

9 **After the installation completes, reboot the target system.**

How to Monitor the Live CD Startup Process

You can switch from the default graphical boot screen to the text boot screen. The ability to switch to the text boot screen can be useful if you suspect that the system startup process is not proceeding normally. The text screen might contain informational messages or a request for user input. Switching to the text boot screen has no impact on the boot sequence, other than how the information is displayed on the screen. Initialization of the operating system continues and completes as normal.

To switch to a text boot, press any key a few seconds after the graphical boot screen appears, and the progress bar starts.

Note – After switching from the graphical boot to a text boot, there is no way to switch back to the graphical boot screen.

Troubleshooting Login and User Account Issues

If you are unable to log in to your installed system, use the following procedure.

▼ How to Troubleshoot Your Login

Troubleshooting login issues requires you to gain access to the system by booting in single-user mode, so you can troubleshoot the nature of problem and apply the appropriate solution. This procedure includes the steps for booting a system in single-user mode, as well as solutions to the some of the more common login problems.

1 **Boot the system in single-user mode.**

a. **When the boot sequence starts, and the GRUB menu is displayed, type `e` to edit the GRUB menu entries.**

b. **Using the up or down arrow keys, select the `kernel$` line, then type `e` to edit that entry.**

c. **Type an `-s` after the `kernel$` entry.**

d. **Press Return (or Enter) to go back to the previous screen.**

e. **To boot the system in single-user mode, type `b`.**

2 **When prompted, type a user account name.**

The account name can be `root`, or any other privileged account, such as `jack` on the live CD ISO image, or an account that you created during the installation.

3 **Type the `root` password.**

After the system has booted, depending on your particular situation, you can do any of the following:

- **Display the existing user accounts and roles:**

```
-bash-3.2#  cat /etc/user_attr
```

- **Delete a user account:**

```
-bash-3.2# userdel username
```

- **Create a new user account:**

```
-bash-3.2# useradd username
```

a. **Assign a password for the user name.**

```
-bash-3.2# passwd username
```

Note – You will need to type the password twice.

b. **Assign the `root` role to that user.**

```
-bash-3.2# usermod -R root username
```

4 **To return to the installed system, type `exit`.**

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