3

Installing and Maintaining Solaris 8

Terms you'll need to understand:

✓ Software clusters
✓ Software groups
✓ Packages
✓ Patches

Techniques you'll need to master:

✓ Installing Solaris 8
✓ Adding and removing packages
✓ Listing installed packages
✓ Adding and removing patches
✓ Listing installed patches

The first section of this chapter covers the Solaris 8 distribution. Next, installing the operating system is covered in detail. The last two sections summarize the commands for performing software package administration and patch administration. The *Installation* test objectives are covered in this chapter.

The Solaris 8 Distribution

Solaris 8 system and application software is delivered as collections of files and directories, referred to as *packages*. You can copy these packages onto the system from CD-ROM or magnetic tape as a single compressed file and uncompress them for installation.

Included with the package is information about the package, such as its title, storage requirements, and version. Also included are any custom scripts needed to properly install the software.

Sometimes system software is distributed in more than one package, but you need to distribute and install the packages as a unit. A collection of two or more related packages is referred to as a *software cluster*, a logical grouping of packages.

The Solaris 8 operating system is preconfigured into *software groups* consisting of different collections of software clusters and packages. The five software groups are shown in Table 3.1.

Table 3.1 Solaris 8 Software Groups	
Software Group	**Contents**
Core	Required operating system files
End-User System Support	Core plus windowing environments
Developer System Support	End-User plus development environment
Entire Distribution	Developer System plus enhanced features
Entire Distribution Plus OEM	Entire Distribution plus third-party hardware drivers

NOTE Some Solaris 8 documents refer to the operating system's preconfigured software groups as *software configuration clusters* or simply *clusters*. The term *software cluster* also refers to a collection of packages, so this reference can create confusion. This book uses the term s*oftware groups* because it is the term used in the *Solaris 8 Advanced Installation Guide*.

The Entire Distribution Plus OEM group is available only for SPARC platforms.

Installing Solaris 8

Solaris 8 can be installed in four ways. Two of the methods are interactive: The Solaris Interactive Installation program (SunInstall) and Solaris Web Start are covered in this chapter. The other two methods are automatic: JumpStart and Custom JumpStart. These methods are objectives for Exam CX-310-012 and are covered in Chapter 21, "Over-the-Network Installation and JumpStart."

SunInstall, an interactive Open Windows installation program, can be used to install the Solaris 8 software but it does not support installation of copackaged software. You can install any copackaged software using its provided installation program after you finish installing the Solaris 8 software.

Web Start enables you to install Solaris 8 by using a Web browser–like interface instead of the Open Windows interface SunInstall uses. By default, all Solaris and copackaged software is installed; however, this default can be changed so that you can select specific software.

By default, Web Start sets up the system disks, including the root and swap partitions. It also enables you to change the size of the system partitions and provides access to the Layout File Systems utility to set up other disks. The /opt partition is created automatically for copackaged software. With Web Start, you can also create additional partitions and file systems.

Hardware Requirements

Solaris 8 can be installed on Sun SPARC platforms and Intel x86 or compatible platforms. The hardware requirements for both are similar.

Solaris 8 on SPARC Hardware

Solaris 8 can be installed on most sun4c, sun4u, and sun4m platform groups. Consult the *Solaris 8 Sun Hardware Platform Guide* to determine whether a particular platform is supported along with other devices and peripherals, such as disk drives, CD-ROM drives, tape drives, floppy disk drives, small computer system interface (SCSI)/Peripheral Component Interconnect (PCI) host adapters, graphic accelerators, network interfaces, and keyboard/mouse components.

You can use the Solaris 8 installation programs to install the 32-bit or 64-bit version of the Solaris operating system. The 64-bit version is selected by default when you install on Sun UltraSPARC systems, but you can choose the 32-bit version instead. However, you might need to upgrade the Flash PROM on some UltraSPARC sun4u platforms to provide 64-bit support. The *Solaris 8 Sun Hardware Platform Guide* supplies information on determining whether the Flash PROM for a particular system must be upgraded and provides a procedure for updating the Flash PROM.

Solaris 8 requires a minimum of 64MB of memory. The recommended space for the End-User System is 1.6GB of hard disk space. For the largest software group (Entire Distribution Plus OEM with 64-bit support), 2.4GB of hard disk space is required. Either a CD-ROM drive or the appropriate environment for a network installation is required.

Solaris 8 on Intel Hardware

Solaris 8 can be installed on most Pentium or better Intel-compatible CPUs, including AMD and Cyrix processors. Consult the *Solaris 8 (Intel Platform Edition) Hardware Compatibility List* to determine whether a particular CPU is supported along with other devices and peripherals, such as system buses, disk drives, CD-ROM drives, tape drives, floppy disk drives, SCSI/PCI host adapters, graphic accelerators, network interfaces, and keyboard/mouse components. If the system does not have a CD-ROM drive or cannot be booted from the CD-ROM drive, a floppy disk drive is required.

The memory and storage requirements for Intel hardware are identical to those for SPARC hardware: a minimum of 64MB of memory, 1.6GB of hard disk space for the End-User System with 32-bit support, and 2.4GB of hard disk space for the Entire Distribution. Either a CD-ROM drive or the appropriate environment for a network installation is required.

Installing Solaris 8 on a New System by Using Web Start

If you're installing Solaris 8 on a single new system, the preferred installation method is to install from a local CD-ROM drive by using Web Start. (Over-the-network installation is described briefly later in this chapter and in more detail in Chapter 21, "Over-the-Network Installation and JumpStart.") Solaris Web Start can be accessed with a command-line interface or a graphical user interface (GUI).

The installation is divided logically into three phases:

➤ Preparation

➤ Configuration

➤ Software installation

Preparation

The following list summarizes the preparation steps for installing Solaris 8 on a SPARC or Intel-compatible platform from a local CD-ROM drive:

1. Verify that the system hardware is supported. For a SPARC system, see the *Solaris 8 Sun Platform Guide*. For an Intel-compatible system, see the *Solaris 8 (Intel Platform Edition) Hardware Compatibility List*.

2. If the system is networked (will be attached to a network), decide whether Dynamic Host Configuration Protocol (DHCP) will be used. If not, determine the hostname, IP address, and subnet mask information.

3. Determine the domain name. If a name service is used, determine the server hostname and IP address. The name service choices are Domain Name System (DNS), Network Information Service (NIS), or Network Information Service Plus (NIS+).

4. Determine the disk space required by selecting a software group (End-User, Developer, Entire Distribution, or Entire Distribution Plus OEM) and identifying additional software and space for home directories.

5. Determine the language used to install Solaris.

6. Insert the appropriate Solaris 8 Installation CD-ROM (English or Multilingual) into the CD-ROM drive. For Intel-compatibles that cannot boot from the CD-ROM drive, insert the Solaris 8 Device Configuration Assistant floppy disk in the floppy disk drive.

7. Boot the system by turning the power on.

8. For Intel-compatible systems, the Device Configuration Assistant runs to identify the hardware configuration.

9. If you're using the Multilingual CD-ROM, the Web Start Installer prompts you for the language to use during the install. Select the appropriate language.

10. For SPARC platforms, the Installer prompts you to select Initial Install or Upgrade. Select Initial Install.

11. For Intel-compatible platforms, if an appropriate partition for Solaris is not located, a utility similar to the MS-DOS FDISK program executes to define a partition.

12. The Installer prompts you to confirm reformatting of the default disk, requests a size for the swap space, and confirms that the swap space can be located at the beginning of the disk (or prompts for a starting location if the swap space can't be located). The Installer copies the mini-root and platform-specific files to the disk and then reboots the system.

13. For SPARC platforms, the Web Start GUI starts automatically after the system boots.

14. For Intel-compatible platforms, the Installer prompts you for a window configuration (video card and monitor) and tests it to be certain the configuration is correct. Without a proper configuration, the GUI and Solaris Desktop cannot be displayed. After a few seconds, the Web Start GUI starts.

The install process continues with the configuration phase.

Configuration

Use the following steps in the Web Start GUI to collect the necessary configuration information. In this sequence of windows, the next window is typically displayed after you supply the required information in the current window and click the Next button:

1. The Welcome window is displayed.

2. In the Network Connectivity window, select Networked. (If you do not know the network configuration, contact your network administrator.)

3. In the DHCP window, select Yes to enable DHCP; otherwise, select No. If DHCP is not being used, do the following:

   ➤ In the Host Name screen, enter the name of the host in the dialog box.

   ➤ In the IP Address screen, enter the IP address of the system name in the dialog box.

   ➤ In the Netmask screen, enter the subnet mask in the dialog box.

4. In the IPv6 screen, select Yes to enable IPv6; otherwise, select No.

5. In the Name Service screen, select NIS+, NIS, DNS, or None. If you select a name service, do the following:

   ➤ In the Domain Name screen, enter the domain name in the dialog box.

   ➤ If you selected NIS or NIS+, in the Name Server screen, select Find One or Specify One. If you select Specify One, the Name Server Information screen opens, in which you specify the server hostname and IP address.

➤ If you selected DNS, in the DNS Server Address screen, enter up to three IP addresses for DNS servers in the dialog boxes. In the DNS Search List screen, enter up to six domains to be searched to resolve a DNS query in the dialog boxes. If none is identified, only the domain specified for the system will be searched.

6. In the Time Zone screen, select how to specify the time zone: Geographic Region, Offset From GMT, or Time Zone File. Depending on which selection you make, do the following:

   ➤ If you select Geographic Region, the Geographic Region screen opens. Select a region or country and an associated time zone.

   ➤ If you select Offset From GMT, the Offset From GMT window opens. Drag the slide bar until the window displays the correct number of hours (plus or minus) the time zone differs from GMT.

   ➤ If you select Time Zone File, the Time Zone File window opens. Enter the name of the time zone file (typically /usr/share/lib/zoneinfo).

7. In the Date And Time window, enter the year, month, day, hour, and minute in the appropriate dialog boxes.

8. In the Root Password window, enter the password for the root account.

9. In the Power Management window, select whether power management should be turned on or off and whether the selection should be prompted at each reboot.

10. In the Proxy Server Configuration window, select Direct Connection To The Internet or Use Proxy Configuration and enter the proxy server's hostname and port number.

11. The Confirm Information window summarizes your selections. Either click Confirm to continue with the software installation phase, or click Back to change one or more selections.

The install process continues with the software installation phase.

Software Installation

Use the following steps in the Web Start GUI to install the Solaris 8 software on a networked SPARC or Intel-compatible system with a local CD-ROM drive. In this sequence of windows, the next window is typically displayed after you provide the required information in the current window and click the Next button:

1. In the Welcome window, click Next. The Installation CD is ejected.

2. In the Insert CD window, click OK after inserting the Solaris 8 Software 1 of 2 CD-ROM in the CD-ROM drive.

3. In the Select Type Of Install window, select Default Install or Custom Install. *If you select Default Install, skip steps 4 through 10; the installation continues with step 11.*

4. In the Select Software Localizations window, select software localization based on geographic region.

5. In the Select System Locale window, select the initial locale.

6. In the Select Products window, select any additional products (such as the AnswerBook2) that should be installed.

7. In the Additional Products window, select None if no other products are to be installed at this time, or select one of the following:

   ➤ If you select Product CD, the Solaris 8 Software CD-ROM is ejected and the Insert CD dialog box is displayed. Click OK after inserting a product CD-ROM to be scanned. The Scanning CD window is displayed. After the CD-ROM has been scanned, the Select Products window is displayed; it lists the software products found on the CD-ROM. Select the products to install. Eject the Product CD-ROM, insert the Solaris 8 software CD-ROM, and click OK.

   ➤ If you select Kiosk Download, the Scanning Download window is displayed. After Web Start scans the Kiosk download directory (/webstart/kiosk/download), the Select Products window is displayed; it lists the software products found in the download directory. Select the products to install and click OK.

   ➤ If you select Local Or Network File System, the Specify Network File System Path window is displayed. Enter the correct path to additional products that should be installed. After Web Start scans the specified path, the Select Products window is displayed; it lists the software products found. Select the products to install and click OK.

8. In the Select Solaris Cluster Configuration window, select the software group.

9. In the Disk Selection window, select one or more disks to be used for the Solaris 8 software.

10. The Lay Out File Systems window shows a default file system layout. To modify the layout, highlight a listed disk/file system entry and click Modify. A Disk dialog box opens in which you can assign the file systems on the disk to different slices and/or modify the size of each file system. Click Apply to save the configuration and return to the Lay Out File Systems window. Click Next when you've finished modifying the layout.

11. The Ready To Install window summarizes your selections. Click Install Now to start the installation or Back to change one or more selections.

12. The Installing window displays messages and progress bars to show the status of the software installation. When the installation of the Solaris 8 Software 1 of 2 CD-ROM is completed, the CD-ROM is ejected.

13. The Installation Summary window displays the status of the installation. To view additional information, click Details.

14. If you select additional products, the Specify Media window opens, in which you can select either CD or Network File System as a source:

   ➤ If you select CD, the Insert CD dialog box is displayed. Click OK after inserting a product CD-ROM. The Reading CD, Launching Installer, Extracting, and Installing windows are displayed.

   ➤ If you select Network File System, the Specify Network File System Path window is displayed. Enter the correct path to additional products that should be installed. The Launching Installer, Extracting, and Installing windows are displayed.

15. In the Reboot window, click Reboot Now to reboot the system.

After the system reboots, log in as the root account and select OpenWindows or CDE as a desktop for the account. You've now completed the Solaris 8 installation for a networked standalone system by using Web Start.

Upgrading an Existing Solaris System

Upgrading a system enables you to merge the existing system configuration with the new Solaris 8 operating system. However, planning and occasional manual intervention are necessary for a successful upgrade.

SunInstall and Custom JumpStart (see Chapter 21) can be used to upgrade a system. Web Start and the standard JumpStart cannot be used to upgrade an existing system with an earlier version of Solaris (Solaris 7 or earlier).

Before the Upgrade

You should complete a number of tasks before you upgrade your system:

1. Check the latest Solaris 8 Release Notes to determine whether any Solaris 8 changes or enhancements affect the current operation. This information includes software no longer provided with Solaris or patches you need to install.

2. Verify that the hardware is supported as described in the preparation phase of the Web Start installation.

3. Install Solaris by using a CD-ROM or via the network. Depending on the method, verify the proper operation of the CD-ROM drive or network connectivity.

4. Some Sun applications, such as DiskSuite, cannot be upgraded automatically. Manual configuration changes are required before the software can be used. Check the documentation provided with the applications.

5. If any third-party software is installed on the system, check with the software manufacturer to verify that the software will run on Solaris 8. You might need to purchase new versions of third-party software.

6. Back up the existing system. If the upgrade fails, you might need to restore to the existing system until the reasons for failure can be determined and resolved.

7. Collect any configuration information you might be prompted for during the upgrade, such as hostname, network interface, IP address, subnet mask, and domain name. You can avoid having to respond to prompts during installation by preconfiguring system configuration information (as explained in the "Preconfiguring System Configuration Information" section later in this chapter).

8. Set up a backup medium for possible use during the upgrade. If disk space needs to be reallocated, you need to copy file systems to a backup medium and then reload them after the space on the system disks has been adjusted. Local devices, such as unused system disks, tape, or floppy disks, as well as remote file systems can be used for the backup medium.

9. If you're using the Solaris 8 distribution CD, insert it in the system's CD-ROM drive. For x86 platforms that cannot be booted from the

CD-ROM drive, insert the Device Configuration Assistant floppy disk into the A: drive. If you're installing over the network, set up an install server and possibly a boot server.

10. Reboot the system.

During the Upgrade

If the current layout of the system disks does not provide enough space for the upgrade, SunInstall uses the auto-layout feature to reallocate disk space as required. If the auto-layout fails or you want to use a different layout, you must manually specify the disk layout.

If the system configuration information was not preconfigured, you need to supply the correct information when prompted.

After the Upgrade

Merging the existing system configuration with the Solaris 8 operating system might not be completely successful, and you may need to do some manual cleanup. Check the /a/var/sadm/system/data/upgrade_clean file to determine any configuration problems that need to be reviewed and possibly modified before the system can be rebooted.

After resolving any cleanup issues, reboot the system.

Preconfiguring System Configuration Information

You can preconfigure the system configuration information required for installation in two ways:

➤ **Name service method**—This method adds the system information to an available name service (NIS or NIS+). During installation, the information is retrieved from the name service and used to configure the system. This is the recommended method for SPARC installations.

➤ **Sysidcfg file method**—This method creates a file named sysidcfg that contains the configuration information. The file must conform to a defined format (keywords and syntax). The file must be available on a local drive, and the local floppy disk drive on the remote drive must be accessible via the network.

Over-the-Network Installation

Typically, a system is installed with the Solaris 8 distribution CD using a local CD-ROM drive. However, software can be installed over the network if these systems are set up:

➤ **Install server**—A server created by copying the contents of the Solaris 8 distribution CD to its disk drive or that has the distribution CD available in its CD-ROM drive.

➤ **Boot server**—A server used for booting clients located on a different subnet than the install server. The boot server should be located on the same subnet as the clients.

You set up systems to be installed over the network by using Solstice Host Manager to add (preconfigure) information about the systems to NIS/NIS+ or by adding the information to configuration files of an install server or a boot server.

Software Package Administration

Both Sun Microsystems and third-party vendors deliver software as easily manipulated collections of files and executable installation/removal procedures referred to as *packages*. Software packages can be installed on or removed from standalone systems or servers in a fairly straightforward manner because both the root and /usr file systems are local.

Package Tools

Solaris 8 package tools provide a convenient mechanism for installing and removing packaged software. These package tools are standard Unix commands and are accessible through the shell command-line interface. In addition, the system administration tool, **admintool**(1M), provides a GUI for installing and removing packages.

These are the most commonly used command-line package tools:

➤ **pkgadd**(1M)—Installs packages

➤ **pkginfo**(1) *and* **pkgparam**(1)—Displays information about packages

➤ **pkgrm**(1M)—Removes a package

➤ **pkgchk**(1M)—Checks that a package has been correctly installed

Installing a Package by Using the pkgadd Command

The **pkgadd** command can install a package from disk or CD-ROM. Typically, software obtained through the network or from magnetic tape or floppy disk is copied into a spool directory on the system before installation. The default package spool directory is /var/spool/pkg, but you can use any location with adequate free space.

To install one or more packages located in the default spool directory by using the **pkgadd** command, only the package names need to be specified as command-line arguments. For example, to install the SUNWast package, you use the following command:

```
# pkgadd SUNWast

Processing package instance <SUNWast> from </var/spool/pkg>

Automated Security Enhancement Tools
(i386) 11.8.0,REV=2000.01.08.18.17
Copyright 2000 Sun Microsystems, Inc. All rights reserved.
Using </> as the package base directory.
## Processing package information.
## Processing system information.
   1 package pathname is already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with
super-user permission during the process of installing this package.

Do you want to continue with the installation of <SUNWast> [y,n,?] y

Installing Automated Security Enhancement Tools as <SUNWast>
## Installing part 1 of 1.
Installation of <SUNWast> was successful.
#
```

If a package was spooled onto the system into a different directory, you specify the alternative spool directory by using the **-d** command-line argument. For example, if the /tmp directory was used to spool the SUNWast package onto the system, use the following command to install the package:

```
pkgadd –d /tmp SUNWast
```

To install a package located on CD-ROM, use the **-d** command-line argument to specify the pathname to the CD-ROM drive. For example, you can use the **pkgadd** command to install the SUNWast package from a CD-ROM mounted at /cdrom/cdrom0:

```
pkgadd –d /cdrom/cdrom0 SUNWast
```

Actually, the **pkgadd** command does not require the name of a package. If no package name is specified, the **pkgadd** command prompts you with a list of packages that are available in the specified spool directory or on the CD-ROM.

You use the **-s** command-line argument to spool a package into a spool directory instead of installing it. The following command spools the SUNWast package in from the second CD-ROM of the Solaris distribution to the /var/spool/pkg directory (long lines are wrapped):

```
# pkgadd -s /var/spool/pkg
  -d /cdrom/sol_8_600_ia_2/Solaris_8/Product SUNWast
Transferring <SUNWast> package instance
#
```

When you're using the default spool directory, just the word *spool* can be specified with the **-s** command-line argument.

# Installing a Package by Using admintool

After you start the **admintool** command, choose Browse, Software from the menu to open the Software dialog box (see Figure 3.1).
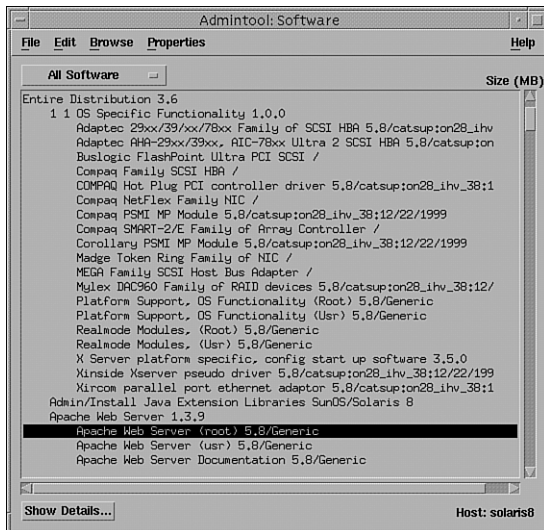
Figure 3.1   The Admintool: Software dialog box.

To install a package, choose Edit, Add from the menu. The Set Source Media dialog box opens, in which you can select either CD-ROM or Hard Disk. Figure 3.2 shows the Software Location set to CD with Volume

Management. The other choices are CD Without Volume Management and Hard Disk. If you're using a CD-ROM, fill in the pathname in the CD Path text box.
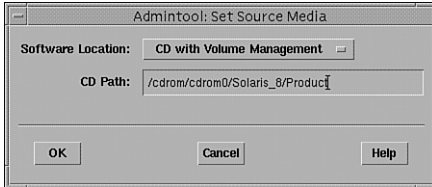

Figure 3.2   Selecting source media settings in the Admintool: Set Source Media dialog box.

If the package has been spooled onto disk, change the Software Location selection to Hard Disk (as shown in Figure 3.3) and specify the spool directory if necessary.

Figure 3.3   Selecting the Hard Disk setting in the Admintool: Set Source Media dialog box.

After selecting the source media, click OK. The Add Software dialog box opens (see Figure 3.4).
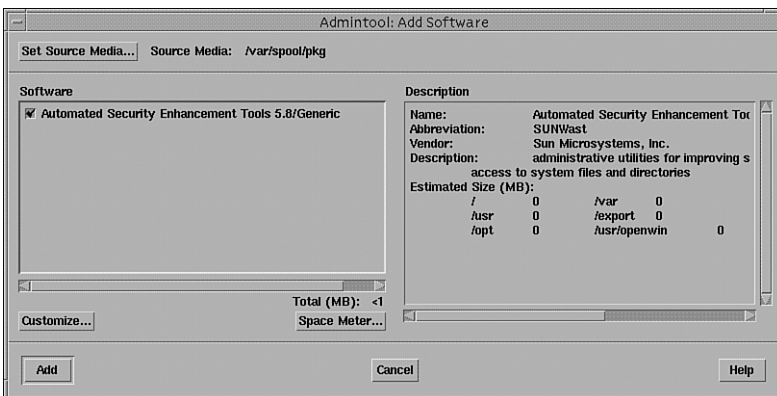
Figure 3.4   The Admintool: Add Software dialog box.

The available packages on the CD-ROM or in the spool directory are listed. Figure 3.4 shows one package in the /var/spool/pkg directory, the Automated Security Enhancement Tools package. To install the package, select the check box to the left of the package title and click the Add button. The **admintool** command calls the **pkgadd** command and opens a window to display the results.

Obtaining Package Information by Using the pkginfo Command

The **pkginfo** command with no command-line arguments displays a list of installed packages. The following example shows a partial listing of installed packages:

```
# pkginfo
system     AMImega        MEGA Family SCSI Host Bus Adapter
system     CPQcnft        Compaq NetFlex Family NIC
system     CPQncr         Compaq Family SCSI HBA
system     CPQsmii        Compaq SMART-2/E Array Controller
system     MADGFmt        Madge Token Ring Family of NIC
system     MYLXflp        Buslogic FlashPoint Ultra PCI SCSI
.
.
.
system     SUNWapchu      Apache Web Server (usr)
system     SUNWarc        Archive Libraries
system     SUNWarrf       X11 Arabic required fonts
system     SUNWast        Automated Security Enhancement Tools
system     SUNWatfsr      AutoFS, (Root)
system     SUNWatfsu      AutoFS, (Usr)
system     SUNWaudd       Audio Drivers
system     SUNWaudh       Audio Header Files
system     SUNWaudio      Audio applications
.
.
.
#
```

Each software package includes a file named *pkginfo* containing various pieces of information about the package. This file is also used to store information generated during and after installation, such as the installation date and a list of any patches applied to the package. To view the contents of the pkginfo file for a particular package, use the **pkginfo** command and specify the **-l** command-line argument and the name of the package. For example, to display the pkginfo file for the SUNWast package, use the following **pkginfo** command:

```
# pkginfo -l SUNWast
   PKGINST:  SUNWast
      NAME:  Automated Security Enhancement Tools
  CATEGORY:  system
```

```
     ARCH:  i386
  VERSION:  11.8.0,REV=2000.01.08.18.17
  BASEDIR:  /
   VENDOR:  Sun Microsystems, Inc.
     DESC:  administrative utilities for improving system
            security by monitoring or restricting access to
            system files and directories

   PSTAMP:  catsup20000108183522
 INSTDATE:  Jan 13 2001 21:31
  HOTLINE:  Please contact your local service provider
   STATUS:  completely installed
    FILES:     41 installed pathnames
                1 shared pathnames
                8 directories
               29 executables
              232 blocks used (approx)
#
```

Obtaining Package Information by Using admintool

You can also use the **admintool** command to obtain the same information as from the **pkginfo** command. To display a list of installed packages, choose Browse, Software from the menu to display a list similar to the one in Figure 3.1.

To view selected contents of the pkginfo file for a particular package, high-light the package name in the list and click the Show Details button. The Software Details dialog box opens (see Figure 3.5).
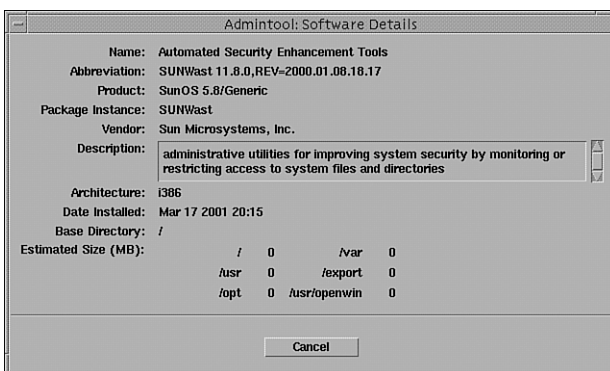
Figure 3.5   The Admintool: Software Details dialog box.

The pkginfo file for each installed package, along with other package-related files, is located under the /var/sadm/pkg directory in a subdirectory with the same name as the package.

Removing a Package by Using the pkgrm Command

The **pkgrm** command is used to remove installed packages. To remove one or more packages, only the package names need to be specified as command-line arguments. For example, to remove the SUNWast package, use the following command:

```
# pkgrm SUNWast

The following package is currently installed:
   SUNWast          Automated Security Enhancement Tools
                    (i386) 11.8.0,REV=2000.01.08.18.17

Do you want to remove this package? y
# Removing installed package instance <SUNWast>
## Verifying package dependencies.
## Processing package information.
## Removing pathnames in class <none>
/usr/aset/util/taskstat
/usr/aset/util/str_to_mode
.
.
.
/usr/aset/masters/uid_aliases
/usr/aset/masters/tune.med
/usr/aset/masters/tune.low
/usr/aset/masters/tune.high
/usr/aset/masters
/usr/aset/asetenv
/usr/aset/aset.restore
/usr/aset/aset
/usr/aset/archives
/usr/aset
/usr <shared pathname not removed>
## Updating system information.

Removal of <SUNWast> was successful.
#
```

Removing a Package by Using admintool

You can also remove an installed package by using the **admintool** command. First, to display a list of installed packages, choose Browse, Software from the menu.

To delete a package, highlight its name in the list and choose Edit, Delete from the menu. A Warning dialog box opens to confirm removal of the package (see Figure 3.6). Click Delete to delete the package. The **admintool** command calls the **pkgrm** command and opens a dialog box to display the results.
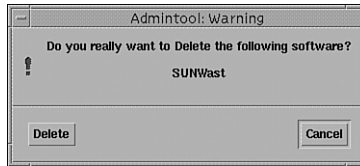
Figure 3.6   The Admintool: Warning dialog box.

Patch Administration

A *patch* is a collection of files intended to update or fix problems with installed software. For example, a patch might be required to fix a problem with a system command or address a security issue. Because most system and application software are installed as packages, patches are applied against one or more packages. Actually, patches are special packages used to update other packages. Like packages, a collection of patches can be grouped together into a *patch cluster*.

The ability to obtain and install patches, keep track of installed patches, and occasionally remove patches are key skills of a competent system administrator.

Obtaining Patches and Patch Information

You can obtain patches from Sun Microsystems in several ways. The two most common methods are purchasing a service contract from Sun or downloading the patches yourself from Sun's Web or FTP site.

Sun Service customers have access to an online patch database and an extended set of patches. The patches can be downloaded from Sun's Web site or FTP site. In addition, Sun Service customers receive a CD-ROM of patches every six to eight weeks.

Everyone else can obtain recommended and security patches for supported systems on the Web at **http://sunsolve.sun.com** or through anonymous FTP from **ftp://sunsolve1.sun.com/pubs/patches**. Another site for Solaris patches is **http://www.ibiblio.org/pub/sun-info/sun-patches**.

Sun offers a bimonthly report that summarizes recommended and security patches for each supported system. Like the patches, the information is available at **http://sunsolve.sun.com** along with other system support information.

Patches are identified with an eight-digit number. The first six digits identify the base patch, and the last two digits identify the revision. For example, patch number 110906-01 is the update for the x86 version of the Solaris 8 **find**(1) command.

Installing a Patch

You install patches by using the **patchadd** command. The appropriate type of system configuration must be specified by using a **patchadd** command-line argument. You might also need to specify a target directory. In addition, you can use a single **patchadd** command to install more than one patch.

Regardless of the type of system configuration being patched, the **patchadd** command is typically executed locally on the system where the software being patched resides (the *target directory*). However, you can install patches remotely over the network if the target directory can be accessed through Network File System (NFS) services.

If the patch is on a CD-ROM, you can install it directly from the CD-ROM. A patch downloaded from the Sun Web or FTP site must reside on a system hard disk. The area where patches are stored before they are installed is referred to as the *spool directory*.

Although patches have no required spool directory, the most commonly used location is the /var/spool/patch directory. However, you can use any location on the system that has adequate free space.

If a patch was obtained via download, chances are good that it is *zipped* (compressed) to make it easier and quicker to download. Some patches (mainly for SPARC platforms) are compressed with the **gzip**(1) command and have filenames ending with the .gz suffix. Others are compressed with the **zip**(1) command and have filenames ending with the .zip suffix. The **zip** command is used for both SPARC and Intel x86 platforms. To uncompress or *unzip* the x86 find patch (110906-01), which is located in the current directory, use the **unzip**(1) command as shown in the following example:

```
# unzip 110906-01.zip
Archive:  110906-01.zip
   creating: 110906-01/
  inflating: 110906-01/.diPatch
   creating: 110906-01/SUNWcsu/
  inflating: 110906-01/SUNWcsu/pkgmap
  inflating: 110906-01/SUNWcsu/pkginfo
   creating: 110906-01/SUNWcsu/install/
  inflating: 110906-01/SUNWcsu/install/checkinstall
  inflating: 110906-01/SUNWcsu/install/copyright
  inflating: 110906-01/SUNWcsu/install/i.none
  inflating: 110906-01/SUNWcsu/install/patch_checkinstall
  inflating: 110906-01/SUNWcsu/install/patch_postinstall
  inflating: 110906-01/SUNWcsu/install/postinstall
  inflating: 110906-01/SUNWcsu/install/preinstall
   creating: 110906-01/SUNWcsu/reloc/
   creating: 110906-01/SUNWcsu/reloc/usr/
   creating: 110906-01/SUNWcsu/reloc/usr/bin/
  inflating: 110906-01/SUNWcsu/reloc/usr/bin/find
  inflating: 110906-01/README.110906-01
#
```

A subdirectory with the same name as the patch will be created under the current directory, and the unzipped files will be placed in this subdirectory.

You then use the **patchadd** command to install the patch. Because patches have no default spool directory, you must specify the full pathname to the patch as a command-line argument. The following example shows the installation of the x86 **find** command patch on a standalone system:

```
# patchadd 110906-01

Checking installed patches...
Verifying sufficient filesystem capacity (dry run method)...
Installing patch packages...

Patch number 110906-01 has been successfully installed.
See /var/sadm/patch/110906-01/log for details

Patch packages installed:
  SUNWcsu

#
```

Note that the patch modified the SUNWcsu package (core Solaris software). The **patchadd** command is actually a ksh script that calls the **pkgadd** command to install the patch.

To apply a patch to the bootable root image of a diskless client or AutoClient, use the **-R** command-line argument and specify the path to the client's root image. For example, applying the Solaris 8 x86 **find** command patch to a diskless client that uses a root image stored under the /export/root/client directory on the current system requires the following command:

```
patchadd -R /export/root/client /var/spool/patch/110906-01
```

To apply a patch to an operating system (OS) service, use the **-S** command-line argument and specify the service. (See Chapter 13, "The Solaris Network Environment," for information about OS servers.) For example, applying the Solaris 8 **find** command patch to an x86 Solaris 8 OS service named Solaris_8x86 on the OS server requires the following command:

```
patchadd -S Solaris_8x86 /var/spool/patch/110906-01
```

To apply a patch to the mini root of a net install image (the image used to install a system over the network), use the **-C** command-line argument and specify the pathname to the net install image. For example, applying the Solaris 8 **find** command patch to an x86 Solaris 8 image on the Solaris_8x86 net install server requires the following command:

```
patchadd -C /export/Solaris_8x86/Tools/Boot
/var/spool/patch/110906-01
```

Multiple patches can be installed by using the **patchadd** command with the **-M** command-line argument and by specifying a directory where all the patches are located and a list of the patch numbers. For example, to install patches 108529-05, 108653-23, and 108876-07, which are all located in the /var/spool/patch directory, you can use the following command:

```
patchadd -M /var/spool/patch 108529-05 108653-23 108876-07
```

Instead of listing several patches on the command line, you can create a text file containing a list of patches. Then specify the name of the text file on the command line in place of all the individual patch names.

For example, to install the 108529-05, 108653-23, and 108876-07 patches located in the /var/spool/patch directory, create a text file with the name /var/spool/patch/patchlist that contains the name of the three patches (separated by spaces or returns). Then use the following command to install the patches:

```
patchadd -M /var/spool/patch /var/spool/patch/patchlist
```

The **-M** command-line argument can be used to install multiple patches for client, services, or install servers by specifying the previously described **-R**, **-S**, or **-C** command-line argument. This argument should be specified after the **-M** patch spool directory and patch names or patch list command-line arguments. See the previous examples of the **patchadd** command for use of these arguments.

By default, any files that will be changed as a result of the patch's installation are copied to one or more backup directories. If necessary, you can then remove the patch and return the system to its state before the patch was

installed. However, if you specify the **-d** command-line argument on the **patchadd** command, the files are not backed up, and the patch cannot be removed.

The default backup directories, located under /var/sadm/pkg, are based on the installed package or packages being modified by the patch and the patch number. For example, the x86 **find** command patch (110906-01) modified the SUNWcsu package. Any files changed by installing this patch will be saved under the /var/sadm/pkg/SUNWcsu/110906-01 directory. You can specify a different backup directory by using the **-B** command-line argument.

The **patchadd** command will fail if any of the following occur:

➤ A package being patched is not installed or is only partially installed.

➤ The patch requires another patch that is not installed.

➤ The patch is incompatible with another patch already installed.

➤ The current version or a higher version of the patch is already installed.

➤ The architecture of the patch and the system do not match.

> **TIP** After you unzip a patch, you can delete the zip file to save space. Likewise, after you install a patch, you can delete the files associated with the patch in the patch spool directory to save space.

Determining Which Patches Are Installed

Two commands can be used to generate a list of installed patches for a stand-alone system:

➤ **showrev -p**

➤ **patchadd -p**

Both commands generate almost identical lists. The following example illustrates the use of the **showrev**(1M) command (the output is formatted for readability):

```
$ showrev -p
Patch: 110906-01
Obsoletes:
Requires:
Incompatibles:
Packages: SUNWcsu
Patch: 108632-06
Obsoletes:
```

```
Requires: 109000-01, 109038-01, 109067-02, 108994-01, 108969-01
Incompatibles:
Packages: SUNWcsr, SUNWnisr, SUNWncar
$
```

When a patch is installed, information about the patch is added to the pkginfo file of each package the patch updates. The pkginfo files are located in subdirectories under the /var/sadm/pkg directory. The **showrev** and **patchadd** commands extract and format information from the pkginfo files. In addition to the patch number and packages the patch updates, the commands list any dependency information, such as other required patches or incompatible patches.

You can use the **patchadd** command to display a list of installed patches for other system configurations by using the **-C**, **-R**, and **-S** command-line arguments, as previously described. For example, to display the patches applied to an OS service named Solaris8x86, you can use the following **patchadd** command:

```
patchadd -S solaris8x86 -p
```

To display a list of patches applied to a particular package, use the **pkgparam** command. The following example lists the patches applied to the SUNWcsu package:

```
$ pkgparam SUNWcsu PATCHLIST
108529-01 108826-01 108900-01 108980-04 108986-01 108990-02
109010-01 109020-01 109028-01 109044-02 109046-02 109092-01
109138-01 109146-01 109148-01 109150-01 109278-01 108965-02
108976-02 109004-01 109006-01 109008-01 109012-01 109016-01
109018-01 109022-01 109024-01 109032-01
109034-01 109036-01
110906-01
$
```

Removing a Patch

The **patchrm** command is used to remove or back out a patch by specifying the patch number as a command-line argument. This command also supports the system configurations that the **patchadd** command supports. You use the same **-C**, **-R**, and **-S** command-line arguments, as previously described. For example, to remove patch 110906-01 from the bootable root image of a diskless client named client5, you can use the following **patchrm** command:

```
patchrm -R /export/root/client5 110906-01
```

Because the default backup directory could have been changed during installation by using the **-B** command-line argument to the **patchadd** command, the **patchrm** command also supports the **-B** argument. In addition, you can force the **patchrm** command to remove a patch that has been superseded by another patch by using the **-f** command-line argument.

You can remove installed patches and return the system to the state it was in before the patch was installed as long as the following conditions are met:

➤ The patch is not required by another patch or has been made obsolete by a later patch.

➤ The patch was not installed by using **patchadd -d**, which instructs **patchadd** not to save a copy of files before they are updated or replaced.

Practice Questions

Question 1

> Which of the following can be used to install multiple patches? (Select all that apply.)
>
> ❑ a. **patchadd -M /var/spool/patch 104567-03 106583-10 103276-04**
>
> ❑ b. Use **patchadd** to install each patch separately.
>
> ❑ c. **patchadd -M /var/spool/patch patchlist**

Answers a, b, and c are correct. All the answers can be used to install multiple patches. The command in answer a installs three patches located in the /var/spool/patch directory. The command in answer c uses a file named patchlist that contains a list of patches to install. Of course, the **pkgadd** command can be used to install several patches, one at a time (answer b).

Question 2

> Which of the following can be used to install packages? (Select all that apply.)
>
> ❑ a. **admintool**
>
> ❑ b. **pkgtool**
>
> ❑ c. **pkgadd**
>
> ❑ d. **pkgrm**
>
> ❑ e. **pkginfo**

Answers a and c are correct. You can use **admintool** and **pkgadd** to install packages. **pkgtool** does not exist. Therefore, answer b is incorrect. **pkgrm** is used to remove packages, and **pkginfo** is used to display information about packages. Therefore, answers d and e are incorrect.

Question 3

What are the two most commonly used methods for installing Solaris 8? (Select all that apply.)

- ❑ a. Tape
- ❑ b. CD-ROM
- ❑ c. Over-the-network
- ❑ d. Floppy disk
- ❑ e. Web

Answers b and c are correct. Solaris 8 is most commonly installed via CD-ROM or over the network. Tape and floppy disks are valid boot devices but are not used for installation. Therefore, answers a and d are incorrect. Answer e, the Web, is not feasible.

Question 4

Which of the following is the default spool directory for packages?

- ○ a. /var/spool
- ○ b. /var/sadm/pkg
- ○ c. /tmp
- ○ d. /var/spool/pkg

Answer d is correct. /var/spool/pkg is the default spool directory for packages. The system spool directory is /var/spool. Therefore, answer a is incorrect. The directory containing information about installed packages is /var/sadm/pkg. Therefore, answer b is incorrect. The temporary directory is /tmp. Therefore, answer c is incorrect.

Question 5

Solaris 8 cannot be installed on which of the following?

- ○ a. Macintosh system
- ○ b. Sun SPARC
- ○ c. Intel Pentium
- ○ d. AMD or Cyrix (Intel-compatibles)

Answer a is correct. Solaris 8 cannot be installed on a Macintosh system. Solaris 8 can be installed on Sun SPARC, Intel Pentium, or Intel-compatibles (AMD and Cyrix). Therefore, answers b, c, and d are incorrect.

Question 6

Which of the following commands displays selected information from the SUNWast pkginfo file? (Select all that apply.)

❑ a. **pkginfo SUNWast**

❑ b. **pkginfo -l SUNWast**

❑ c. **display pkginfo SUNWast**

❑ d. Highlight SUNWast in the Admintool: Software dialog box and click Show Details.

Answers a, b, and d are correct. You can display selected information from the SUNWast pkginfo file by using the **pkginfo SUNWast** or **pkginfo -l SUNWast** command, or by highlighting SUNWast in the Admintool: Software dialog box and clicking Show Details. Although the command in answer a provides only the package title and type of software, the pkginfo file is the only place you can obtain this information. The command in answer c does not exist.

Question 7

Which of the following commands can be used to remove a patch?

○ a. **rmpatch**

○ b. **patchrm**

○ c. **pkgrm -p**

○ d. **patchadd -d**

Answer b is correct. You can use the **patchrm** command to remove a patch. Answer a (**rmpatch**) is not a valid command. The **pkgrm** command is used to remove packages, and no **-p** command-line argument exists. Therefore, answer c is incorrect. The **patchadd -d** command is used to add a patch without saving files before they are updated or replaced. Therefore, answer d is incorrect.

Question 8

Which of the following commands can be used to list all installed patches? (Select all that apply.)

❑   a.   **showrev -p**

❑   b.   **patchinfo**

❑   c.   **patchlist all**

❑   d.   **patchadd -p**

Answers a and d are correct. You can use the **showrev -p** and **patchadd -p** commands to list all installed patches. The commands in answers b and c do not exist.

Question 9

During an upgrade, the disk space needs to be reallocated. Which of the following can be used as the backup medium? (Select all that apply.)

❑   a.   Unused system disk

❑   b.   Tape

❑   c.   Floppy disk

❑   d.   CD-ROM

❑   e.   Remote file system

Answers a, b, c, and e are correct. An unused system disk, tape, floppy disk, or remote file system can be used as the backup medium during an upgrade, assuming it provides enough storage space. A CD-ROM, as the name implies, is read only (compact disc - read-only media). Read-only media cannot be used for backup. Therefore, answer d is incorrect. A writable CD could probably be used, but that option was not offered as a choice.

Question 10

> Which of the following items can be selected during a custom installation using Web Start? (Select all that apply.)
>
> ❑ a. File system layout
>
> ❑ b. Software localizations
>
> ❑ c. Additional software products
>
> ❑ d. System locale
>
> ❑ e. Software group or cluster

Answers a, b, c, d, and e are correct. The file system layout enables you to add file systems and/or adjust the size of file systems. Software localizations can be used to select a geographical region (such as North America), and the system locale further defines the system language. (For North America, you can select one of several English variations, for example.) The software group and additional products can also be selected. These items are available only when you choose Custom Installation.

Need to Know More?

Mulligan, John P., *Solaris 8 Essential Reference* (New Riders, Indianapolis, IN: 2001), ISBN 0-7357-1007-4.

Sun Microsystems, *Solaris 8 (Intel Platform Edition) Hardware Compatibility List*. Available in printed form (part number 806-1054-11), on the Web at **http://docs.sun.com**, and from the online documentation, AnswerBook2, provided with the Solaris 8 operating system.

Sun Microsystems, *Solaris 8 (Intel Platform Edition) Installation Guide*. Available in printed form (part number 806-0956-10), on the Web at **http://docs.sun.com**, and from the online documentation, AnswerBook2, provided with the Solaris 8 operating system.

Sun Microsystems, *Solaris 8 (SPARC Platform Edition) Installation Guide*. Available in printed form (part number 806-0955-10), on the Web at **http://docs.sun.com**, and from the online documentation, AnswerBook2, provided with the Solaris 8 operating system.

Sun Microsystems, *Solaris 8 1/01 Sun Hardware Platform Guide*. Available in printed form (part number 806-6513-10), on the Web at **http://docs.sun.com**, and from the online documentation, AnswerBook2, provided with the Solaris 8 operating system.

Sun Microsystems, *System Administration Guide*, *Volume 1*. Available in printed form (part number 805-7228-10), on the Web at **http://docs.sun.com**, and from the online documentation, AnswerBook2, provided with the Solaris 8 operating system.

Sun Microsystems, *System Reference Manual*, *Section 1—User Commands*. Available in printed form (part number 806-0624-10), on the Web at **http://docs.sun.com**, and from the online documentation, AnswerBook2, provided with the Solaris 8 operating system.

Sun Microsystems, *System Reference Manual*, *Section 1M—System Administration Commands*. Available in printed form (part number 806-0625-10), on the Web at **http://docs.sun.com**, and from the online documentation, AnswerBook2, provided with the Solaris 8 operating system.