

# *Software Administration*

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## **Student Guide**



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# *The Package Commands*

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## Objectives

Upon completion of this lesson, you will be able to:

- Display software package information.
- Add a software package from a CD-ROM.
- Check installed software package attributes.
- Determine a command's full pathname and the name of its software package.
- Remove a software package.
- Describe the steps for installing a software package from a spooled directory.

## References

*Solaris 2.1 System Configuration and Installation Guide*,  
Chapter 13, "Adding and Removing Packages"



## Introduction

All bundled and unbundled software is distributed as packages on a Solaris® 2.x system. During installation, selected software packages are added automatically from the CD-ROM device.

After installation, software packages are added to the system using the package administration commands or the Software Manager tool.

Packages contain files describing the package, files describing the relationship to the target system (for example disk space required), the actual files to be installed, plus scripts that should be run before and after installation and/or removal.

This lesson briefly reviews the package administration commands and describes some package management tips.



# Displaying Package Information

## The `pkginfo` Command

The `pkginfo` command is used to display software package information.

### Command format:

```
pkginfo [ -d device | pathname ] -l pkg_name
```

```
# pkginfo | more
application SUNWabs      Solaris 2.1 System Software AnswerBook
system      SUNWaccr      System Accounting, (Root)
system      SUNWaccu      System Accounting, (Usr)
system      SUNWadmap     System & Network Administration Applications
system      SUNWadmfw     System & Network Administration Framework
system      SUNWadmr      System & Network Administration Root
system      SUNWarc       Archive Libraries
system      SUNWast       Automated Security Enhancement Tools
system      SUNWaudio    Audio applications
system      SUNWaudmo    Audio demo programs
system      SUNWbcp       Binary Compatibility
system      SUNWbnur     Networking UUCP Utilities, (Root)
system      SUNWbnuu     Networking UUCP Utilities, (Usr)
system      SUNWbtool    CCS tools bundled with SunOS
system      SUNWcar       Core Architecture, (Root)
graphics    SUNWcg12      GS (cg12) Device Driver
```

The fields are:

Column Name	Description
<code>pkg_category</code>	The package category may be application, graphics, or system.
<code>pkg_name</code>	The software package name; it begins with SUNW if it is a Sun product.
<code>description</code>	This column provides a brief description of the software product.



# Displaying Package Information

## The `pkginfo` Command

Use the following commands to list software packages that reside on the installation CD-ROM.

The volume manager creates the `/cdrom` directory and mounts the CD-ROM automatically.

```
# pkginfo -d /cdrom/solaris_2_2/s0/Solaris_2.2 | more
```

Use the `pkginfo -l` command to display detailed information about a package, including the package size (in disk blocks).

```
# pkginfo -d /cdrom/solaris_2_2/s0/Solaris_2.2 -l SUNWaudio
PKGINST: SUNWaudio
NAME: Audio applications
CATEGORY: system
ARCH: sparc
VERSION: 3.0,REV=1.0.7
BASEDIR: /
VENDOR: Sun Microsystems, Inc.
DESC: Audio binaries for SunOS 5.2
PSTAMP: patio930308165920
HOTLINE: Please contact your local service provider
STATUS: spooled
FILES: 9   spooled pathnames
        2   directories
        3   executables
        4   package information files
        758 blocks used (approx)
#
```

The last line of the above output identifies the size of the package. Use this information and the `df -k` command to determine if you have enough disk space to install the package.





# Adding a Software Package

## The pkgadd Command

Use the pkgadd command to add a software package.

### Command format:

```
pkgadd [ -d device | pathname ] pkg_name
```

```
# pkgadd -d /cdrom/solaris_2_2/s0/Solaris_2.2 SUNWaudio
Processing package instance <SUNWaudio> from
</cdrom/solaris_2_2/s0/Solaris_2.2>
```

```
Audio applications
(sparc) 3.0,REV=1.0.7
      (C) 1993 Sun Microsystems, Inc. All Rights Reserved.
      << Many copyright messages here... >>
      Using </> as the package base directory.
## Processing package information.
## Processing system information.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.
```

```
Installing Audio applications as <SUNWaudio>
```

```
758 blocks
[ verifying class <none> ]
## Installation of part 1 of 1 is complete.
```

```
Installation of <SUNWaudio> was successful.
#
```

Mail is sent to root when the package is added successfully.



# Verifying Package Installation

## The pkgchk Command

The `pkgchk` command verifies that the attributes and contents of package path names are correct by comparing them to their values as specified in the system log file.

### Command format:

```
pkgchk [ -p path1 [ path2... ] ]
```

This command can check an entire package or just a particular path name if used with the `-p` option. No output is given if no disparities are detected.

```
# pkgchk SUNWaudio
# pkgchk -p /etc/group
  file size <248> expected <289> actual
  file cksum <21204> expected <24836> actual
```

The `/etc/group` file has changed in size, so the *checksum* of the file contents is off.



## Exploring Package Information

The `pkgadd` command updates the `/var/sadm/install/contents` file, which is a log file of all packages installed on the system.

There is no simple way to identify the package that owns a particular file (or command).

For an installed package, search the `/var/sadm/install/contents` log file for the line with the path name in question:

```
# grep /usr/sbin/pkgadd /var/sadm/install/contents
/usr/sbin/pkgadd f none 0500 root sys 77472 53095 733241518 SUNWcsu
$ pkginfo SUNWcsu
system      SUNWcsu          Core Sparc, (Usrc)
#
```

It can also be useful to identify the full path name of a command:

```
# grep pkgadd /var/sadm/install/contents
/usr/sbin/pkgadd f none 0500 root sys 70888 24510 733241518 SUNWcsu
/usr/share/man/man1m/pkgadd.1m f none 0444 bin bin 3784 63018 732833371 SUNWman
# Last modified by pkgadd for SUNWaudio package
#
```

For uninstalled software packages, search the mounted CD-ROM:

```
# grep showrev /cdrom/solaris_2_2/s0/Solaris_2.1/*/pkgmap
/cdrom/Solaris_2.2/SUNWadmap/pkgmap:1 f none usr/bin/showrev 0755 root sys
13164 41711 728620646
/cdrom/Solaris_2.2/SUNWman/pkgmap:1 f none share/man/man1m/showrev.1m 0444 bin
bin 1630 8236 729371100
#
```



# Removing a Software Package

## The `pkgrm` Command

Use the `pkgrm` command to remove a software package.

### Command format:

```
pkgrm package_name
```

You are warned about possible package dependencies after invoking the `pkgrm` command, and are prompted about aborting the operation.

```
# pkgrm SUNWaudio
```

```
The following package is currently installed:
```

```
SUNWaudio      Audio applications
                (sparc) 3.0,REV=1.0.7
```

```
Do you want to remove this package [y,n,?,q] y
```

```
## Removing installed package instance <SUNWaudio>
```

```
## Verifying package dependencies.
```

```
WARNING:
```

```
    The <SUNWowrqd> package depends on the package
    currently being removed.
```

```
Dependency checking failed.
```

```
Do you want to continue with the removal of this package
```

```
[y,n,?,q] y
```

```
## Processing package information.
```

```
## Removing pathnames in <none> class
```

```
/usr/bin/audiorecord
```

```
/usr/bin/audioplay
```

```
/usr/bin/audioconvert
```

```
/usr/bin <shared pathname not removed>
```

```
/usr <shared pathname not removed>
```

```
## Updating system information.
```

```
Removal of <SUNWaudio> was successful.
```

```
#
```

**Mail is sent to root when the package removal is successful.**

---

## Removing a Software Package

The `pkgrm` command uses the `/var/sadm/install/contents` file to determine where files are located and updates this file after a package is removed.

If a file is shared by two or more packages, it is only removed when the last of those packages is removed.



## Spooling Packages

A package can be copied from the installation CD-ROM without installing it so that it can be stored on a system. For example, a server can copy software packages for storage, and then systems without CD-ROM players can mount the software packages from the server for installation.

Software packages can also be installed remotely using the Software Manager tool, which is covered in another lesson.

### On the Server

The following two `pkgadd` commands illustrate how to spool a package into the `/var/spool/pkg` directory and into a directory of your choosing.

```
# pkgadd -d /cdrom/solaris_2_2/s0/Solaris_2.2 -s spool SUNWaudio
Transferring <SUNWaudio> package instance
#
```

The `-s spool` option to the `pkgadd` command copies the package into the `/var/spool/pkg` directory by default.

You can specify a different directory as an argument to the `-s` option.

```
# mkdir /export/pkgs
# pkgadd -d /cdrom/solaris_2_2/s0/Solaris_2.2 -s /export/pkgs SUNWaudio
Transferring <SUNWaudio> package instance
# ls /export/pkgs
SUNWaudio
#
```

---

## Spooling Packages

### On the Client

Client systems can now mount the `/export/pkgs` directory and install the software package, if the server has shared the `/export/pkgs` directory.

```
# mount venus:/export/pkgs /export/pkgs
# pkgadd -d /export/pkgs SUNWaudio
```

### Removing Spooled Packages

Packages can be removed from a spooling directory with the `-s` option on the server.

```
# pkgrm -s /export/packages SUNWaudio
```



## Package Command Summary

The following table summarizes the main commands used to perform package administration.

Command Name	Description
pkginfo	Lists packages installed on the system or available on distribution media
pkgadd	Installs packages
pkgrm	Removes packages
pkgck	Verifies the attributes and contents of the path names belonging to packages





## Package Administration File and Directory Summary

The following table summarizes the files and directories used to perform package administration.

File or Directory	Description
/var/sadm	Directory containing system log and administration files
/opt/ <i>pkgname</i>	Preferred location for the installation of unbundled <i>pkgname</i> package
/opt/ <i>pkgname</i> /bin or /opt/bin	Preferred location for the executable files of unbundled <i>pkgname</i> package
/var/opt/ <i>pkgname</i> or /etc/opt/ <i>pkgname</i>	Preferred location for log files of unbundled <i>pkgname</i> package
/var/sadm/ install/contents	Package map of entire system



## Summary

In this lesson, you learned that:

- Software package information can be displayed with the `pkginfo` command.
- Software packages can be removed with the `pkgrm` command.
- Software package installation information is stored in the `/var/sadm/install/contents` file.
- The `pkgchk` command is used to verify package installation.
- Software packages can be spooled or copied rather than installed using the `-s` option to the `pkgadd` command.

## Exercise 1-1

The purpose of this lab is to practice using the package administration commands.

### Procedure

Write down the command used to perform each task.

1. Identify the installed software package that contains the `showrev` command.

---

2. Identify the path name of the `showrev` command.

---

3. Remove a package specified by your instructor.

---

---

4. Select a software package to be installed and verify that you have enough disk space to install the package. Then install the package.

---

---

5. Verify that the package has been successfully installed.

---

---



# *The Software Manager*

---



## **Objectives**

Upon completion of this lesson, you will be able to:

- Describe the benefits of using the Software Manager.
- Add and remove software packages using the Software Manager.

## **References**

*Solaris 2.1 Software Manager Administrator's Guide*



## Introduction

This lesson provides an alternate method of adding and removing packages. The Software Manager can be used to manage software instead of the package commands.

There are two software management interfaces available in the Solaris 2.x environment: `swm` and `swmtool`. This lesson covers the `swmtool` program.

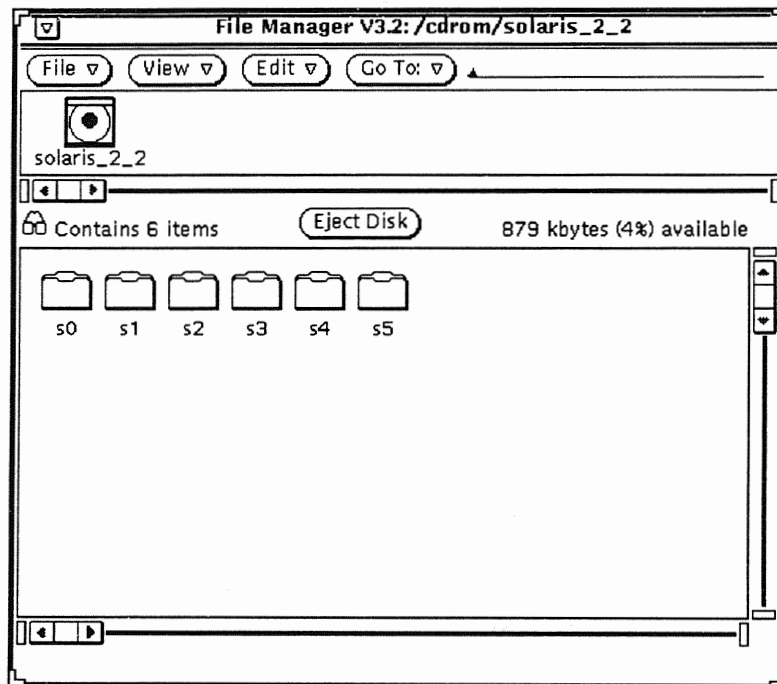
The Software Manager has two main benefits:

1. Its graphical user interface is easier to use than the package commands.
2. It can be used to add and remove software from both local and remote hosts.

## Starting the Software Manager

1. If necessary, start the OpenWindows™ environment.  

```
# /usr/openwin/bin/openwin
```
2. A File Manager window that contains an icon representing the CD-ROM device can be clicked to an icon.

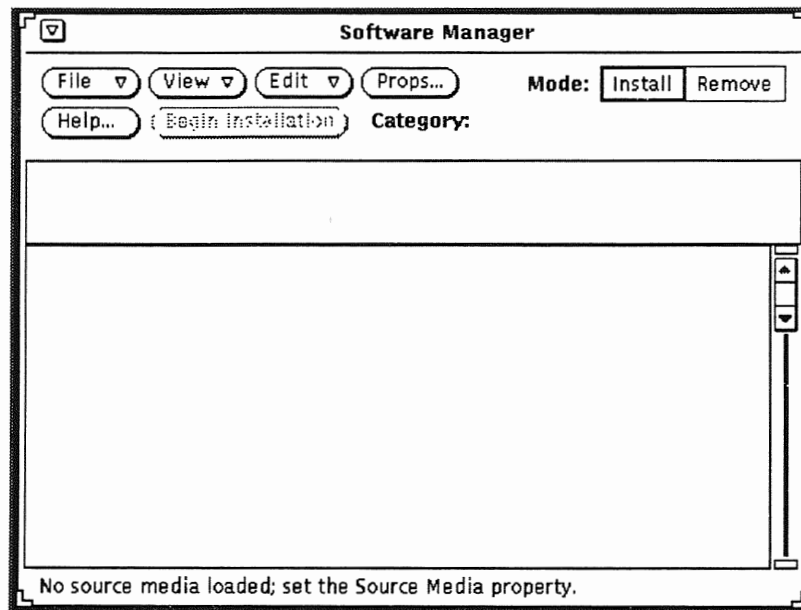




## Starting the Software Manager

3. Start the Software Manager.

```
# swmtool &
```



The Software Manager window displays the following message at the bottom of the screen:

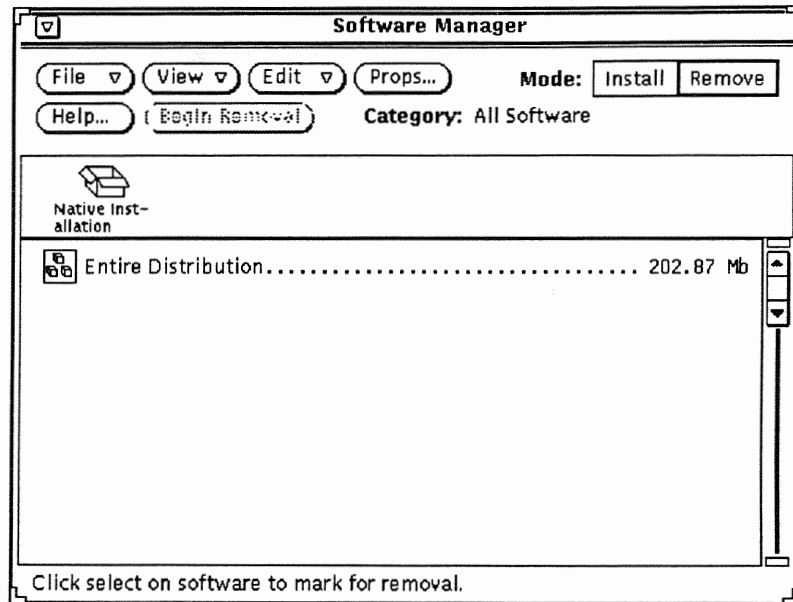
```
No source media loaded; set the Source Media property.
```

It is looking for the installation media. This is not a problem because we are removing software.



## Removing Software on the Local System

- Click on the Remove mode button at the top of the window.



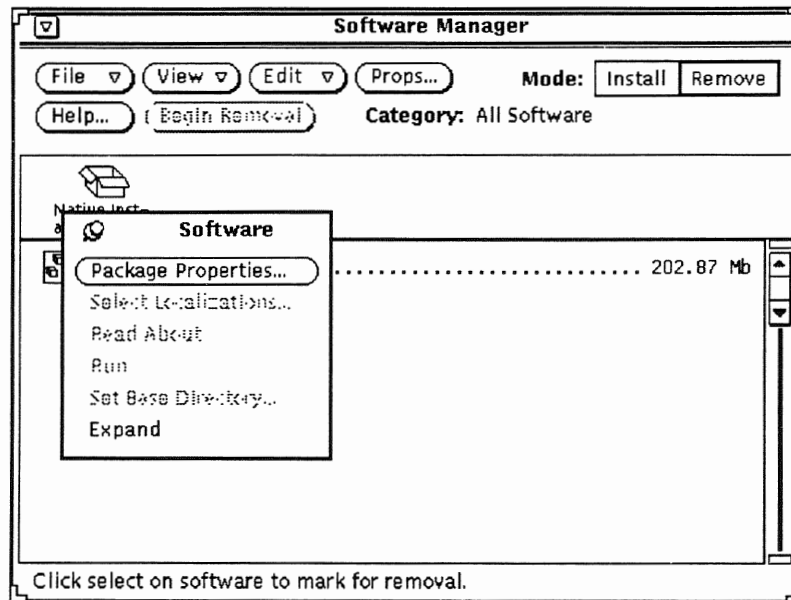
The Software Manager displays the Entire Distribution software icon and the following message appears on the bottom of the screen:

Click select on software to mark for removal.

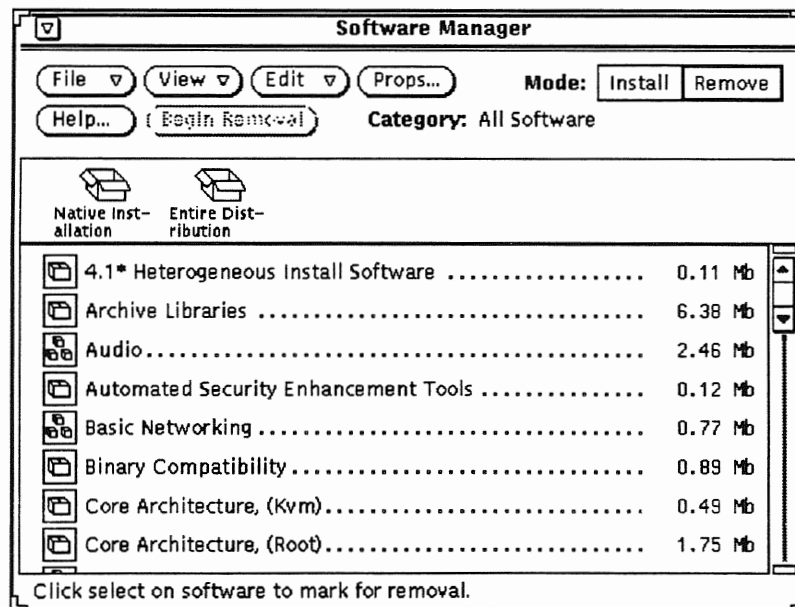


## Removing Software on the Local System

5. Press **MENU** on the Entire Distribution icon and choose **Expand** to list all of the software packages on the local system.



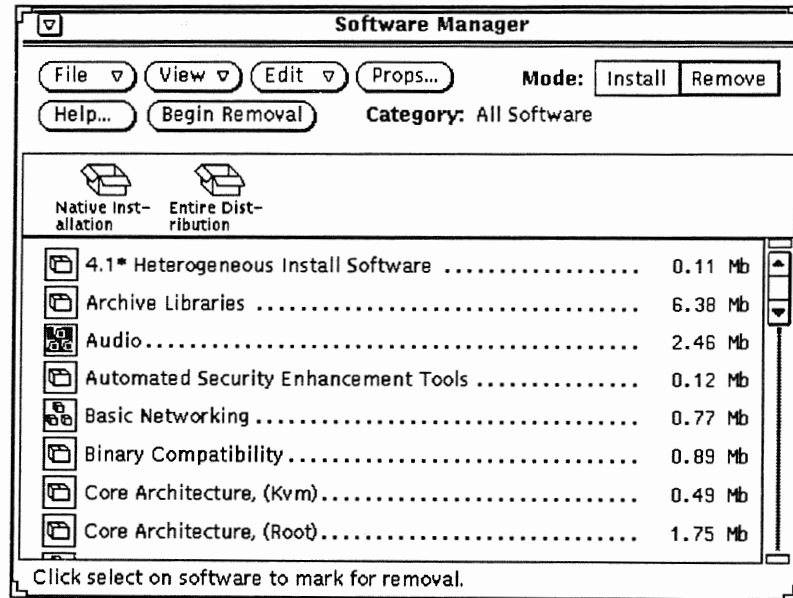
The Software Manager window displays the software loaded on the local host.



## Removing Software on the Local System

Use the scrollbar on the right side of the window to scroll through the software packages installed on the local system.

6. Remove the audio package by clicking on the Audio icon.

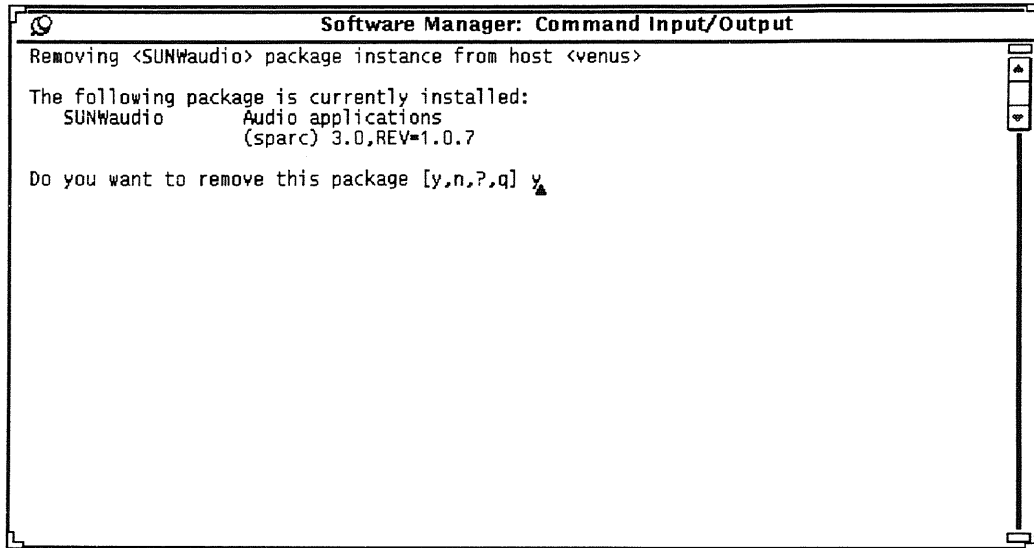


Note the Audio icon displays in reverse video when selected.



## Removing Software on the Local System

7. Click on Begin Removal. The Command Input/Output window is displayed.



This window displays the same information and prompts as the `pkgadd` and `pkgrm` commands.

8. Type `y` at the prompt to verify the removal request and press Return.
9. Type `y` at the prompt to confirm the dependency check and continue with the removal request and press Return.

## Removing Software on the Local System

10. Type `y` at the prompt to confirm the removal of the audio demo package (`SUNWaudmo`) as well and press Return.

```

Software Manager: Command Input/Output
WARNING:
  The <SUNWovrqd> package depends on the package
  currently being removed.
Dependency checking failed.

Do you want to continue with the removal of this package [y,n,?,q] y
## Processing package information.
## Removing pathnames in class <none>
/usr/bin/audiorecord
/usr/bin/audioplay
/usr/bin/audioconvert
/usr/bin <shared pathname not removed> /usr <shared pathname not removed>
## Updating system information.

Removal of <SUNWaudio> was successful.
Removing <SUNWaudmo> package instance from host <venus>

The following package is currently installed:
SUNWaudmo      Audio demo programs
                (sparc) 3.0,REV=1.0.7

Do you want to remove this package [y,n,?,q] y

```

The output in the Command Input/Output window should indicate the removal was successful with messages similar to:

```

Removal of <SUNWaudio> was successful
Removal of <SUNWaudmo> was successful

```

11. Confirm that the removal was successful by using the `pkginfo` command.

```

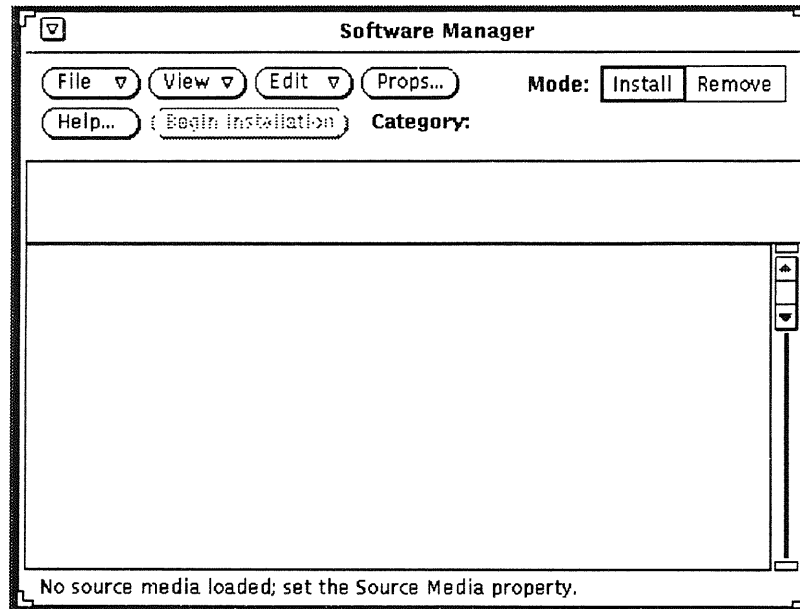
$ pkginfo SUNWaudio
ERROR: information for "SUNWaudio" was not found

```



## Adding Software on the Local System

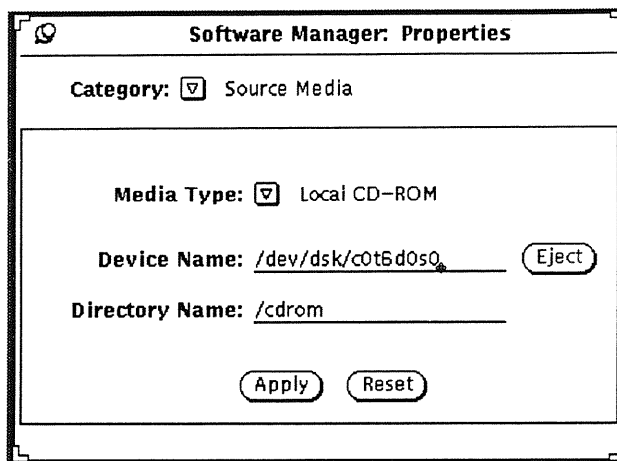
1. If the Software Manager is running, click on the Install mode setting at the top of the Software Manager window.
2. If the Software Manager is not running, start it. Install mode should be selected by default.



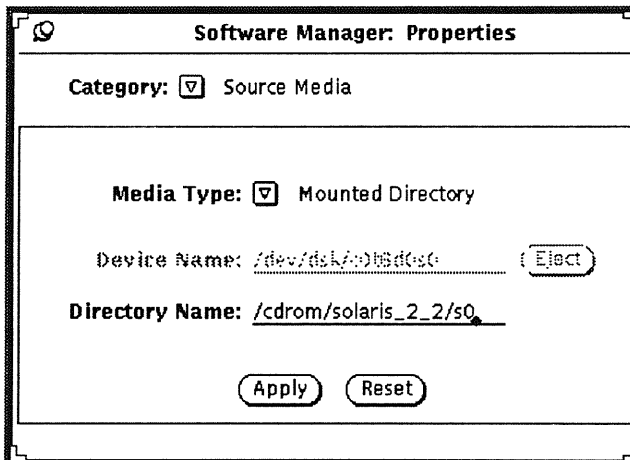
3. Load the installation CD-ROM, if necessary. (The CD-ROM should already be loaded from another module.)

## Adding Software on the Local System

- Click on the Props button to set up the installation CD-ROM as the source media. The Properties window is displayed.



- Choose Mounted Directory from the Media Type menu.



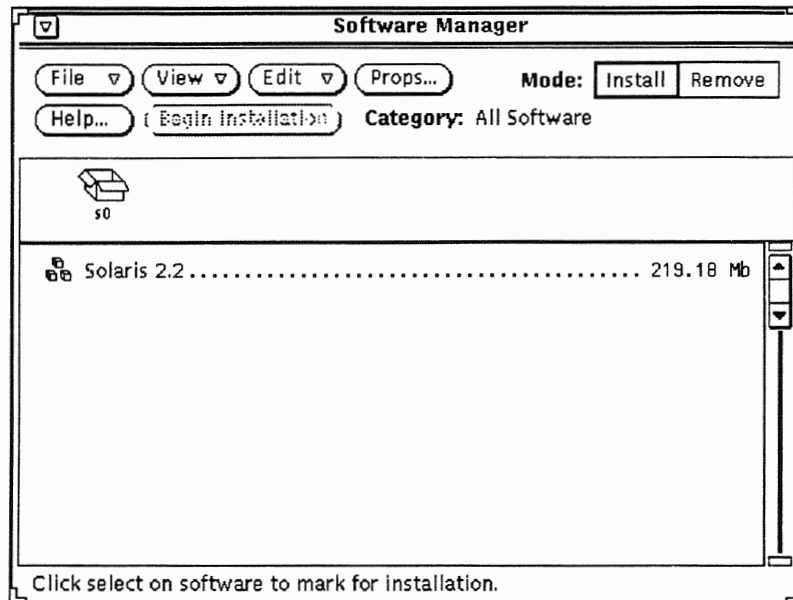
Type the following pathname for the Directory Name: prompt  
/cdrom/solaris\_2\_2/s0

- Click on Apply.

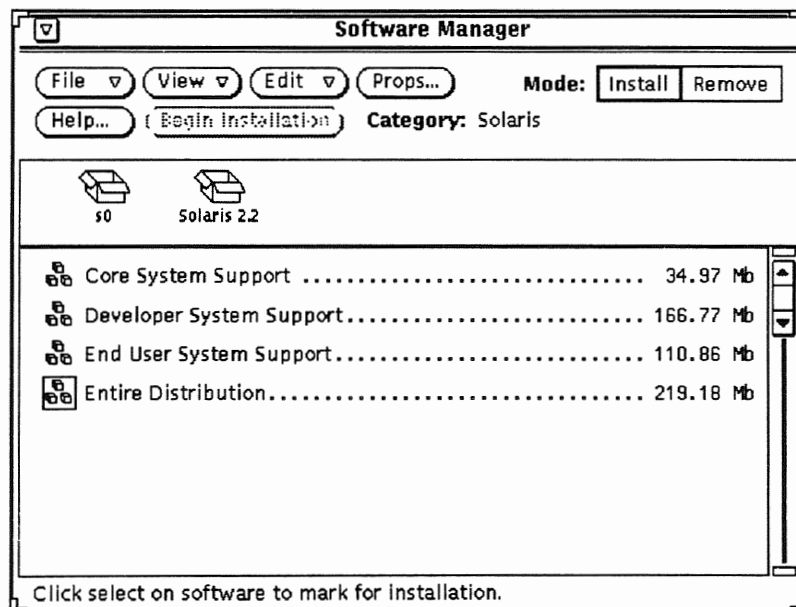


## Adding Software on the Local System

- Press MENU on the Solaris 2.2 icon to display the Software Menu and choose the Expand option.



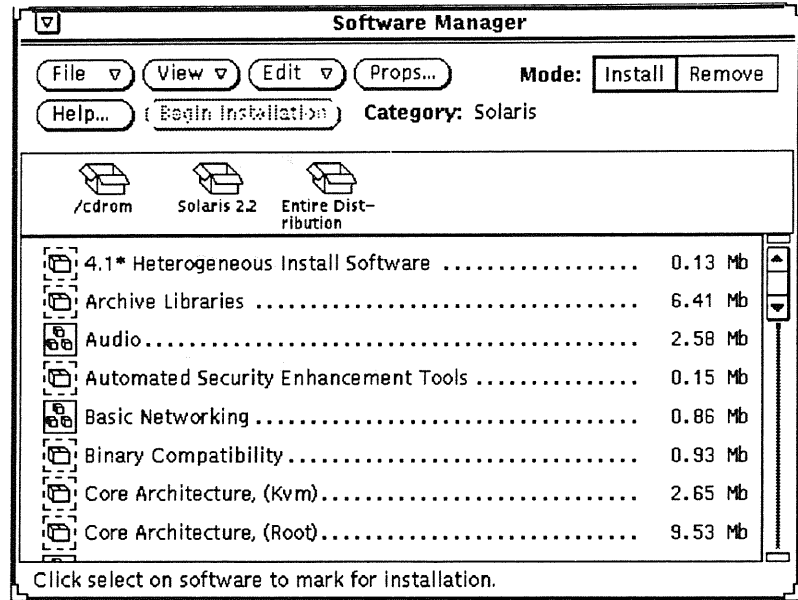
- Press MENU on the Entire Distribution icon to display the Software Menu and choose the Expand option.



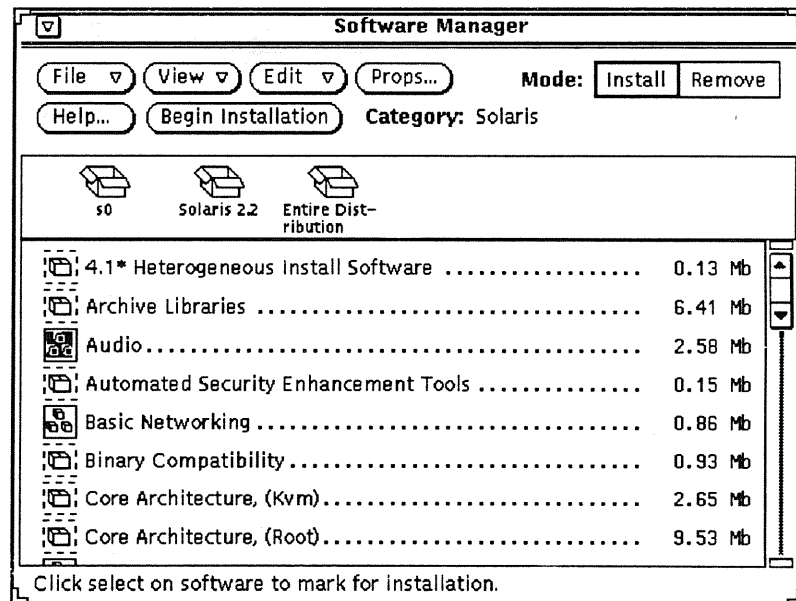


## Adding Software on the Local System

9. The Software Manager window displays the Entire Distribution cluster's software packages.



10. Click on the Audio icon.

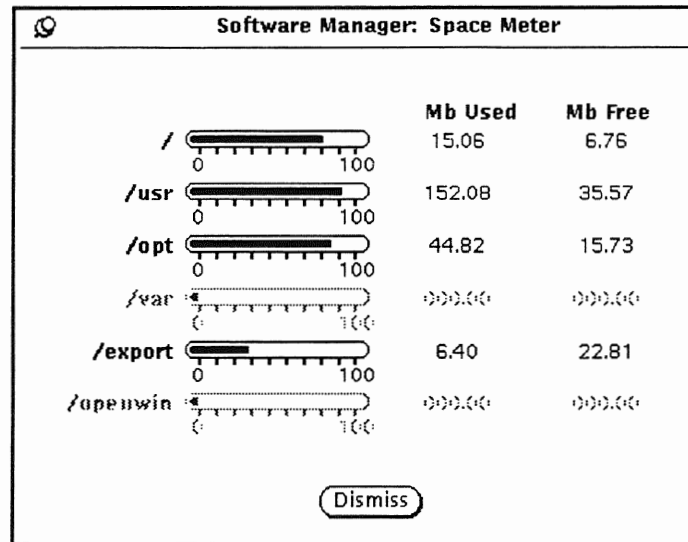


The selected icon displays in reverse video.



## Adding Software on the Local System

If there is insufficient space on the local system to install the software package, the Space Meter window appears automatically.



- Click on Begin Installation. The Command Input/Output window is displayed.

```

Software Manager: Command Input/Output
Installing <SUNWaudio> package instance on host <venus>

Processing package instance <SUNWaudio> from </cdrom/solaris_2_2/s0/Solaris_2.2>

Audio applications
(sparc) 3.0.REV=1.0.5
      (C) 1992-1993 Sun Microsystems, Inc.
      Printed in the United States of America.
      2550 Garcia Avenue, Mountain View, California, 94043-1100 U.S.A.

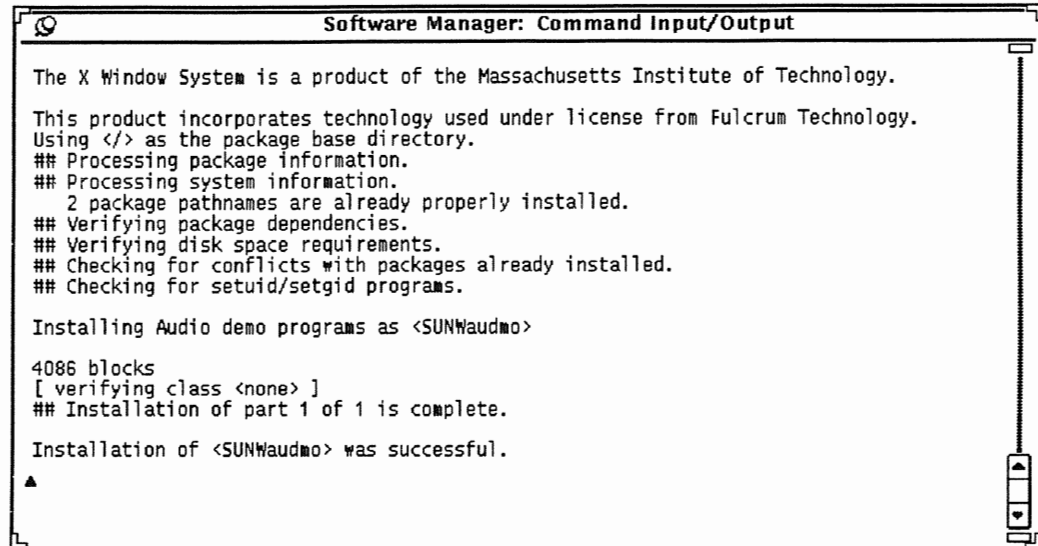
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```

## Adding Software on the Local System

The audio demo package is also installed with the audio package.



```
Software Manager: Command Input/Output

The X Window System is a product of the Massachusetts Institute of Technology.
This product incorporates technology used under license from Fulcrum Technology.
Using </> as the package base directory.
## Processing package information.
## Processing system information.
  2 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

Installing Audio demo programs as <SUNWaudmo>
4086 blocks
[ verifying class <none> ]
## Installation of part 1 of 1 is complete.

Installation of <SUNWaudio> was successful.
▲
```

The output in the Command Input/Output window should indicate the installation was successful with messages similar to:

```
Installation of <SUNWaudio> was successful
Installation of <SUNWaudmo> was successful
```



## Adding Software on the Local System

12. Confirm that the installation was successful by using the `pkgchk` command. There will be no output if the installation was successful.

```
# pkgchk SUNWaudio  
#
```

---

## Adding/Removing Software on Remote Hosts

Keep the following in mind when adding and removing software on a remote host.

1. The local and remote hosts must know about each other either through an entry in the `/etc/inet/hosts` file on both systems or an available name service map.
2. The installing system (or the *media host*) must also know the target host's superuser password in order to install or remove software.
3. Create a `/.rhost` file on the remote system to avoid the need for supplying the remote host's superuser password with the following entry:

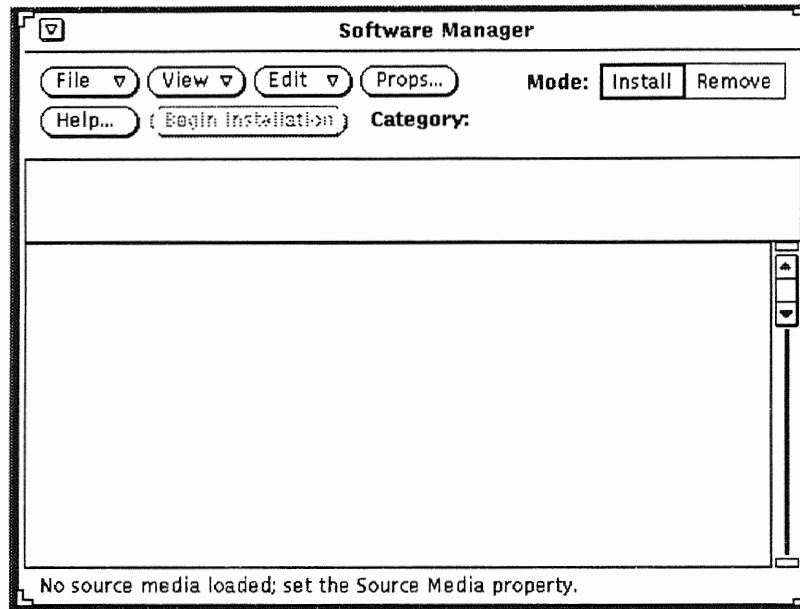
```
media_host      root
```

(This file is discussed in another module.)

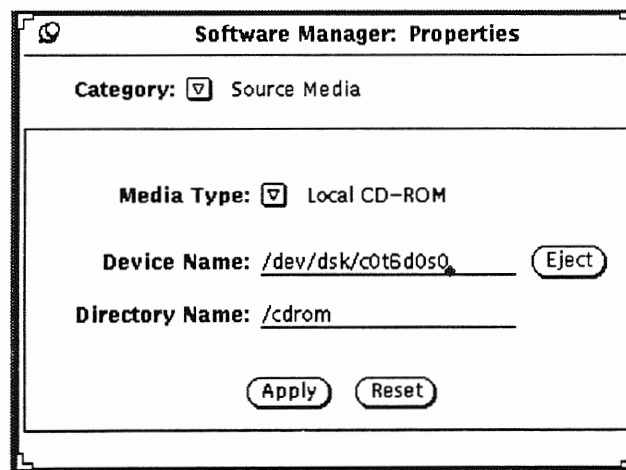


## Adding Software on a Remote Host

1. If the Software Manager is running from the previous example, the Install mode setting at the top of the Software Manager window should be selected.
2. If the Software Manager is not running, start it. Install mode should be selected by default.

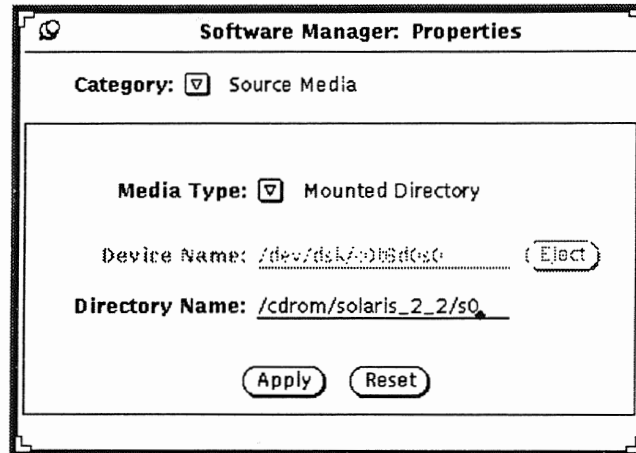


3. Click on the Props button to set up the installation CD-ROM as the source media. The properties window is displayed.



## Adding Software on a Remote Host

4. Choose Mounted Directory from the Media Type menu.



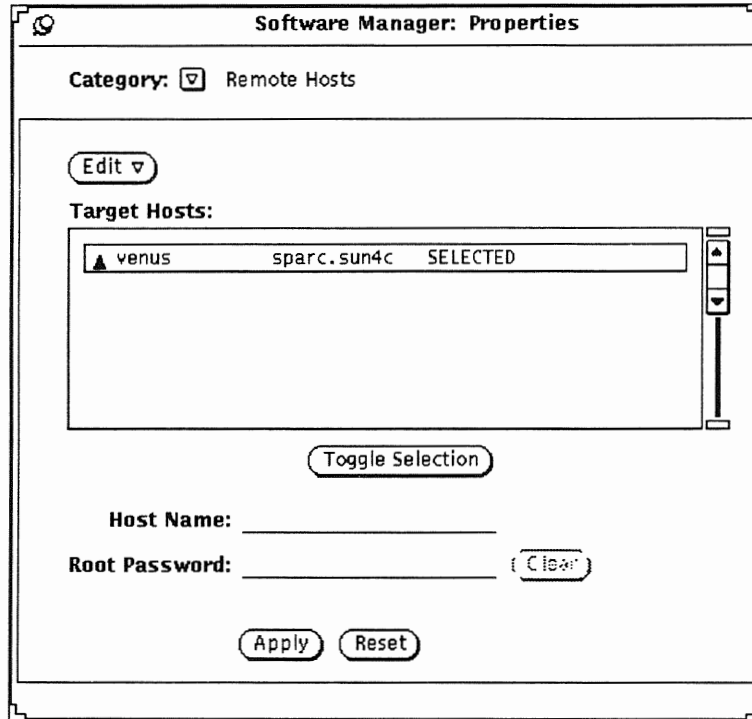
Type the following pathname for the Directory Name: prompt  
/cdrom/solaris\_2\_2/s0

5. Click on Apply.



## Adding Software on a Remote Host

6. Choose Remote Hosts from the Category menu.

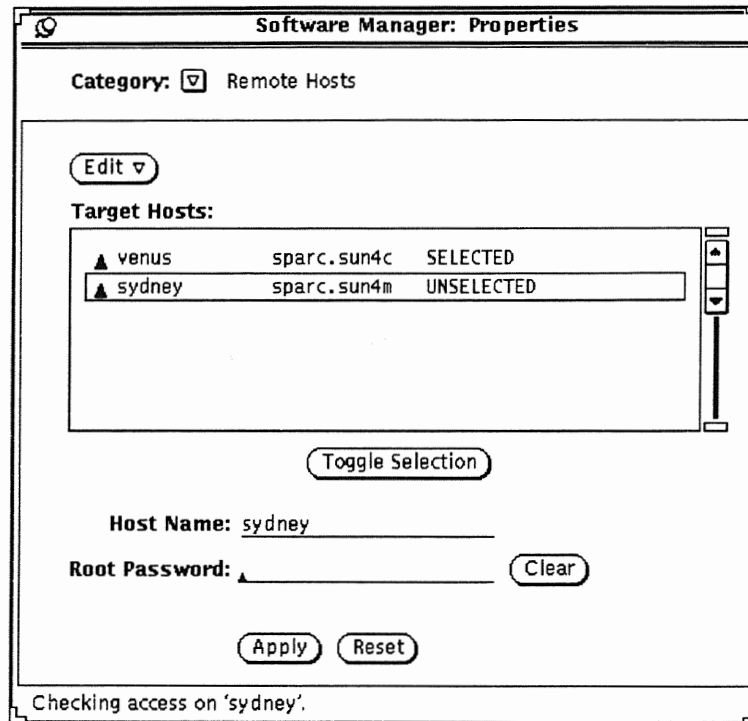


The local host's name and architecture is displayed in the window and is selected by default.



## Adding Software on a Remote Host

7. Add the remote host's name and `root` password at the Host Name: and Root Password: prompts at the bottom of the screen.



Nothing displays as you type the password.



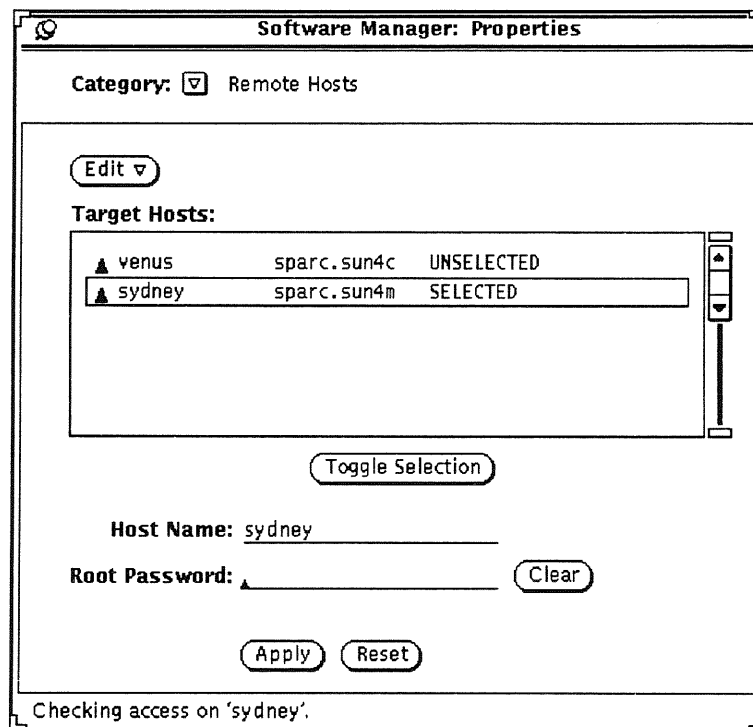
## Adding Software on a Remote Host

8. Select Add from the Edit menu to add the remote host.

If a question mark (?) appears next to the host when you select Add from the Edit menu, click on Clear and retype the password before doing anything else.

The upright triangle (or *glyph*\*) that appears next to the remote host (sydney) means the installation process may continue.

9. Click on Toggle Selection to select the remote host instead of the local host.



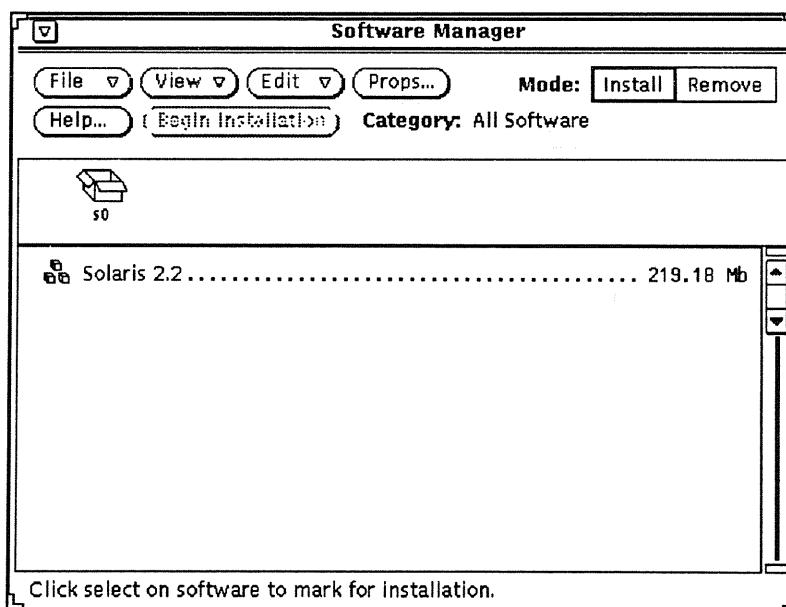
10. Click on Apply.

\*A glyph is a symbolic character and the glyphs used by the Software Manager are described on the next page.

## Adding Software on a Remote Host

Glyph	Meaning
Upright triangle	The remote host is up and the Software Manager has access to it.
Upside down triangle	The remote host is down.
A circle with a line through it	The host is known on the network, but the Software Manager does not have access to it.
Question mark	The host is not known on the network or it is not a Solaris 2.x system.

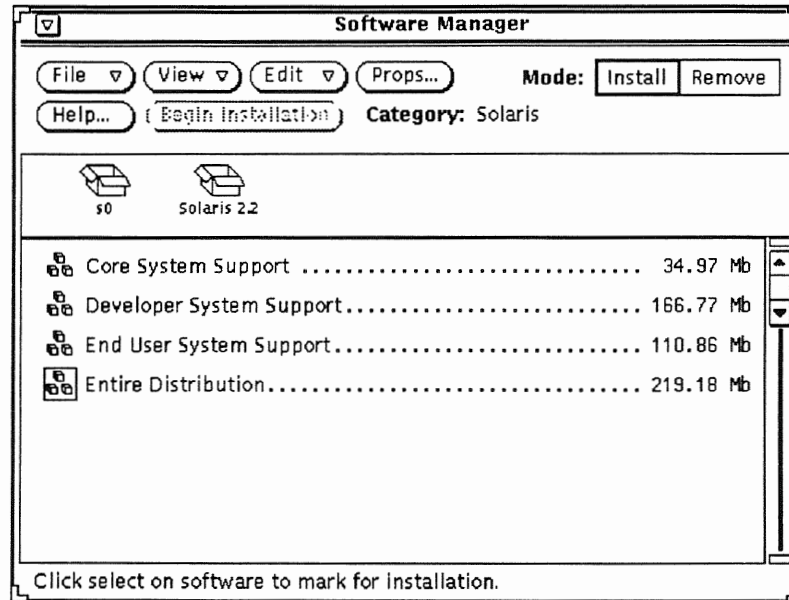
11. Dismiss the Properties menu.
12. Press MENU on the Solaris 2.2 icon in the Software Manager window and choose the Expand option.



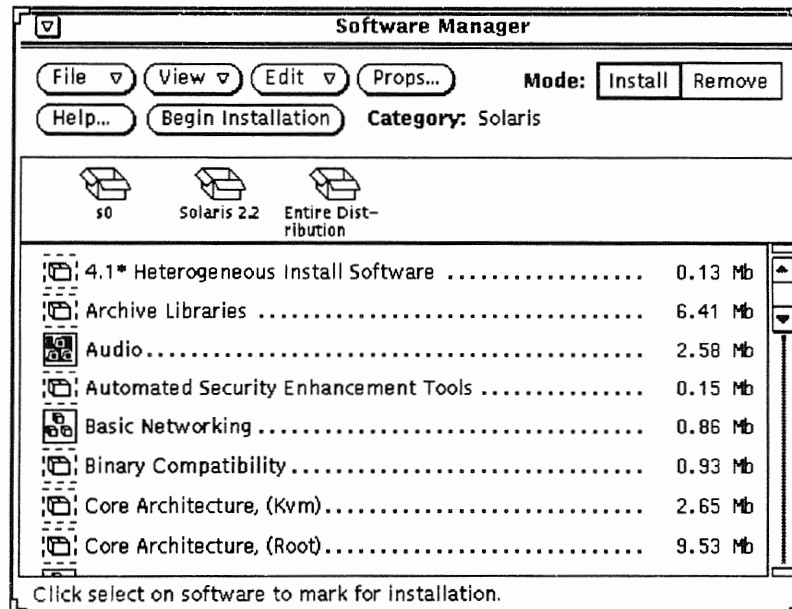


## Adding Software on a Remote Host

13. Press MENU on the Entire Distribution icon and choose Expand.



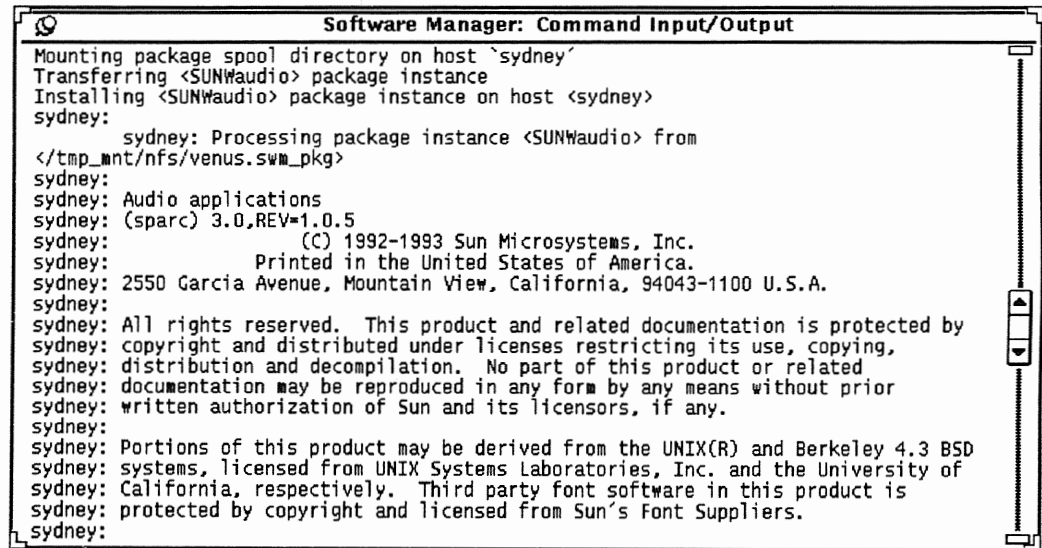
14. Click on the Audio icon.



The icon turns to reverse video when selected.

## Adding Software on a Remote Host

- Click on Begin Installation. The Command Input/Output window is displayed.



```

Software Manager: Command Input/Output
Mounting package spool directory on host `sydney'
Transferring <SUNWaudio> package instance
Installing <SUNWaudio> package instance on host <sydney>
sydney:
    sydney: Processing package instance <SUNWaudio> from
    </tmp_mnt/nfs/venus.swm_pkg>
sydney:
sydney: Audio applications
sydney: (sparc) 3.0,REV=1.0.5
sydney:          (C) 1992-1993 Sun Microsystems, Inc.
sydney:          Printed in the United States of America.
sydney: 2550 Garcia Avenue, Mountain View, California, 94043-1100 U.S.A.
sydney:
sydney: All rights reserved. This product and related documentation is protected by
sydney: copyright and distributed under licenses restricting its use, copying,
sydney: distribution and decompilation. No part of this product or related
sydney: documentation may be reproduced in any form by any means without prior
sydney: written authorization of Sun and its licensors, if any.
sydney:
sydney: Portions of this product may be derived from the UNIX(R) and Berkeley 4.3 BSD
sydney: systems, licensed from UNIX Systems Laboratories, Inc. and the University of
sydney: California, respectively. Third party font software in this product is
sydney: protected by copyright and licensed from Sun's Font Suppliers.
sydney:
  
```

Notice that the output messages are prefaced with the name of the remote system (sydney).

The output in the Command Input/Output window should indicate the installation was successful with messages similar to:

```

Installation of <SUNWaudio> was successful
Installation of <SUNWaudmo> was successful
  
```



## Summary

In this lesson, you learned that:

- The Software Manager is a graphical administration tool that can be used instead of the package administration commands.
- The Software Manager is used to manage software on local and remote hosts.
- If the Software Manager is to be used to install or remove software remotely, the remote system must be known to the local system and vice versa.
- If the Software Manager is to be used to install or remove software remotely, the local system must know the remote system's `root` password.

## Exercise 2-1

The purpose of this lab is to practice using the Software Manager to install and remove software on the local host.

### Procedure

1. Remove a software package such as SUNWaudio.
2. Set up the Software Manager to install the SUNWaudio package on your machine.
3. Verify that the software package is installed.





# *Answer Key*

---





## Lesson 1: The Package Commands

### Exercise 1-1

1. `grep showrev /var/sadm/install/contents`
2. `/usr/sbin/showrev`
3. `pkgrm <SUNWpkg>`, if necessary
4. `pkginfo -l SUNWpkg`  
`df -k`  
`pkgadd SUNWpkg`
5. `pkgchk SUNWpkg`

---

## Lesson 2: The Software Manager

### Exercise 2-1

Follow the steps described.

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