

**SA-285**

## **System Administration II**

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*Kent Peterson - Instructor*

### **Student Guide**



Sun Education Services  
MS UMIL07-14  
2550 Garcia Avenue  
Mountain View, CA 94043  
U.S.A.

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## *About This Course*

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### **Overview**

The primary objective of this course is to prepare students to install and maintain a local-area network of Sun™ workstations that are running the Solaris® 2.x operating environment.

This course is intended for the following audience:

- Students with at least six months of UNIX® system experience.
- Students with system administration experience who are not familiar with UNIX system administration.

Attending this course provides hands-on experience performing system administration tasks such as installing a server system, managing user accounts and printer configurations, backing up and restoring file systems, configuring the NFS® distributed computing environment, adding diskless clients, and configuring the NIS+ environment.



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## Course Objectives

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

- Install a server system.
- Add and remove system software.
- Change system run levels.
- Manage user accounts.
- Maintain disks and file systems.
- Configure terminals and printers.
- Configure the NFS environment for sharing and accessing remote file resources.
- Add diskless client systems.
- Back up and restore file systems.
- Configure the NIS+ environment to facilitate sharing system information consistently and automatically in a local-area network.

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## Course Prerequisites

You should be familiar with the following before attending this course:

- Use basic UNIX commands.
- Make directories and navigate the file system.
- Use metacharacters, pipes, and redirection.
- Create and edit text files using the `vi` editor.
- Use basic security commands to change file permissions and ownerships.
- Describe partitions and disk components.
- Describe commands for backing up and restoring files and directories.



# *Custom Installation*

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## **Student Guide**



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Technical Education Services  
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# *The Solaris 2.x Network Environment*

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## **Objectives**

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

- Describe the network capabilities of the Solaris® 2.x network environment.
- Define the following terms: server, client, file server, diskless client server, dataless client server, and standalone.
- Describe the basic hardware components and file system configurations for diskless clients, dataless clients, and standalones.
- Describe the file system configuration for diskless and/or dataless servers, and state the minimum required disk space in megabytes.

## **Reference Information**

*SunOS 5.2 Administering NFS and RFS, Chapter 1,  
"Overview of SunOS 5.2 Resource Sharing Services"*



## Introduction

Until recently, computing environments could be divided into timesharing business systems and standalone personal computers.

While many companies are now moving away from closed systems to take advantage of modern networking capabilities, Sun is the only major manufacturer that has always been dedicated to open network environments.

In this lesson, you will review the capabilities of the Solaris® 2.x network environment and learn about the basic configurations that can easily be installed on a Sun workstation.



# Mainframe, Personal, and Workstation Computing

## Timesharing Mainframes

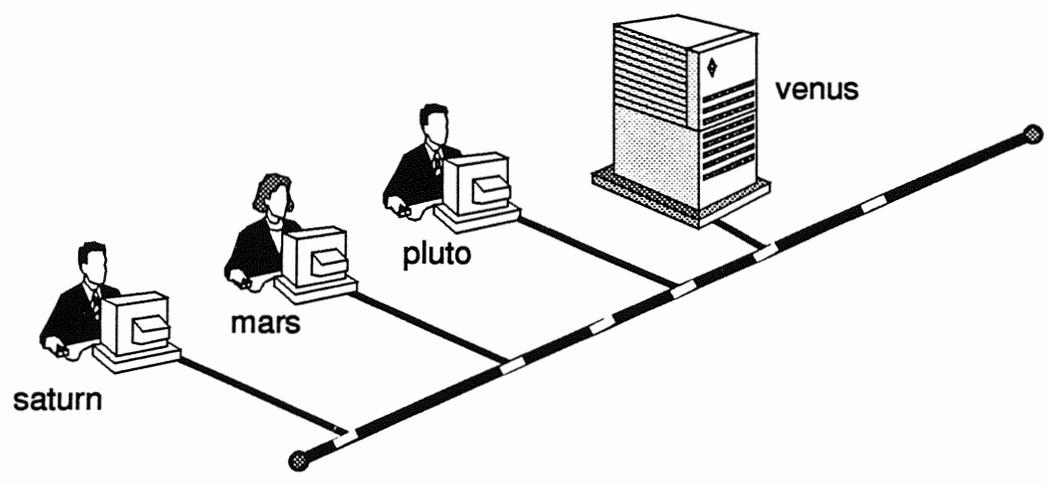
Provide all of the advantages of shared resources (centralized backups, one point of administration, shared peripherals, etc.), along with all of the disadvantages of shared resources (competing for CPU cycles, disk space, etc.).

## Personal Computers

Provide low cost, single-user systems with dedicated resources.

## Networked Workstations

Provide the advantages of shared resources (centralized backups, one point of administration, shared peripherals, etc.) along with the advantages of private resources (local CPU and memory).





# Networked Workstation Capabilities

## Remote Access Features

- Remote login
- Remote command execution
- Remote file copying
- Remote printing
- Remote backups
- Electronic mail

## Implementation

- *Ethernet* (hardware, hardware address, and low-level packet protocol)
- *TCP/IP* (high-level packet and connection-protocol suite, software host name, and software address)

# Networked Workstation Capabilities

## Remote File Sharing Features

- Common read-only file systems can be shared over the network (or between systems) so that they only take up space on a single workstation.
- Home directories can be made available over the network so that any user can sit in front of any workstation and access their own files.
- Workstations can have minimum disk space for their `root` and swap partitions and get the rest of their executables and data files from other systems.
- Workstations with no local disks boot from a remote system over the network. They get everything from a remote system.
- Workstations can even boot from a remote system with a different software release or kernel architecture.

## Implementation

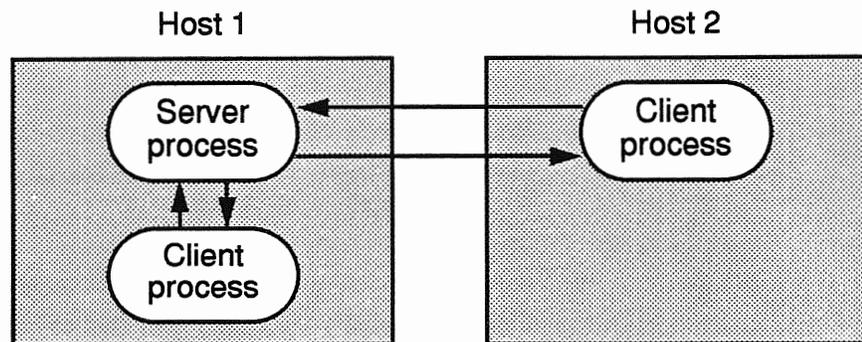
- Sun's NFS® distributed computing file system implements file sharing.
- Sun's Network Information Services Plus (NIS+) implements a shared database of information used by the network community.



## The Client-Server Model for Networked Workstations

A *server* is a process that provides services to other machines on the network. The machine that runs the server process is also often referred to as a server.

A *client* is a process that makes use of services made available by other machines on the network. A machine that runs a client process is often referred to as a client.



- A *file server* is a machine that shares its disk storage and files with other machines on the network.
- A *diskless client server*, also referred to as a boot server, is a file server that supplies all of the files that diskless client machines need in order to boot and operate.
- A *dataless client server* is a file server that supplies all of the files that dataless client machines need in order to operate.
- An *NIS+ server* supplies the NIS+ database to its clients.
- A *print server* makes its local printer available to other machines on the network.
- A *mail server* receives mail for a group of machines and makes users' mailboxes available through the NFS file system.
- The SunInstall™ utility uses the term server to refer to a server of diskless and/or dataless clients. Remote boot support is automatically provided, once the client is defined on the server.

# Standalone Workstation Configuration

This configuration is called *standalone* because the system can exist independent from the network. It can also be a server and/or client of many network resources (NFS, NIS+, and so on). This configuration is not suitable for a machine that serves diskless or dataless clients.

## Basic Hardware

- Monitor and keyboard
- CPU and memory
- Approximately 200-Mbyte disk
- Backup device

## File Systems

- The / (root) file system contains machine-specific files and directories crucial for system operation.
- The /usr file system contains the system's software, often called executables.
- The /export/home directory or file system contains users' home directories.
- The /opt file system is used to store unbundled and third-party software.



# Diskless Client Workstation Configuration

This configuration requires no local disk, although workstations with a local disk can be configured to boot as if they were diskless.

## Basic Hardware

- Monitor and keyboard
- CPU and memory
- Ethernet hardware

## File Systems

Diskless systems get their / (root), /usr, /home, and /opt file systems, along with their swap space, from another system over the network.

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# Dataless Client Workstation Configuration

This configuration requires limited local disk resources. A local swap area and root file system yields faster performance than is possible with diskless systems. This is because much of the work is done locally, and there is therefore less drain on the server.

## Basic Hardware

- Monitor and keyboard
- CPU and memory
- Disk
- Ethernet hardware

## File Systems

Dataless systems use their small local disk for swap and the / (root) file system. They get their /usr, /home, and /opt file systems from another system over the network.



# Diskless and/or Dataless Server Configuration

While this configuration is sometimes referred to simply as server, it is specifically designed to serve diskless and dataless clients.

## Basic Hardware

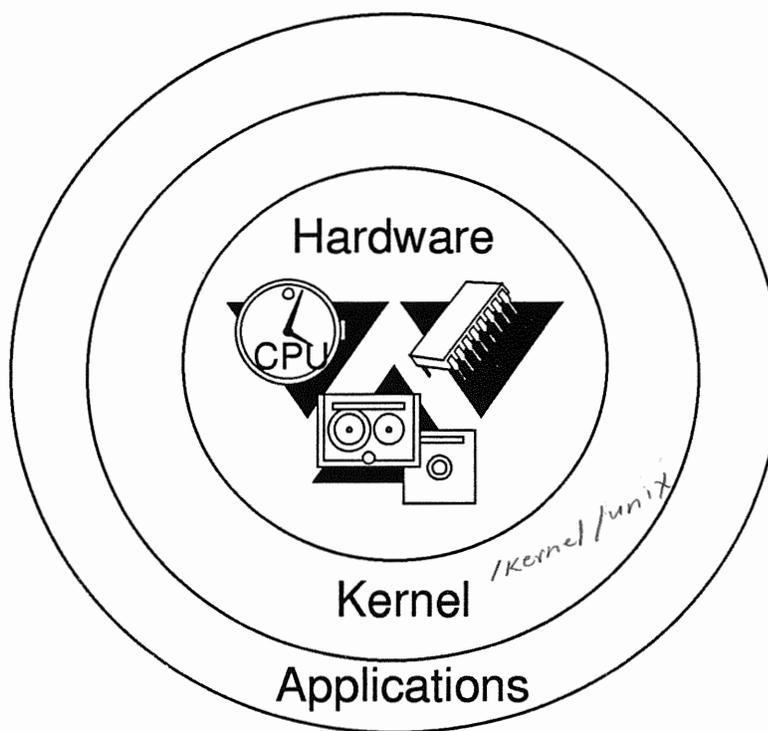
- Monitor and keyboard
- CPU and memory
- More than 300-Mbyte disk
- Ethernet hardware
- CD-ROM
- Tape device

## File Systems

- The / (root) and /usr file systems.
- The /export/home file system.
- The /opt file system.
- The /export file system is made available by the server and contains the following:
  - A root directory for each diskless client
  - A directory that contains the /usr files for each diskless or dataless client. When a client has the same architecture as its server, it shares the server's /usr directory, otherwise files specific to the client's architecture are loaded here.
- The /export/swap file system contains a swap file for each diskless client.

## A View of Kernel and Application Architectures

All UNIX® systems implement a layered architecture. Each layer communicates only with adjacent layers. This modularity makes it possible to port the operating system to a new CPU by changing the kernel without changing the applications.



Two major software layers correspond to two types of software architecture:

- *Kernel Architecture* - The version of the kernel and kernel-specific binaries that run on a CPU.
- *Application Architecture* - The version of applications and commands that run on a CPU.

CPUs that require different kernels may or may not require different applications. The same application architecture is supported by several different kernel architectures. Note the table on the next page.



## A View of Kernel and Application Architectures

The following table illustrates the relationships between various Sun systems, their CPU model numbers, kernel, and application architectures.

System Name	CPU	Kernel Architecture	Application Architecture
SPARCstation™ SLC™	4/20	Sun4c	Sun4
SPARCstation ELC™	4/25	Sun4c	Sun4
SPARCstation IPC™	4/40	Sun4c	Sun4
SPARCstation IPX™	4/50	Sun4c	Sun4
SPARCstation 1	4/60	Sun4c	Sun4
SPARCstation 1+	4/65	Sun4c	Sun4
SPARCstation 2	4/75	Sun4c	Sun4
SPARCstation 10	SS10	Sun4m	Sun4
SPARCserver™ 300	4/3xx	Sun4	Sun4
SPARCserver 400	4/4xx	Sun4	Sun4
Sun-4™/100 series	4/110	Sun4	Sun4
Sun-4/200 series	4/2xx	Sun4	Sun4
SPARCstation 600MP	SS6xxMP	Sun4m	Sun4
SPARCsystem™ 1000	SS1000	Sun4d	Sun4
SPARCcenter™ 2000	SC2000	Sun4d	Sun4
SPARCengine™ 1E	4/E	Sun4e	Sun4
SPARCclassic™	4/15	Sun4m	Sun4
SPARCstation LX	4/30	Sun4m	Sun4

You may display the kernel architecture and application architecture with the `showrev` command.

## Summary

In this lesson, you learned that:

- Networked workstations provide remote access and remote file capabilities.
- There are many kinds of client-server interactions on Sun networks, and any machine can be either a client, server, or both.
- The Solaris 2.x network environment includes four system configurations, each with its own hardware and software requirements.

**Standalone Configuration** - Can exist independent of the network, or can share files over the network.

**Diskless Client Configuration** - Gets all disk resources over the network.

**Dataless Client Configuration** - Gets all but `root` and `swap` resources over the network.

**Diskless/Dataless Client Server** - Serves disk resources to diskless and/or dataless clients.

## Exercise 1-1

Write down your answers to the following questions.

1. What advantage does a networked workstation environment have over a traditional timesharing environment?

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2. What is the difference between remote file copying and true file sharing?

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3. What file systems are found on a standalone system?

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4. What file systems are found on a server system that supports diskless and/or dataless clients?

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## Objectives

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

- Identify the three phases of the installation process.
- Write the minimum required disk space, in megabytes, for specific partitions on a server.
- Verify your system meets the hardware requirements for installing the Solaris 2.x environment on a server.
- Describe the terms “software packages” and “software clusters.”
- List and describe the four software configuration cluster options.
- Perform a custom installation of the Solaris 2.x software.

## References

*Solaris 2.2 System Configuration and Installation Guide*



## Introduction

The installation process actually has three phases: system configuration, system installation, and post-installation tasks. The post-installation steps such as adding users and diskless client information are covered in other modules in this course.

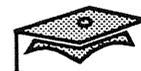
This lesson describes the first two phases of installing a server system.

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## Solaris 2.x Supported Configurations

The Solaris 2.x environment supports the following system configurations:

- Networked/non-networked standalone
- Dataless client
- Diskless client
- Servers
  - A homogeneous server, running the Solaris 2.x release, supporting clients (with the same kernel architecture) at the same or lower release level.
  - A heterogeneous server, running the Solaris 2.x release, supporting clients with differing kernel architectures at the same or lower release level [SunOS™ 4.1.1 and above].



## Hardware Requirements

### Supported Hardware Platforms

The Solaris 2.x environment is supported on the following platforms:

- Sun4/*nnn* series
- SPARCengine series
- SPARCstation series
- SPARCserver series (600MP and 2000MP)

### Memory Requirements

The installation process requires 16 Mbytes of memory.

### Distribution Media

The Solaris 2.x release is distributed on CD-ROM only, and can be installed from a local or remote CD-ROM player.

### Supported Disk Types

The Solaris 2.x operating system supports IPI, SCSI, and SMD drives.

### Disk Space Requirements

Generally, you must have at least 150 Mbytes of available disk space. We recommend approximately 300 Mbytes to install everything.

---

# Hardware Requirements

## Minimal Hardware Configuration

- Sun-4 application architecture
- 16 Mbytes of memory
- Monochrome monitor or ASCII terminal
- Approximately 200 Mbytes of disk space
- Local or remote CD-ROM
- Programmable read-only memory (PROM) level - 1.1 or greater



## Software Terminology

Different terms are used to describe software during and after installation.

### Software Packages

A software *package* is a group of files and directories, which describe a software application, such as the High-Sierra File system or the on-line manual pages. The Solaris 2.x release contains approximately 80 software packages, which total approximately 300 Mbytes of disk space.

Creating a software package is the standard way to deliver bundled and unbundled software. Packages are administered using the package administration commands, and are generally identified by a SUNWxxx naming convention.

### Software Clusters

During installation, the software packages are grouped into software *clusters*, which are logical collections of software packages. For example, the System and Network Administration cluster includes the following packages:

- System and Network Administration Applications
- System and Network Administration Framework
- System and Network Administration Root

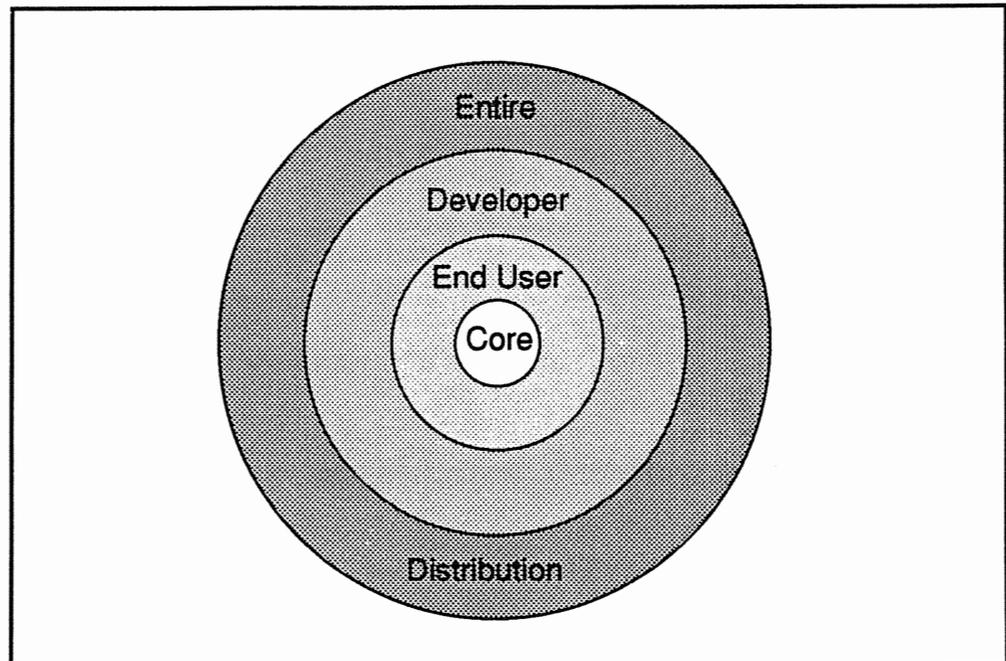
Some clusters include only one package. For example, the *On-line Manual Pages* cluster contains one package—the *On-Line Manual Pages*.

The cluster names used during installation refer to the logical names in the Sun environment such as System and Network Administration, and do not use the SUNW prefix.

# Software Terminology

## Software Configuration Clusters

The SunInstall utility further groups the software packages and clusters into four configuration clusters to make the software installation process easier.



### Core

This cluster contains the software needed to boot and run the Solaris 2.x environment, which can be used to configure a standalone system, but not a server. It includes some networking software and the drivers required to run the OpenWindows™ environment. It does not include the OpenWindows software or man pages.

### End User

This cluster contains the software a user needs to run the Solaris 2.x environment. It includes the OpenWindows version 3.1 software but not the man pages.



## Software Terminology

### Software Configuration Clusters (continued)

#### Developer

This cluster contains the software needed to develop software in the Solaris 2.x environment. It includes compiler tools, OpenWindows, and the man pages. It does not include compilers and debuggers.

#### Entire Distribution

This cluster contains the entire Solaris 2.x release.

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**Note:** Once a software configuration cluster is selected, you may customize it by adding and/or deleting software clusters and/or packages.

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### Configuration Cluster Sizes

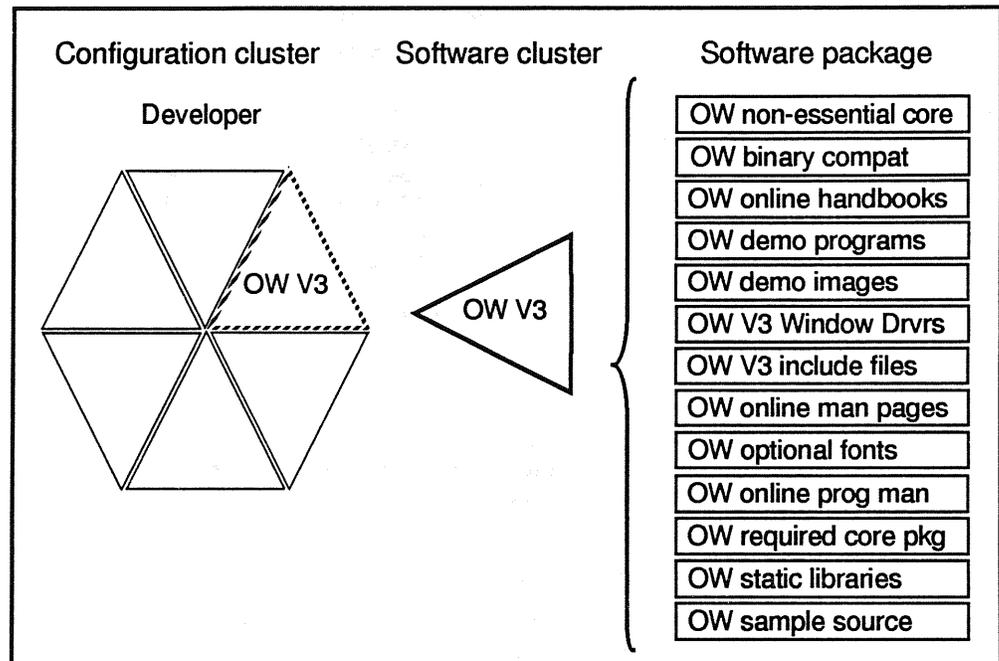
The approximate size of each configuration cluster is listed below.

Configuration Cluster	Size
Entire Distribution	273.98 Mbytes
Developer System Support	208.46 Mbytes
End User System Support	138.57 Mbytes
Core System Support	43.71 Mbytes

# Software Terminology

## Summary

The four configuration clusters contain software clusters, made up of selected packages. This diagram illustrates the difference between a configuration cluster, a software cluster, and a software package.



Once the system is installed, refer to the individual software packages by their package administration names (SUNWxxx). For example, the OpenWindows software-package names used with the package administration commands are:

SUNWowMIT	SUNWowman
SUNWowbcp	SUNWowoft
SUNWowbk	SUNWowpmn
SUNWowdem	SUNWowrqd
SUNWowdim	SUNWowslib
SUNWowdv	SUNWowsrc
SUNWowinc	

The package administration commands do not recognize the software installation cluster names.



## Disk Partition/Software Requirements

The partition size requirements vary depending on what software is selected during the installation.

### Server Disk Partitioning Guidelines

The partition size guidelines listed below are approximately based on selecting the Entire Distribution configuration cluster.

File Systems	Minimum	Maximum Required
/ (root) <sup>a</sup>	12 Mbytes	18 Mbytes
swap	32 Mbytes	The default is three times memory size
/usr	30 Mbytes	181 Mbytes
/opt	varies	Varies based on configuration

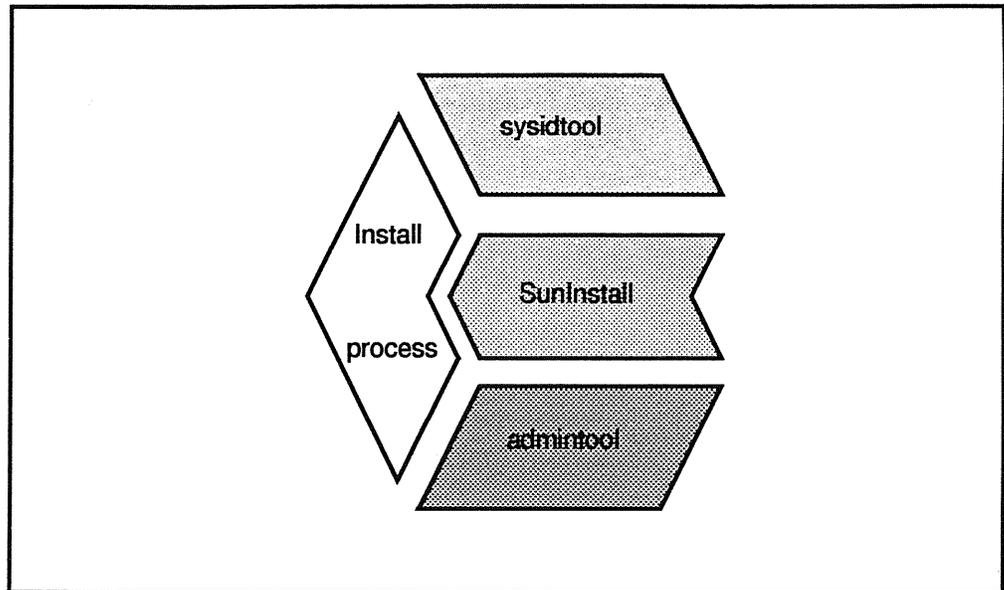
a. The / (root) file system contains the /var directory which may need additional space based on your requirements. For example, spooling space for printing, mail and/or name service information.

The "Maximum Required" column identifies the highest amount of disk space you would need. It does not mean that you cannot go any higher than these recommendations.

### Solaris 2.x Diskless Client Support

File System	Each Client	Each Kernel Architecture
/export/root	20 Mbytes	10 Mbytes
/export/swap	24 Mbytes	Not Applicable
/export/exec	Not Applicable	15 Mbytes

## Installation Process



The installation process has three phases:

- System configuration information is prompted for by `sysidtool`, a suite of programs used to configure a new system.
- The SunInstall utility is an easy-to-use, menu-driven interface that is used to install a Solaris 2.x standalone, dataless, or server system with three different installation choices.
  - The *Custom Install* option is needed to install a server.
  - The *Quick Install* option can be used to install a standalone or dataless client system.
  - The *Upgrade* option can be used to upgrade a machine running Solaris 2.1 to Solaris 2.2 provided the disks do not need to be repartitioned. There additional limitations as far as the configuration cluster to be upgraded and the amount of available disk space.
- Administration Tool is a graphical user interface used to perform post-installation tasks, such as defining diskless clients to be supported by this server.



## Installation Process

The following steps describe the installation process:

1. Prepare the system by saving previous configuration information and data files, if the system to be installed contains a previous SunOS release.
2. Boot from the Solaris 2.x installation CD-ROM.
3. Provide system identification information.
4. Provide SunInstall with system installation information.
5. Choose the Quick Install (for standalone or dataless systems) or Custom Install (for a server) option.
6. If installing a server, identify the number of diskless clients and client architecture to be supported.
7. Select the software to be loaded.
8. Configure the disks to support the selected software (and client information, if installing a server).
9. Start the installation.

---

**Caution** - Remember to back up your existing system, including system configuration information and any data that you want transferred after the Solaris 2.x installation.

---

## Pre-Installation Information

Gather the information that you will be prompted for prior to the installation.

- Host name
- IP address
- Name service (NIS+, NIS, or none). If you choose NIS+ or NIS, you are prompted for:
  - Domain name
  - Name server hostname
  - Name server IP address
- Subnetwork mask, if necessary
- Geographic region
- Time zone and current date and time
- Installation type: Quick Install for standalone or dataless systems or Custom Install for servers
- If you chose Custom Install, select the system configuration:
  - Standalone system
  - Server
  - Dataless client
- Number of diskless clients and the client architecture, if installing a server



## Pre-Installation Information

- The software configuration cluster:
  - Entire distribution
  - Core
  - Developer
  - End-user
- System installation disk and specify whether you want to repartition the disk(s)
- Optionally, any remote file systems to be mounted at boot time
- Post-installation procedures

# Installing a Server

## Booting the Release Media

This table identifies the commands for booting the Solaris 2.x CD-ROM.

System Type	Boot Sequence
Sun4/ <i>nnn</i>	boot sd(0,30,1)
SPARCstation 1 (4/60) SPARCstation 1+ (4/65) SPARCstation SLC (4/20) SPARCstation IPC (4/40)	boot sd(0,6,2) <i>controller unit file #</i>
SPARCengine 1E	boot sd(0,6,5)
SPARCstation ELC (4/25) SPARCstation IPX (4/50) SPARCstation 2 (4/75) SPARCstation 10 SPARCserver 630 MP SPARCserver 670 MP SPARCserver 690 MP SPARCserver 2000 MP SPARCsystem 1000 MP SPARCserver LX SPARCclassic	boot cdrom

### Booting from the local CD-ROM

1. Insert the Solaris 2.x CD into a CD caddy, and place the caddy in the CD-ROM player.
2. As superuser, halt the machine:

```
# halt
```



## Installing a Server

3. Use the appropriate boot command listed in the table on the previous page.

```
ok boot device_name  
  
> b device_name
```

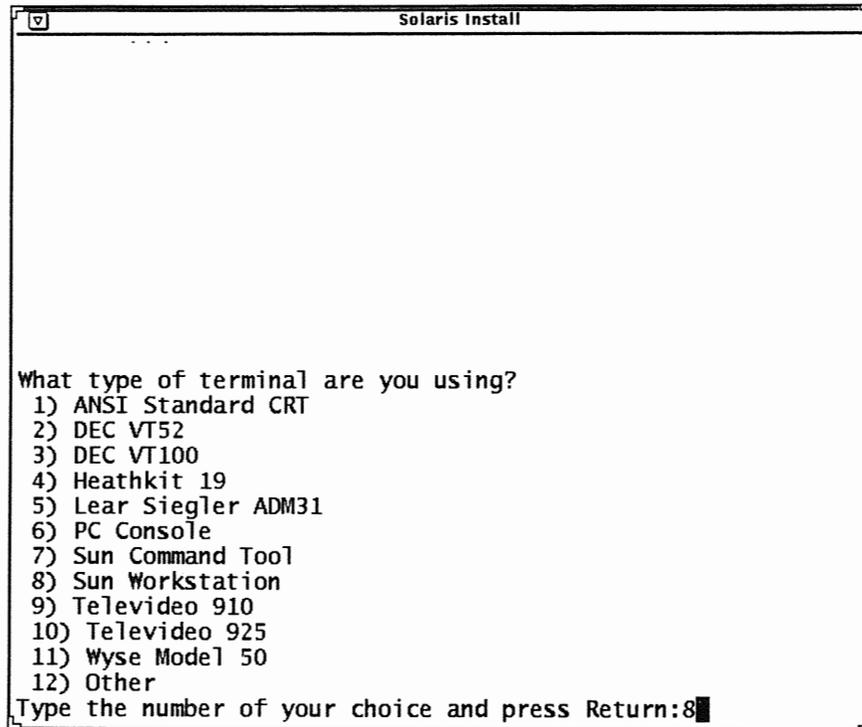
Once the system has booted successfully, you are prompted automatically for system identification information.

The system identification phase is covered over approximately 16 screens, if your system is connected to a network. The screens are described on the following pages.

The example in this next section describes how to install a homogeneous server (with one disk), selecting the Entire Distribution software configuration cluster.

## Defining the Terminal Type

Specify the terminal type you are using and then press Return. (You will not see this screen if you are installing from a Sun™ console.)



*Sun ID Tool*



## Specifying the Host Name

The host name must start with a lowercase letter, and can include digits and hyphens.

Enter the system's host name and then press Return.

A screenshot of a terminal window titled "Solaris Install". The window contains the following text:

What is the hostname for your workstation?

Hostnames must be at least two characters in length, and may contain letters, digits, and minus (-) signs. A hostname may not begin or end with a minus (-) sign.

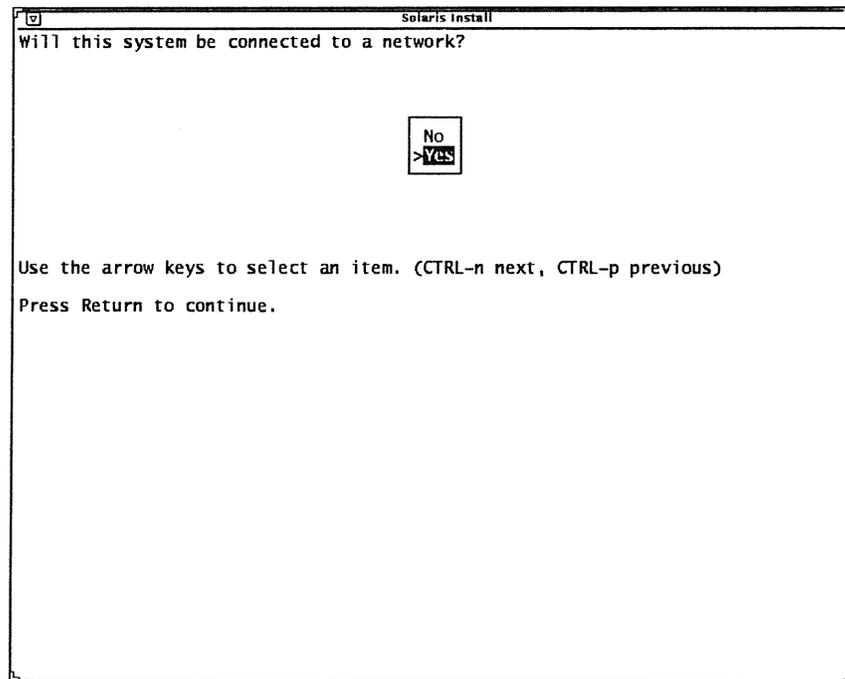
Hostname: venus

Press Return to continue.

The text "hostname: venus" is displayed inside a rectangular input field, with a cursor at the end of the word "venus".

## Configuring the Network

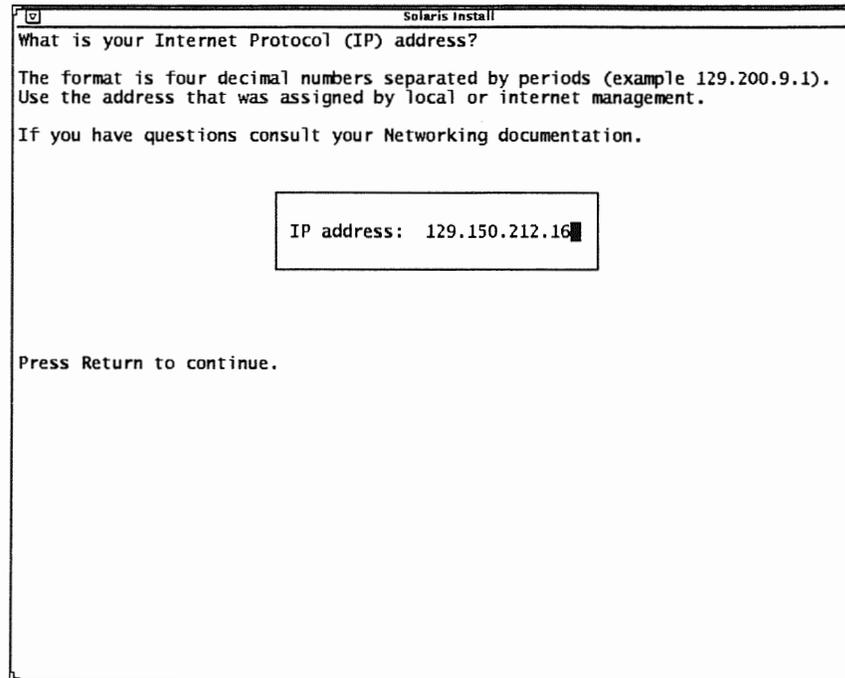
To confirm that the system will be connected to a network, select Yes and then press Return.





## Identifying the Internet Address

Specify your system's Internet Protocol address and then press Return.

A screenshot of a terminal window titled "Solaris Install". The window contains the following text:

What is your Internet Protocol (IP) address?  
The format is four decimal numbers separated by periods (example 129.200.9.1).  
Use the address that was assigned by local or internet management.  
If you have questions consult your Networking documentation.

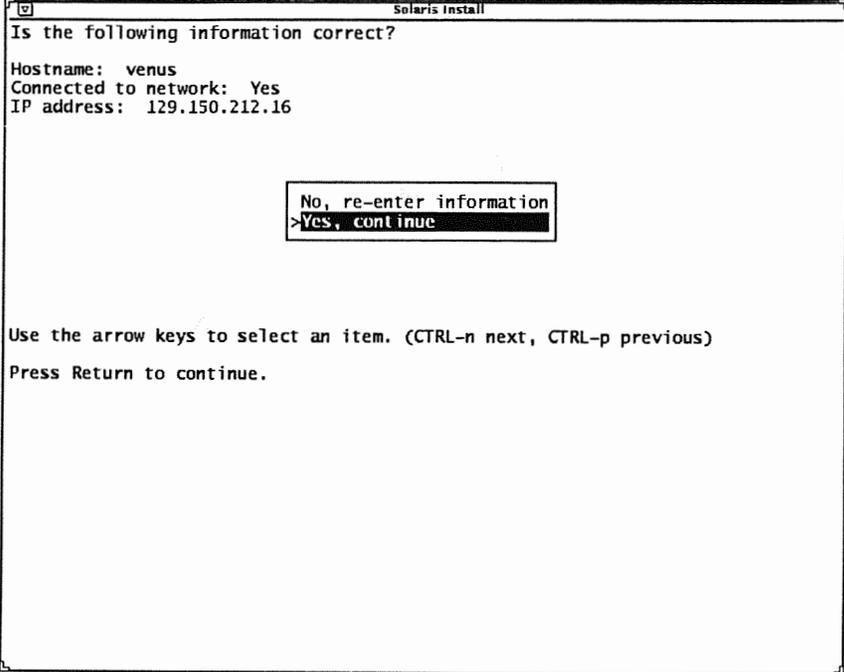
IP address: 129.150.212.16

Press Return to continue.

The IP address input is shown within a rectangular box.

## Confirming the Network Configuration

To confirm that the information entered so far is correct, select Yes, continue and then press Return.



The screenshot shows a terminal window titled "Solaris Install". The text inside the window reads:

```
Is the following information correct?  
Hostname: venus  
Connected to network: Yes  
IP address: 129.150.212.16
```

In the center of the screen, there is a small dialog box with two options:

- No, re-enter information
- >Yes, continue

Below the dialog box, the text reads:

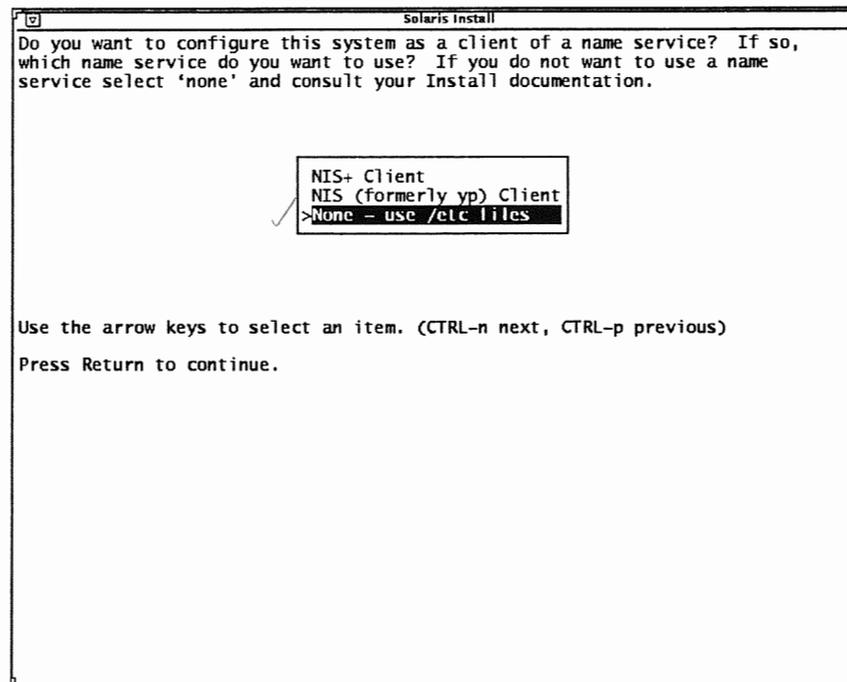
```
Use the arrow keys to select an item. (CTRL-n next, CTRL-p previous)  
Press Return to continue.
```



## Identifying the Name Service

This screen prompts you to select the name service. Select None – use /etc files by using the arrow keys and then press Return.

(The NIS+ environment will be set up after the installation is complete in a later module.)



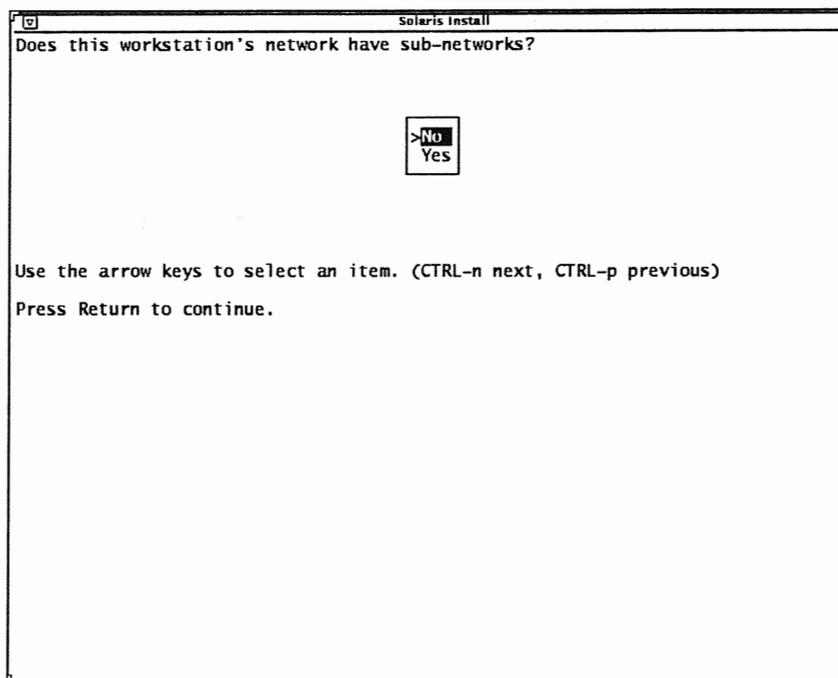
If you select the NIS+ client option, you will be prompted to supply the following information:

- Name Service Domain name
- Name Service Location method
  - Locate server automatically
  - Specify host name of server—If this option is selected, you are prompted for the server's host name and IP address.

A reachable NIS+/NIS server must be available to configure a NIS+/NIS client during installation.

## Configuring Subnetworks

This screen prompts you whether your network uses *sub-networks*. Select NO and then press Return.



A *sub-network* is a portion of a larger network that is used to define a group of systems.

If your network uses sub-networks and you had answered yes to this prompt, you would also be prompted to supply a sub-network *mask*, which is a number used by software applications to separate additional network information from the host part of the IP address.



## Confirming Network Information

To verify the information you have supplied so far is correct, select Yes, continue and then press Return.

The screenshot shows a terminal window titled "Solaris Install". The text inside the window is as follows:

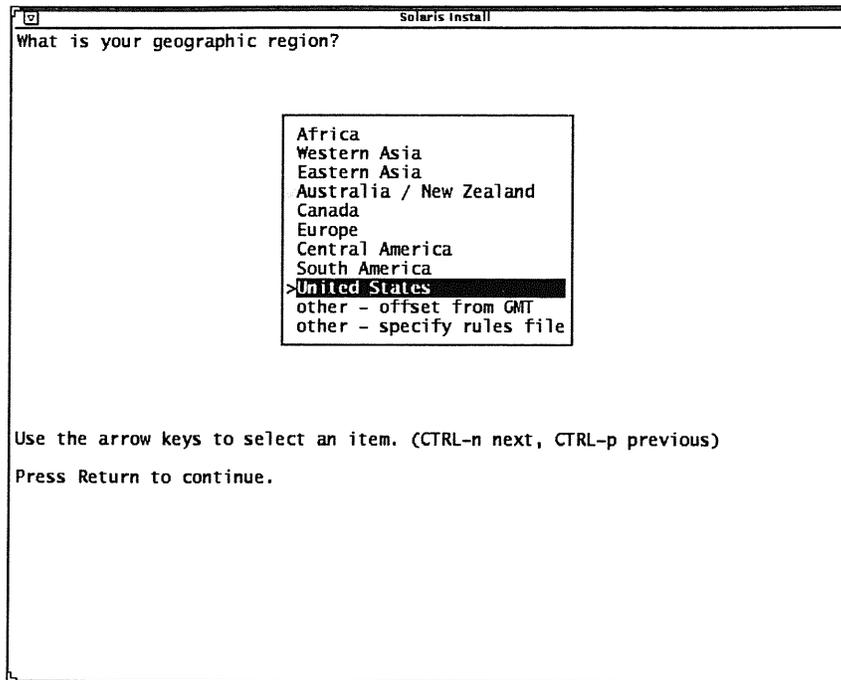
```
Solaris Install
Is the following information correct?
Name service: none
Network is sub-netted: No

No, re-enter information
>Yes, continue

Use the arrow keys to select an item. (CTRL-n next, CTRL-p previous)
Press Return to continue.
```

## Identifying the Geographic Region

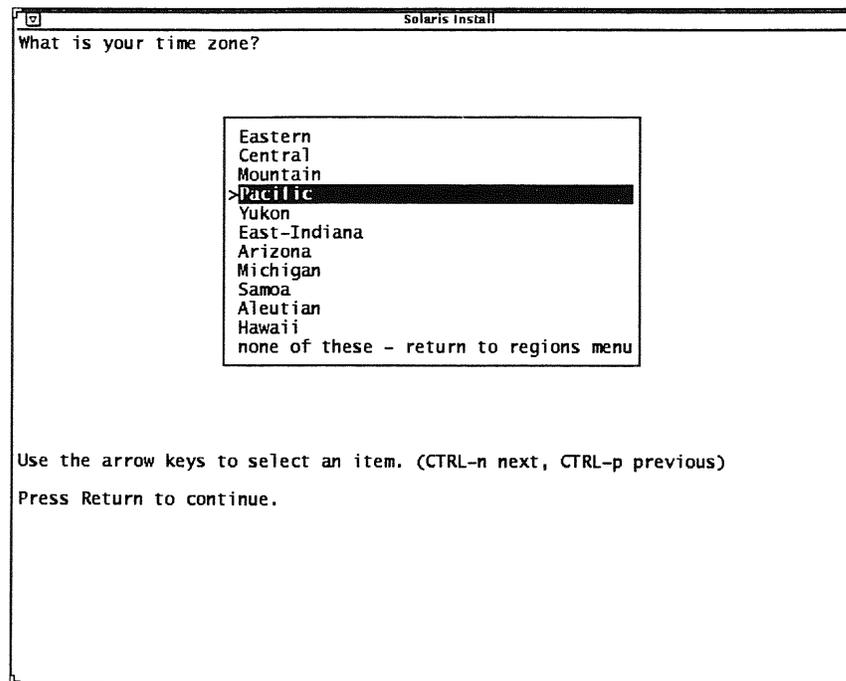
Use the arrow keys or the first letter of the selection item to choose your geographic region.





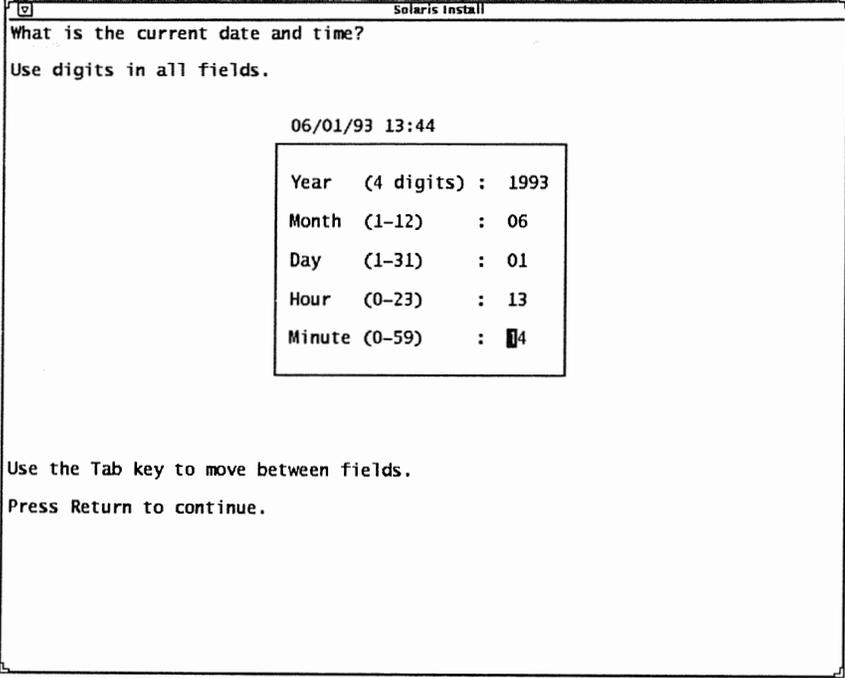
## Selecting the Time Zone

Use the arrow keys or the first letter of the selection item to choose your time zone.



## Confirming the Date and Time

Press Return to confirm the current date and time.



The screenshot shows a terminal window titled "Solaris Install". The text inside the window reads:

```
What is the current date and time?  
Use digits in all fields.  
  
06/01/93 13:44  


|                 |   |      |
|-----------------|---|------|
| Year (4 digits) | : | 1993 |
| Month (1-12)    | : | 06   |
| Day (1-31)      | : | 01   |
| Hour (0-23)     | : | 13   |
| Minute (0-59)   | : | 4    |

  
Use the Tab key to move between fields.  
Press Return to continue.
```



## Confirming Time Zone and Current Date and Time

Verify that the information entered so far is correct. Select Yes, continue and press Return.

Solaris Install

Is the following information correct?

Time zone: US/Pacific  
Date and time: 06/01/93 13:44

No, re-enter information  
>Yes, continue

Use the arrow keys to select an item. (CTRL-n next, CTRL-p previous)  
Press Return to continue.

## Performing a Custom Installation

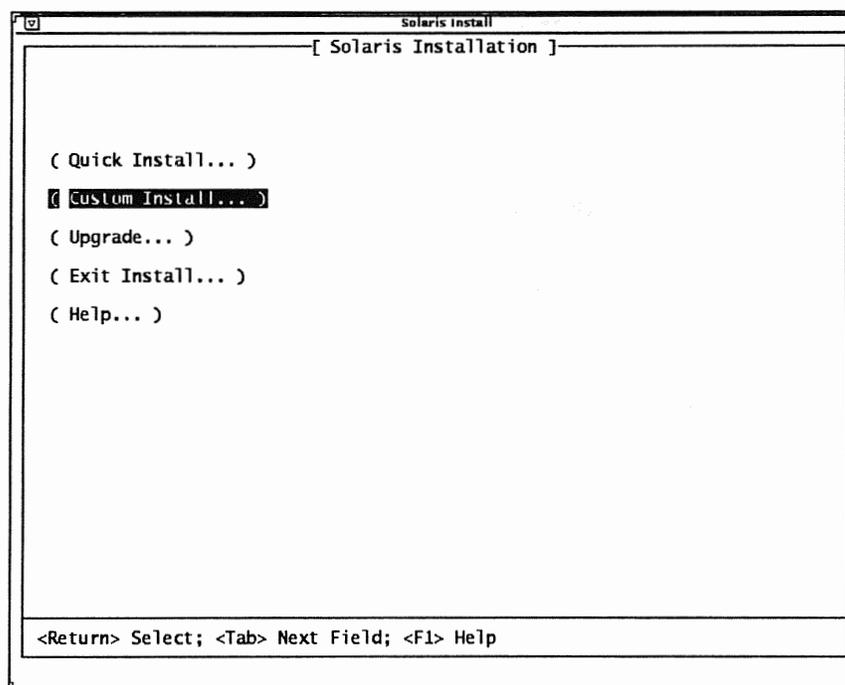
### Solaris Installation Menu

Once the system information is configured, the Solaris Installation Menu is displayed.

A sample system is used to illustrate the server installation for the remainder of this lesson.

- SPARCstation 10
- 424 Mbytes of disk space
- Entire Distribution configuration cluster

Use the Tab key to move to the Custom Install... option, which is required for installing a server. Press Return to make the selection.





## Performing a Custom Installation

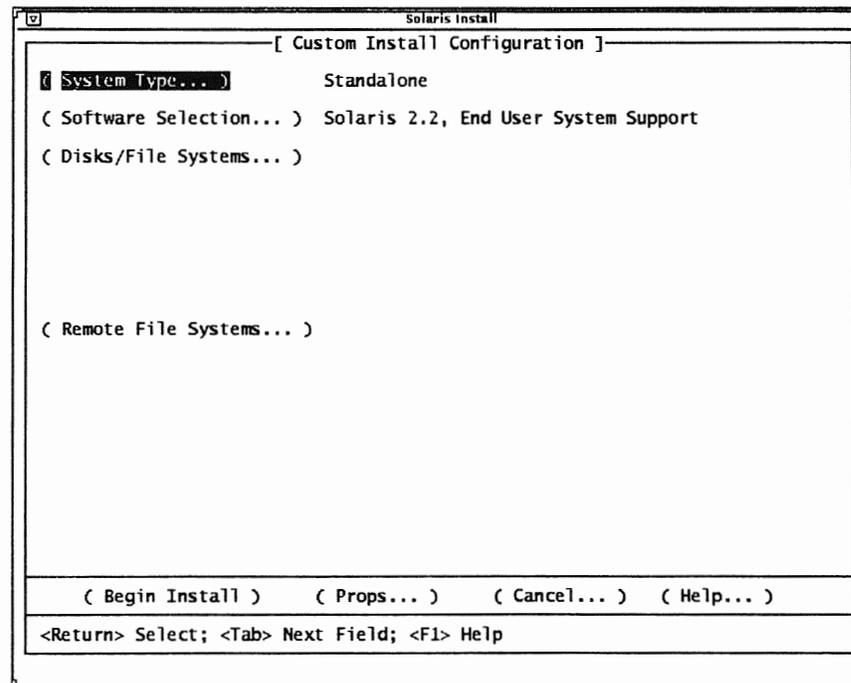
### Traversing the Menus

The following table identifies how to move between menu options and make selections.

Key	Purpose
Return	Selects a menu item
Tab	Moves to the next menu field (item)
Arrow key(s)	Moves within a menu field (item)
F1	Brings up a Help menu

### Custom Install Configuration Menu, System Type

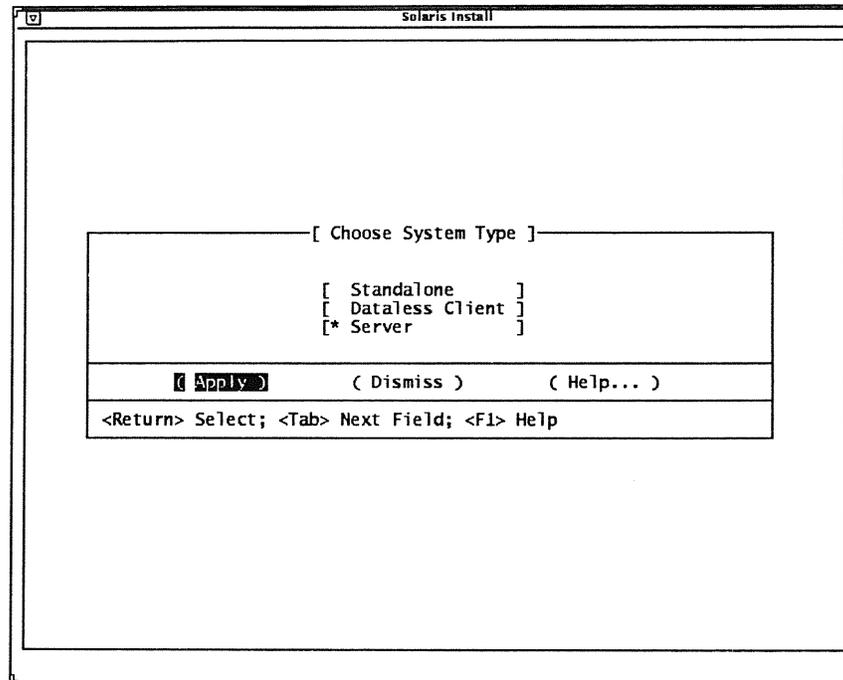
The cursor is positioned at the `System Type` option. Press Return to bring up the System Type menu.



## Selecting the System Type

### Choose System Type Menu

Use the down arrow key to select the Server option and press Return.



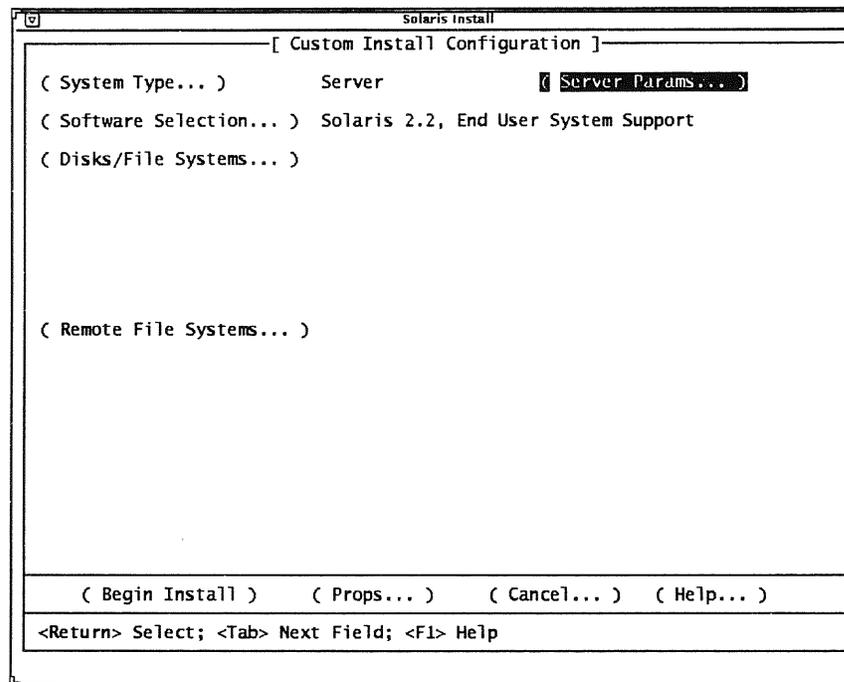
Use the Tab key to move to the Apply button and press Return.



## Defining Server Parameters

### Custom Install Configuration Menu, Server Parameters

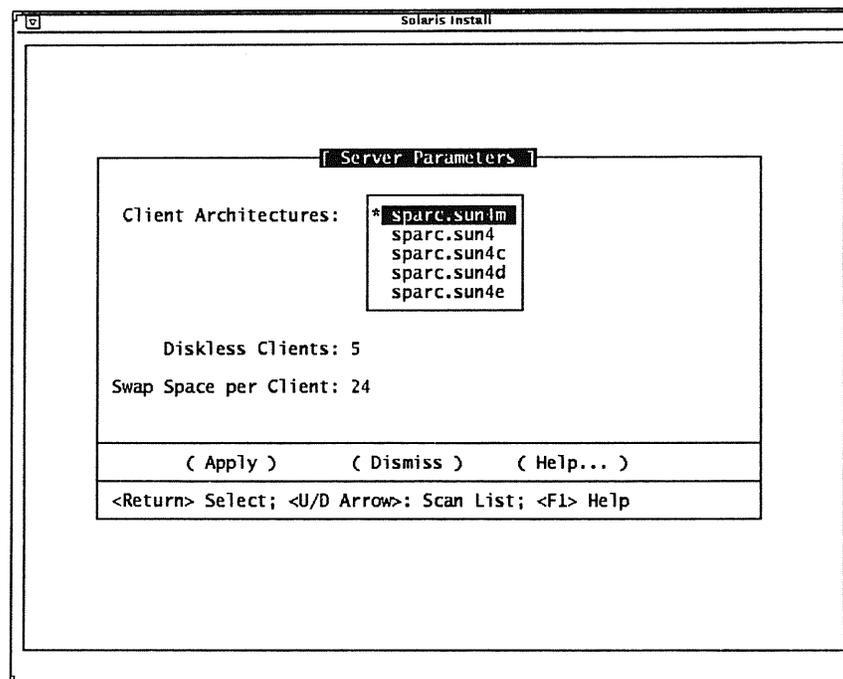
Use the Tab key to move to the Server Params option and press Return.



## Selecting Client Architecture(s)

### Server Parameters Menu

This menu is used to select the client architecture(s) the server will be supporting. Use the down arrow key to select the appropriate client architecture(s). Press Return to confirm the selection(s).



You must select the architecture used by server, in addition to selecting the client architectures the server will support.

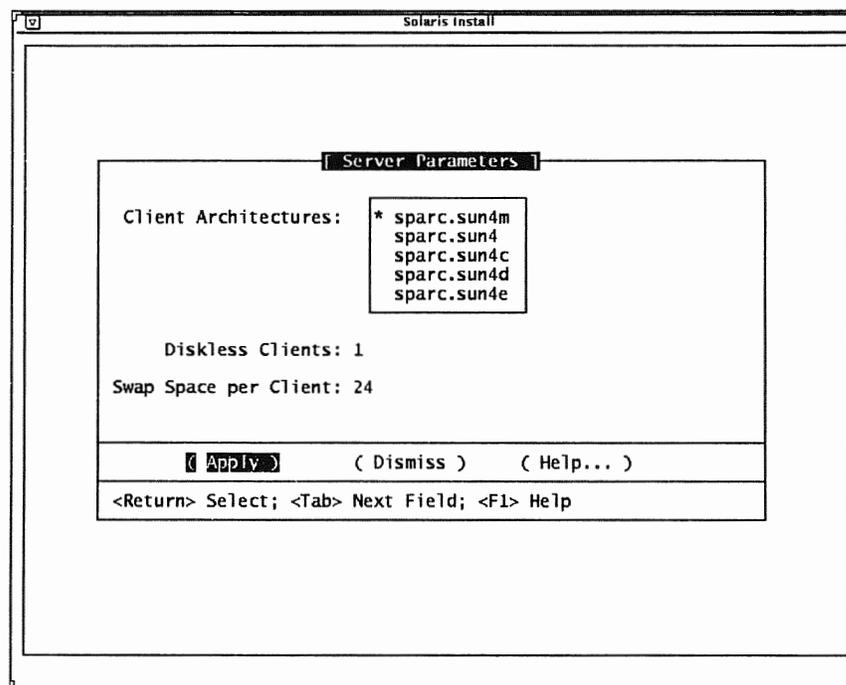


# Configuring Diskless Client Parameters

## Server Parameters Menu

Use the Tab key to move to the Diskless Clients prompt, if necessary. Use the Back Space key to change the default of 5 to 1 or 2 clients and press Return.

Let the Swap Space per Client default to 24 Mbytes and press Return.



One client system is supported in the above example.

---

Note - Your instructor will identify which client architectures to select in the lab environment.

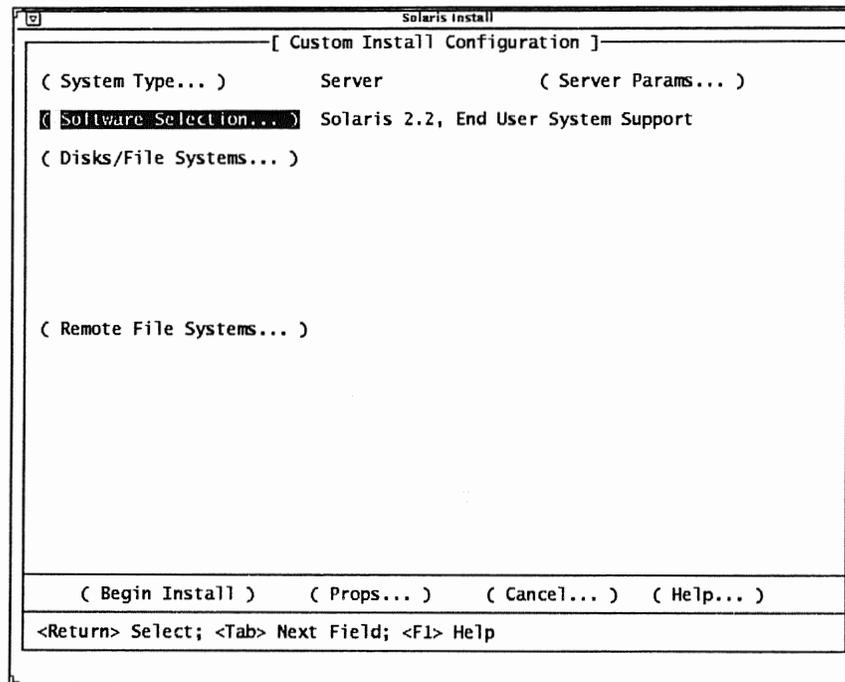
---

Press Return on the Apply button when finished.

## Selecting a Software Configuration

### Custom Install Configuration Menu, Software Selection

Use the Tab key to move to the Software Selection option and press Return to select the appropriate software configuration cluster.



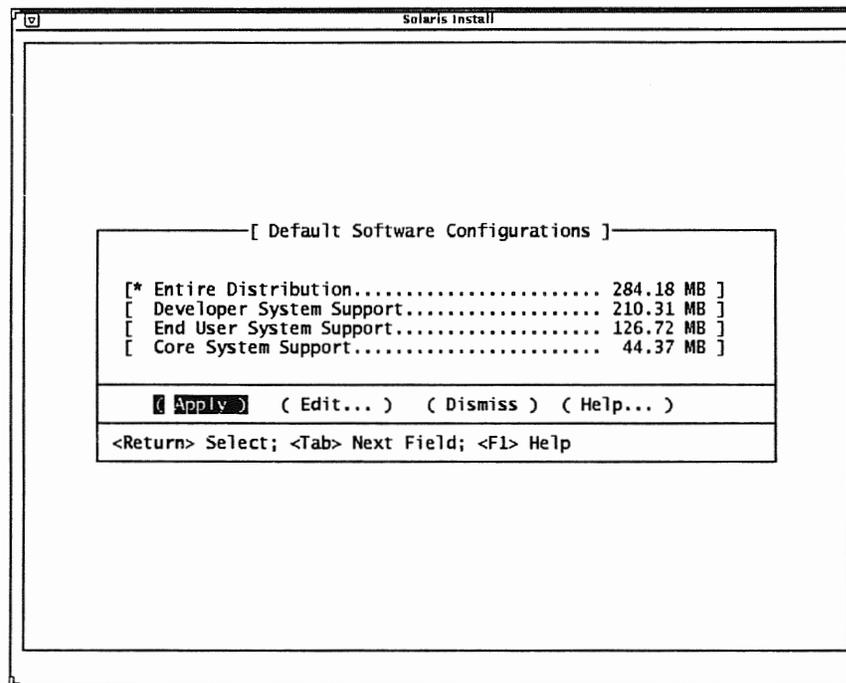
The End User Support Cluster is selected by default.



## Selecting a Software Configuration

### Default Software Configurations Menu

Use the Tab key to move to the Entire Distribution option and press Return. If you do not have enough disk space for the entire distribution, use the down arrow key to select the Developer System Support cluster and press Return.



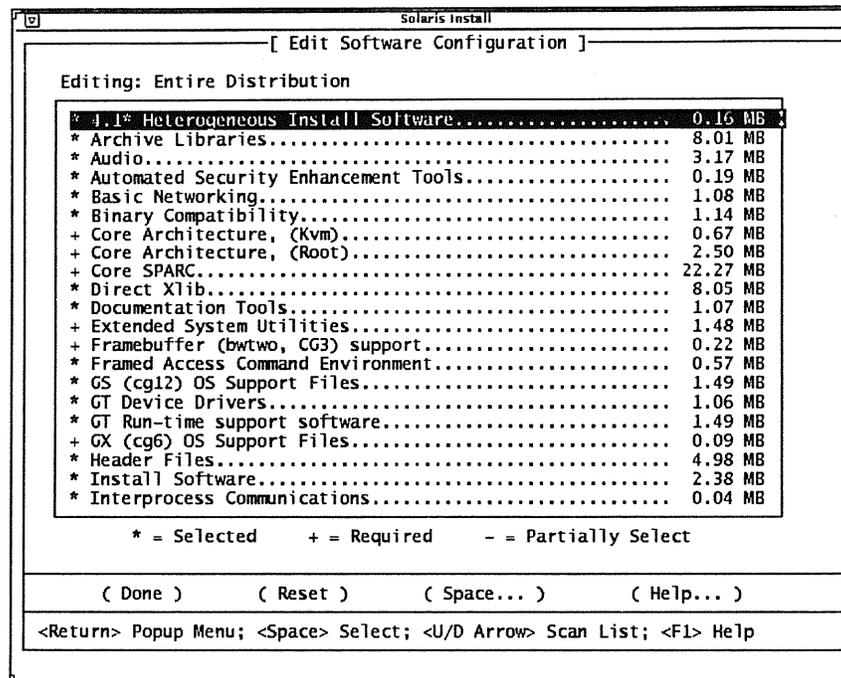
Note that the displayed disk requirements do not include swap space nor the disk space needed to support diskless clients.

Use the Tab key to move to the Edit button and press Return.

# Displaying a Software Configuration

## Edit Software Configuration Menu

The first screen of the Entire Distribution contents is displayed.



Use the Tab key to move to the Space button to display the file system space requirements for the Entire Distribution cluster. Press Return.



## Displaying File System Space Requirements

### File System Space Requirements Menu

The amount of disk space needed for each file system is displayed (including the file systems needed to support diskless clients.)

File System	Minimum	Suggested	Configured
/	13.44 MB	16.80 MB	0.00 MB
/var	5.26 MB	6.57 MB	0.00 MB
/opt	51.61 MB	64.51 MB	0.00 MB
/usr	73.64 MB	92.05 MB	0.00 MB
/usr/openwin	101.10 MB	126.38 MB	0.00 MB
/export/swap	27.60 MB	34.50 MB	0.00 MB
/export/exec	0.62 MB	0.78 MB	0.00 MB
/export/root	24.32 MB	30.40 MB	0.00 MB
Totals:	297.59 MB	371.99 MB	0.00 MB

[ Dismiss ] ( Help... )

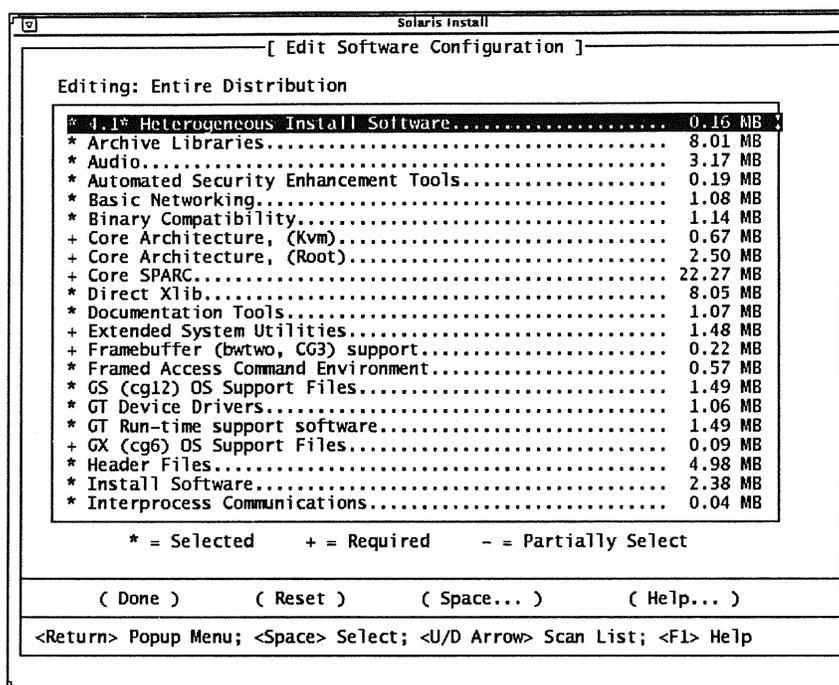
Press Return on the Dismiss button to return to the Edit Software Configuration Menu.

## Displaying a Configuration Option's Components

### Edit Software Configuration Menu

You are returned to the first screen of the Entire Distribution contents.

Press the Tab key to move to the first software cluster. Use the down arrow key to scroll down the list.



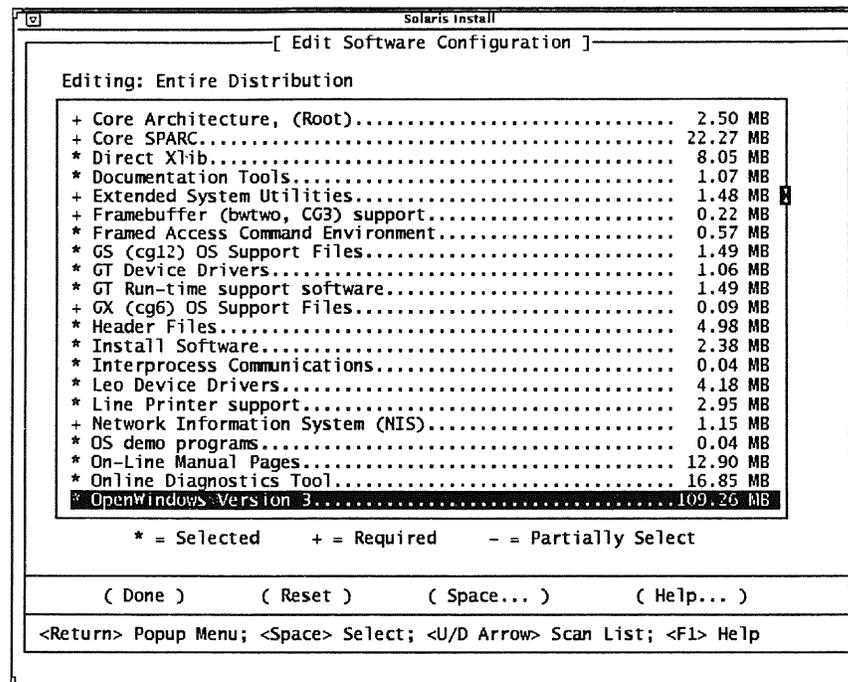
To view the components of a software cluster, use the down arrow key to highlight the cluster, and press Return.



## Highlighting a Software Cluster

### Edit Software Configuration Menu

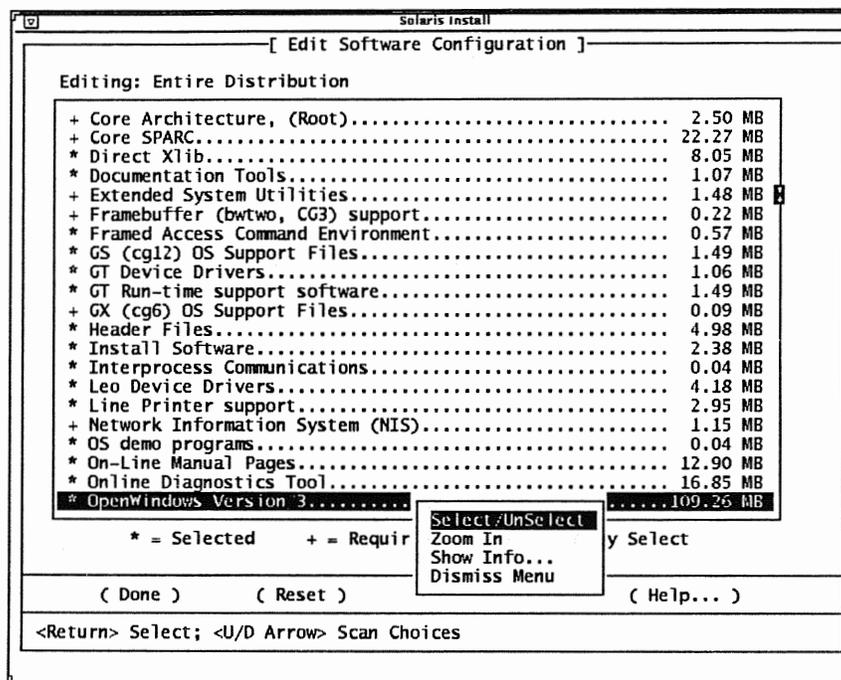
For example, scroll down to the OpenWindows Version 3 software cluster and press Return to view its component packages.



## Selecting/Deselecting a Software Cluster

### Edit Software Configuration Menu

This pop-up menu allows you to select/unselect a cluster.

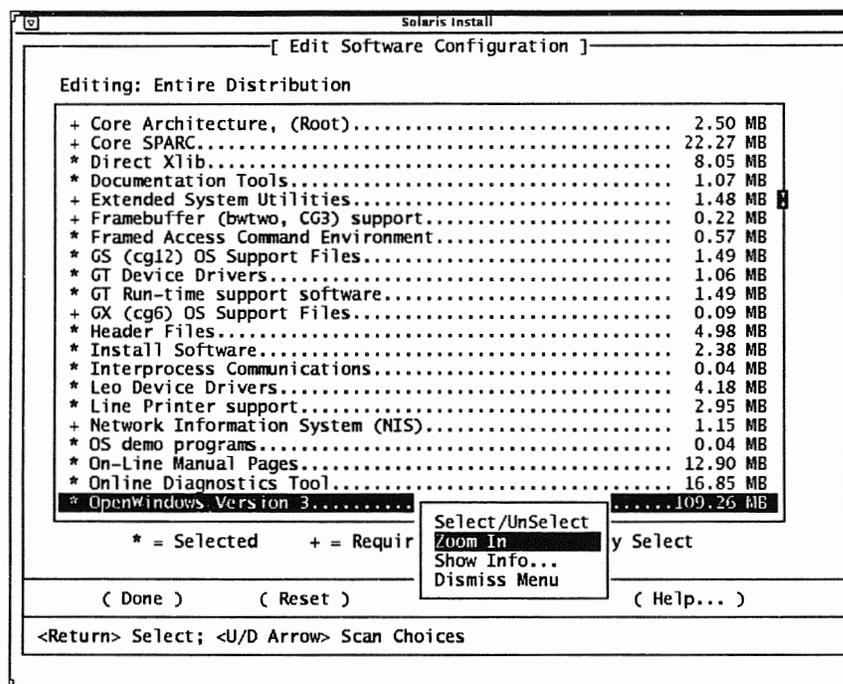




## Zooming In on a Software Cluster

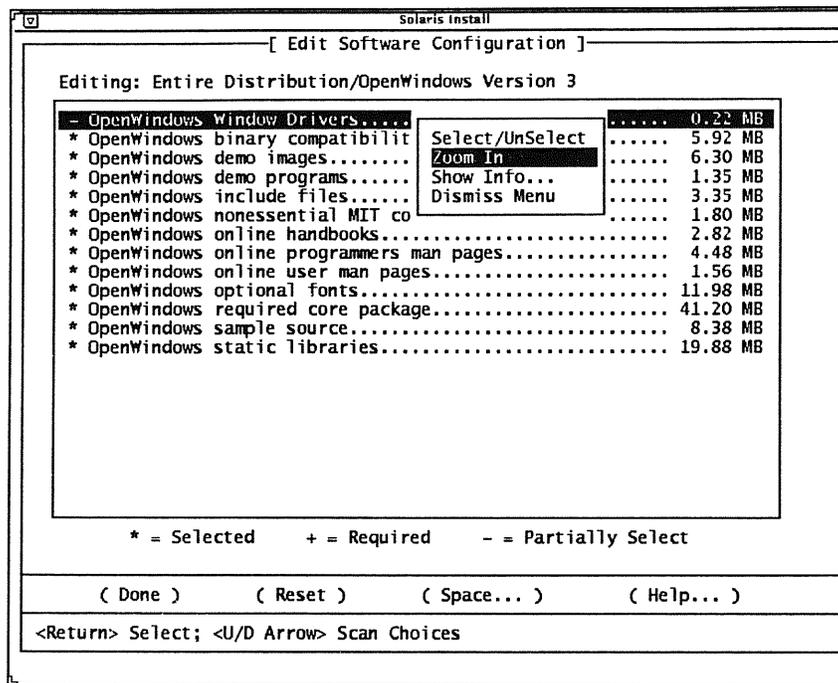
### Edit Software Configuration Menu

Press the down arrow key on the pop-up menu to select **Zoom In** and press **Return**.



## Viewing a Software Cluster's Components

This screen identifies the software package components of the OpenWindows Version 3 cluster.



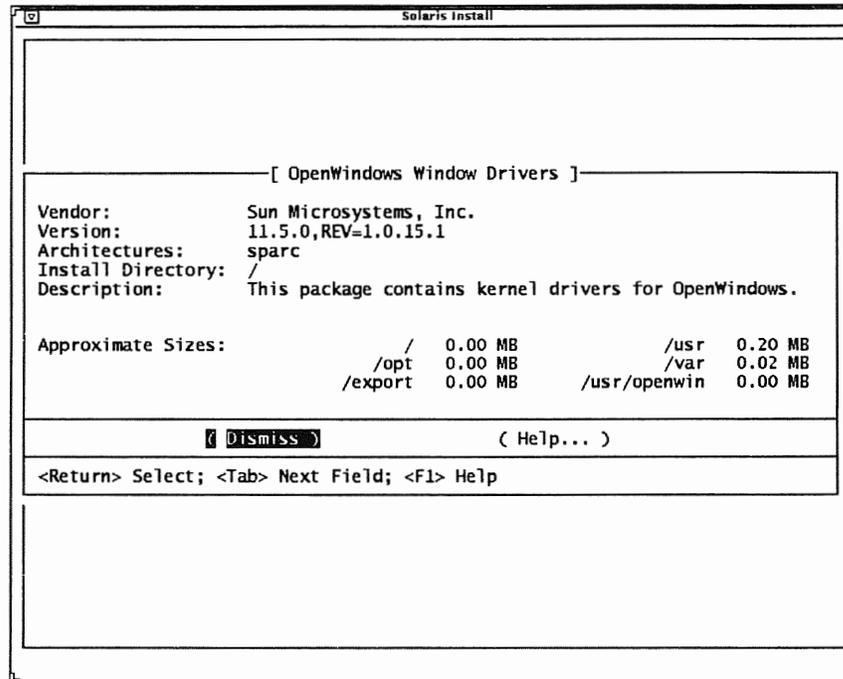
Press Return on the OpenWindows Version 3 Window Drivers package and use the down arrow key to select the Zoom In option from pop-up menu. Press Return.



## Viewing a Software Package's Properties

### OpenWindows Window Drivers Screen

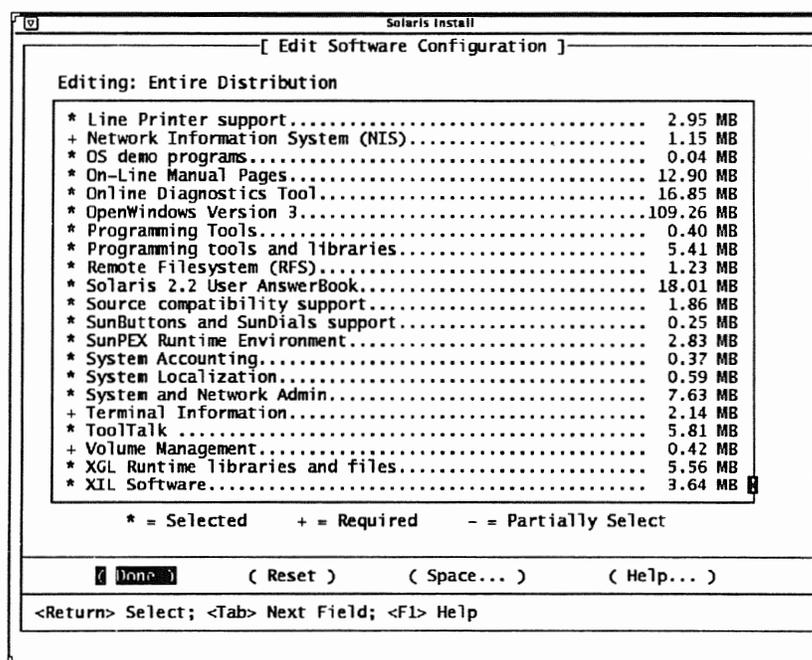
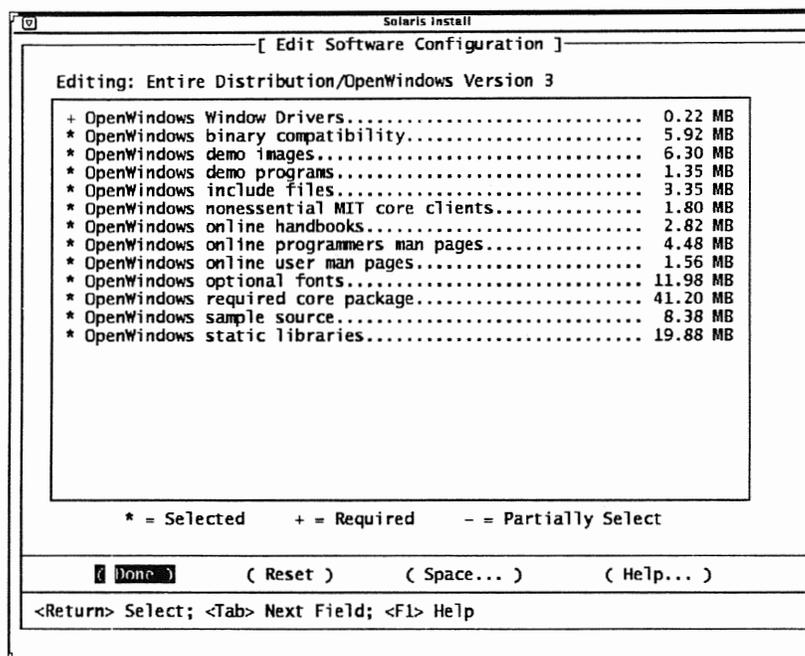
This screen displays detailed package information.



Press Return on Dismiss when finished.

## Returning to Previous Menus

Use the Tab key to move to the Done button and press Return to return to previous menus.



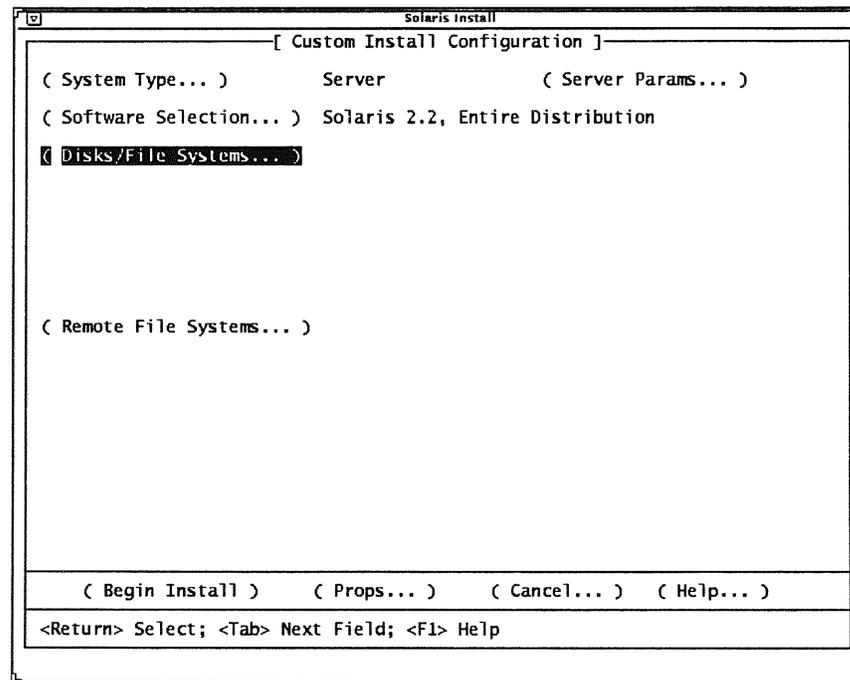


## Configuring Disks/File Systems

### Custom Install Configuration Menu, Disks/File Systems

You are returned to the Custom Installation Configuration Menu.

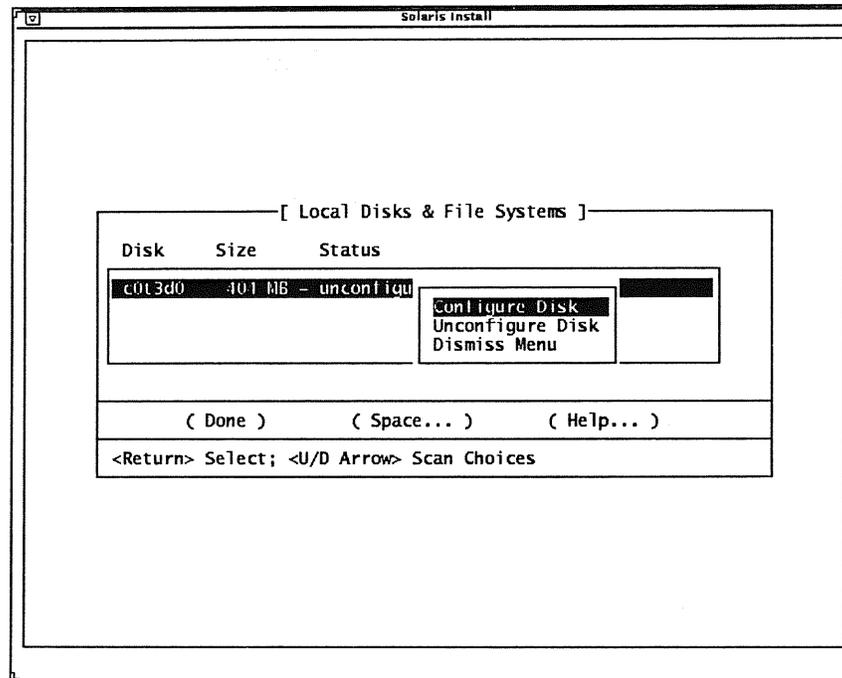
Use the Tab key to move to the Disks/File Systems option and press Return.



## Selecting Available Disks

### Local Disks and File Systems Menu

In this example, there is only one disk to configure.



Press Return on the disk to be selected. Press Return again to select the Configure Disk option from the pop-up menu.

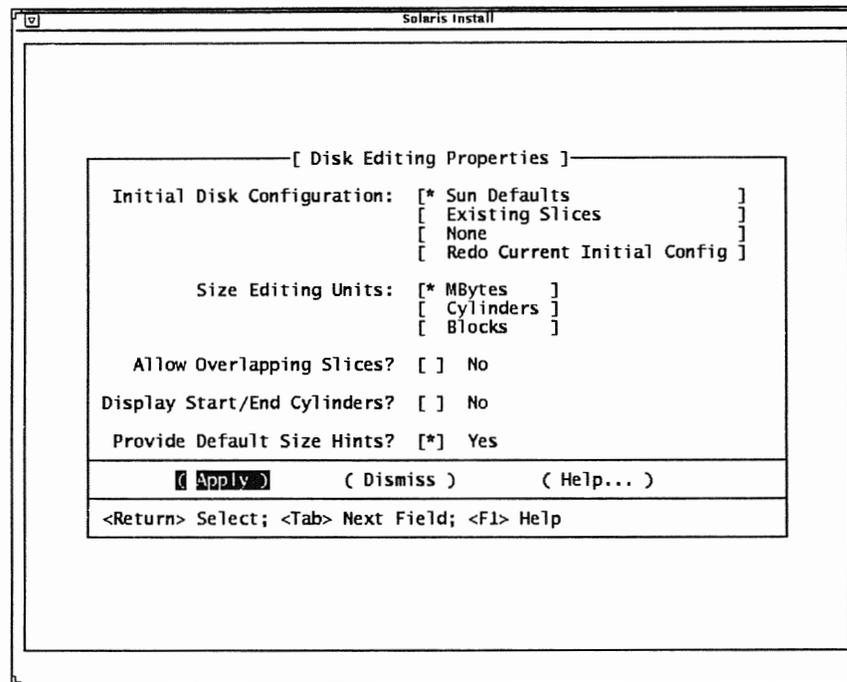
If you have more than one disk to configure, you will come back to this menu to select the other disk(s). Additional disks are selected by using the down arrow key.



## Displaying Disk Editing Properties

### Disk Editing Properties Menu

This menu allows you to set up parameters for configuring disks. Use the Tab key to move through the displayed parameters.



The Initial disk configuration option is set to Sun Defaults by default, which will setup default partition sizes.

The Size Editing Units is Mbytes by default.

The Allow Overlapping Slices option is set to No by default.

Change the Display Start/End Cylinders option to Yes if you want to see the starting and ending cylinders for each partition.

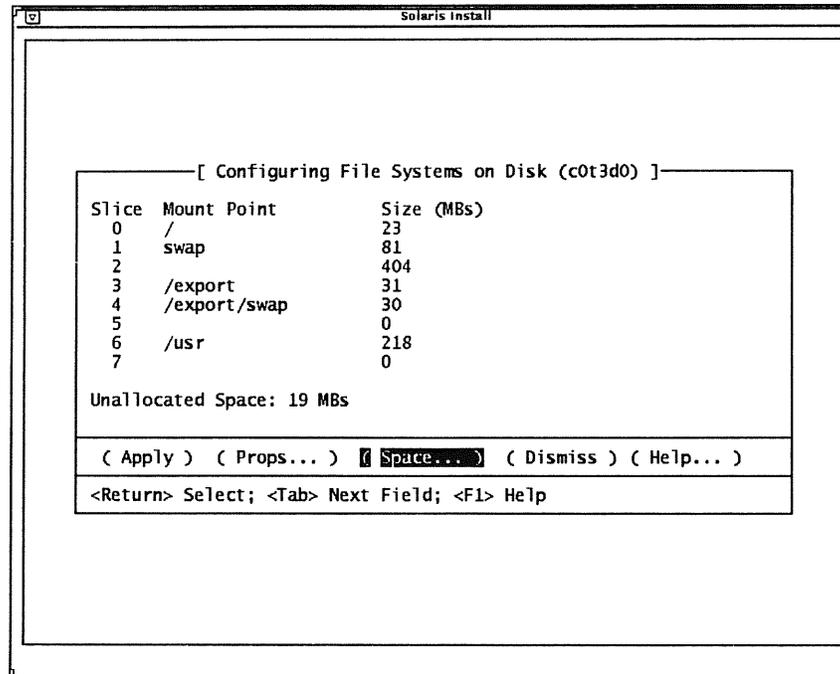
Let the Provide Default Size Hints option default to Yes so that partition size guidelines will be displayed automatically.

Use the Tab key to move to the Apply button and press Return.

## Displaying Disk/File System Information

### Configuring File Systems Menu

The default partitions are displayed below.



Use the Tab key to move to the Space button to view the disk space requirements and press Return.



## Displaying File System Requirements

### File System Space Requirements Menu

Focus on the Minimum and Suggested disk space sizes for each of the file systems to be configured.

The disk space needed for the `/usr/openwin` directory is displayed but it is not created as a separate file system unless you direct SunInstall to create it separately.

The `/export` file systems are used to support diskless clients.

File System	Minimum	Suggested	Configured
/	13.44 MB	16.80 MB	23.00 MB
swap	0.00 MB	80.00 MB	81.00 MB
/var	5.26 MB	6.57 MB	0.00 MB
/opt	51.61 MB	64.51 MB	0.00 MB
/usr	73.64 MB	92.05 MB	218.00 MB
/usr/openwin	101.10 MB	126.38 MB	0.00 MB
/export	0.00 MB	0.00 MB	31.00 MB
/export/swap	27.60 MB	34.50 MB	30.00 MB
/export/exec	0.62 MB	0.78 MB	0.00 MB
/export/root	24.32 MB	30.40 MB	0.00 MB
Totals:	297.59 MB	451.99 MB	383.00 MB

(It is helpful to write down the size of each file system listed here to help set up the appropriate file system sizes during disk configuration.)

Press Return on the Dismiss button when finished.

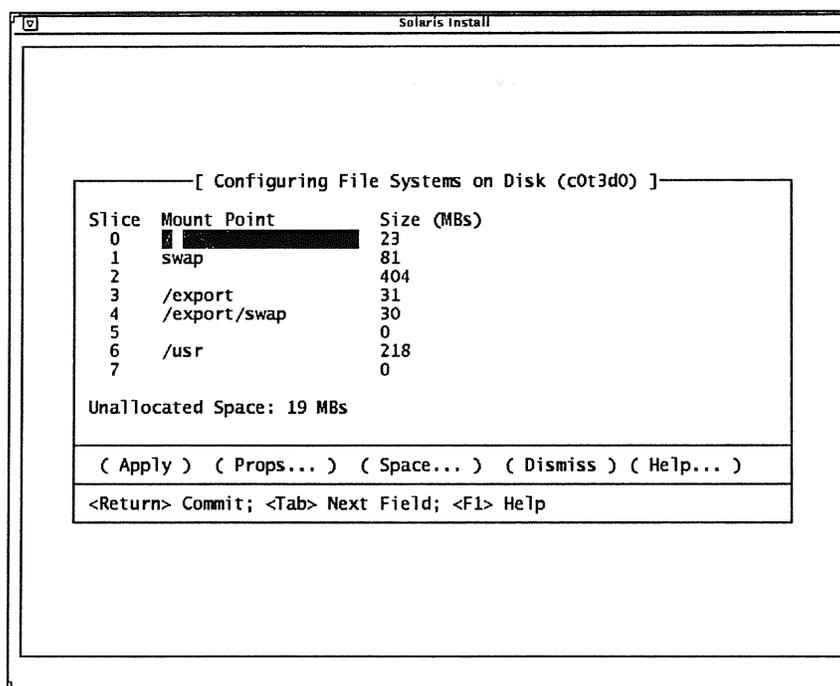
## Displaying Default Partition Sizes

### Configuring File Systems Menu

Focus on the default file system sizes and mount points displayed. Note that there are no partitions currently defined for the `/opt` or `/export/home` file systems.

The next several steps illustrate how to decrease the sizes of the swap space and the `/usr` file system, and then add two partitions, for the `/opt` and `/export/home` file systems.

In this example, the default swap size is 96 Mbytes.



The Unallocated Space meter identifies the amount of unclaimed disk space as partition sizes expand and contract.



## Changing File System Sizes

### Configuring File Systems Menu

Use the Tab key to move to the first file system mount point. Use the Back Space key to backspace over a mount point or size to change it and press Return.

Slice	Mount Point	Size (MBs)
0	/	23
1	swap	32
2		404
3	/export	31
4	/export/swap	30
5	/opt	218
6	/usr	0
7		0

Unallocated Space: 3 MBs

( Apply ) ( Props... ) ( Space... ) ( Dismiss ) ( Help... )

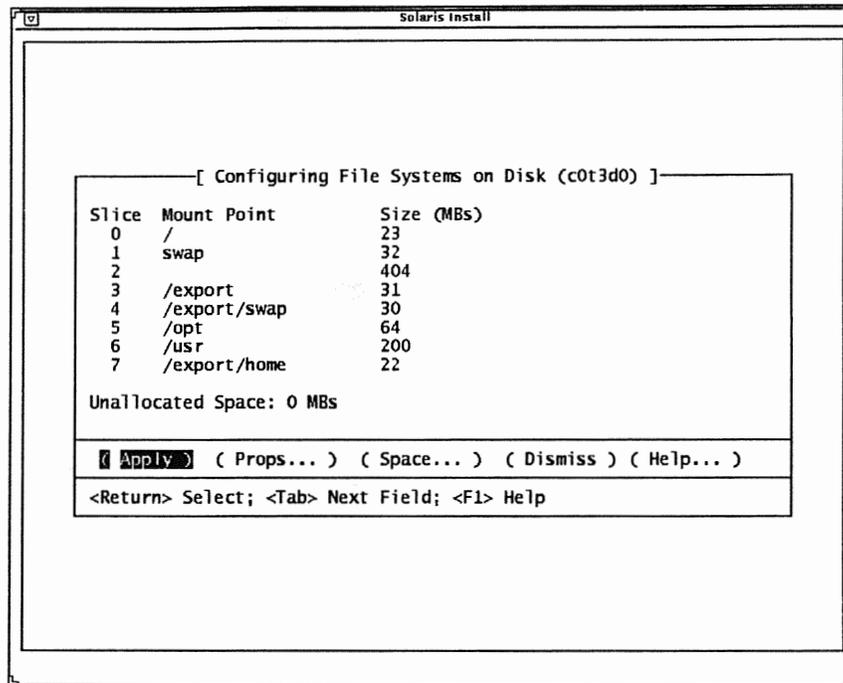
<Return> Commit; <Tab> Next Field; <F1> Help

Note that when the `/opt` mount point is entered (as an example), the recommended size is automatically displayed under the size column.

# Changing File System Sizes

## Configuring File Systems Menu

Use the Tab key to move to the Apply button and press Return when finished.

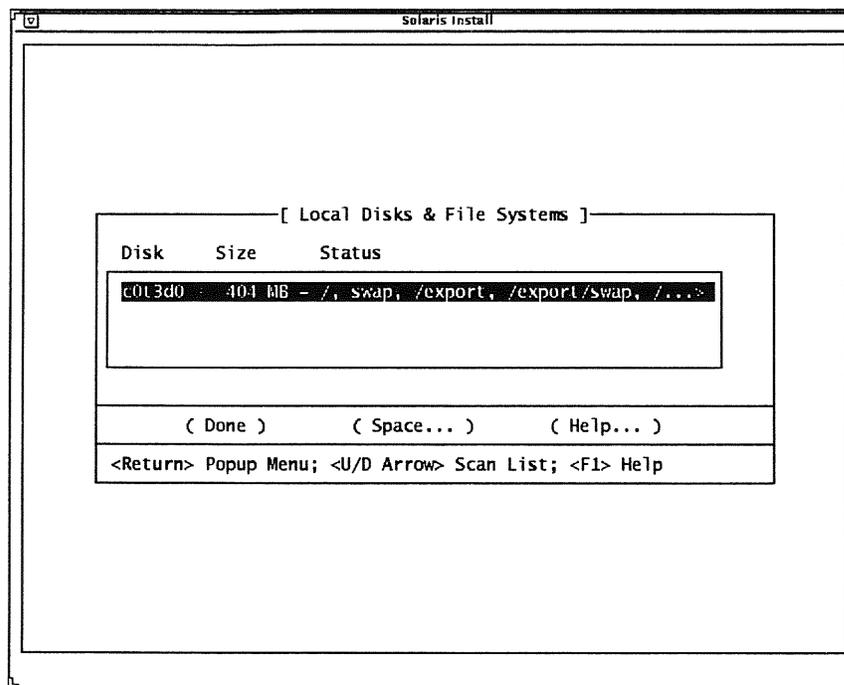




## Changing File System Sizes

### Local Disks and File Systems Menu

Move to the Done button and press Return after exiting the previous menu.



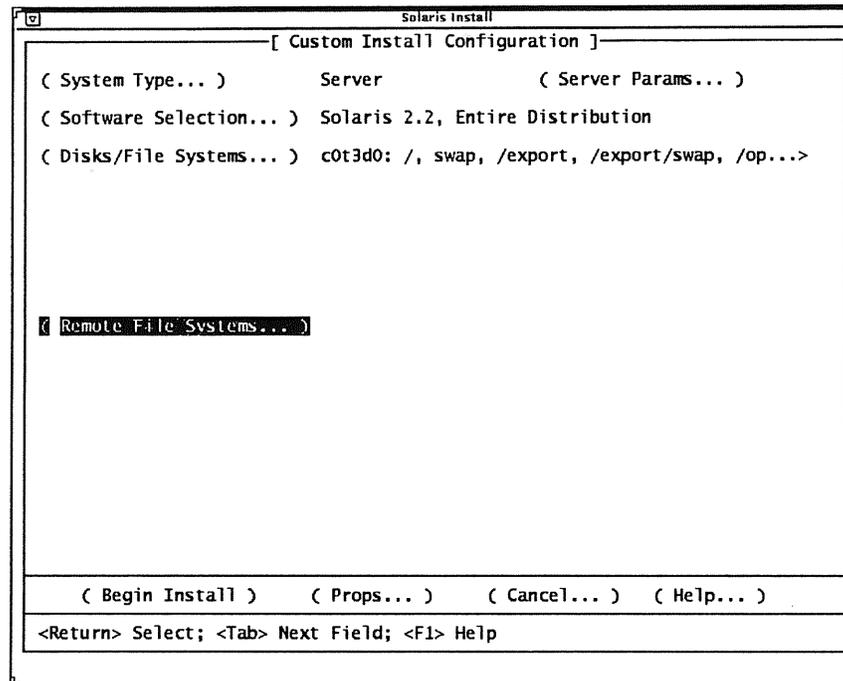
## Accessing Remote File Systems

### Custom Install Configuration Menu, Remote File Systems

The Solaris 2.2 SunInstall program allows you to set up access to remote file systems.

This topic is covered in another module, but the steps are briefly described over the next several pages.

Use the Tab key to move to the Remote File Systems option and press Return.

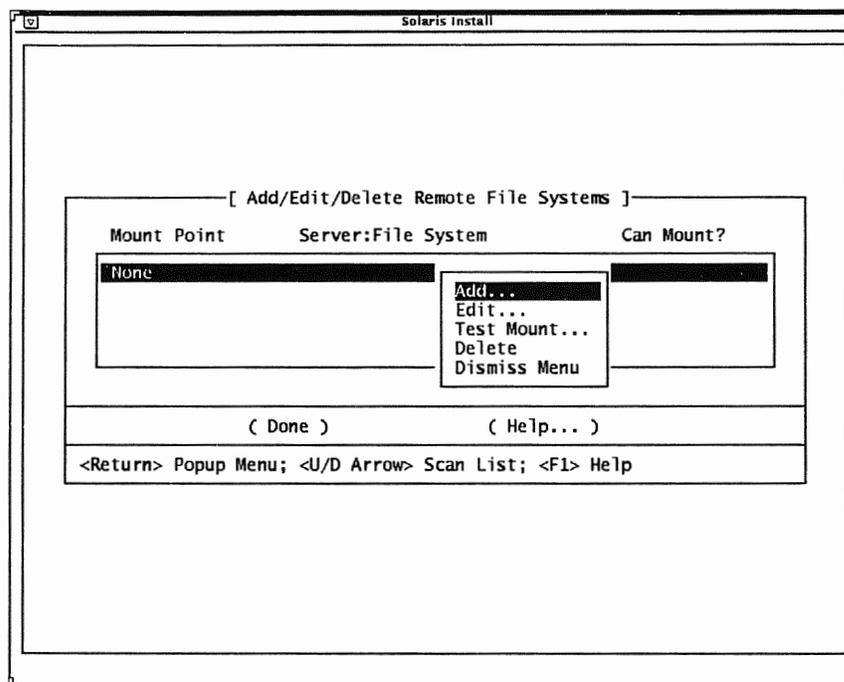




## Adding Remote File System Information

### Add/Edit/Delete Remote File Systems Menu

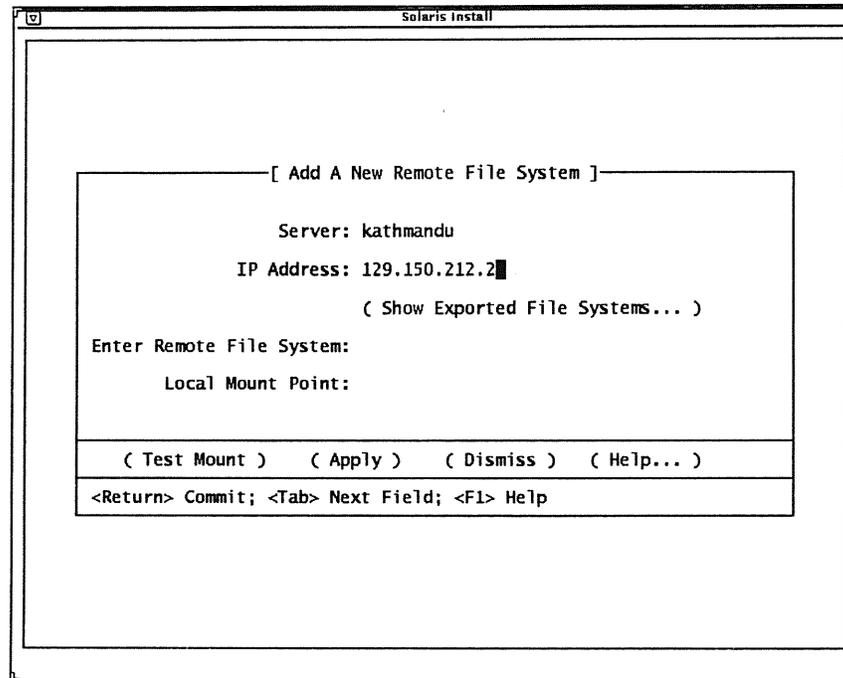
Press Return on the None entry and then press Return again on the pop-up menu to select the Add option.



## Supplying Server Information

### Add A New Remote File System Menu

Fill in the server name and the server's IP address.



The screenshot shows a window titled "Solaris Install" containing a dialog box titled "[ Add A New Remote File System ]". The dialog box has the following text and controls:

- Server: kathmandu
- IP Address: 129.150.212.2
- ( Show Exported File Systems... )
- Enter Remote File System:
- Local Mount Point:
- ( Test Mount ) ( Apply ) ( Dismiss ) ( Help... )
- <Return> Commit; <Tab> Next Field; <F1> Help

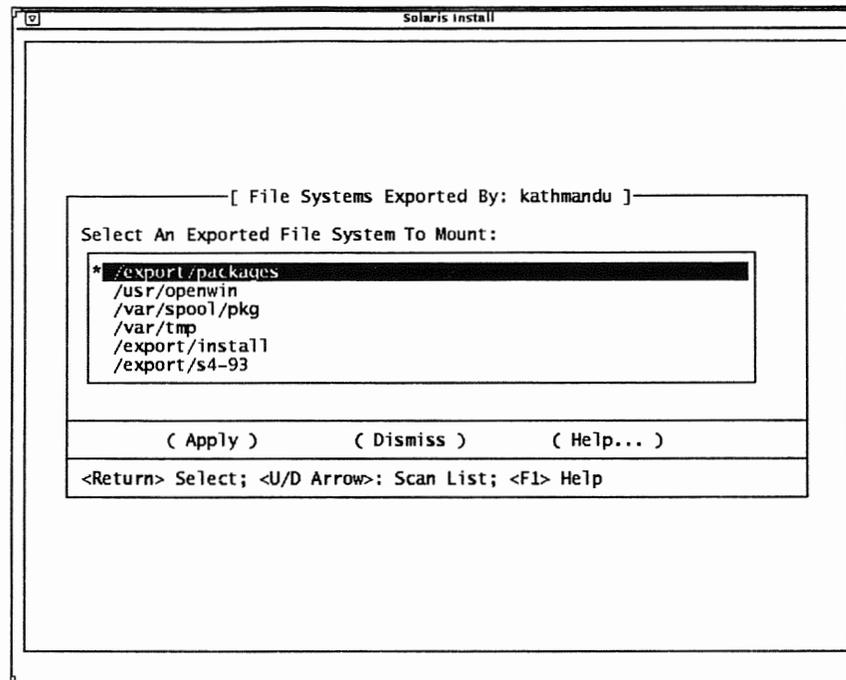
Use the Tab key to move to the Show Exported File Systems button and press Return.



## Displaying Available File Systems

### File Systems Exported Menu

The server's available file systems are displayed.

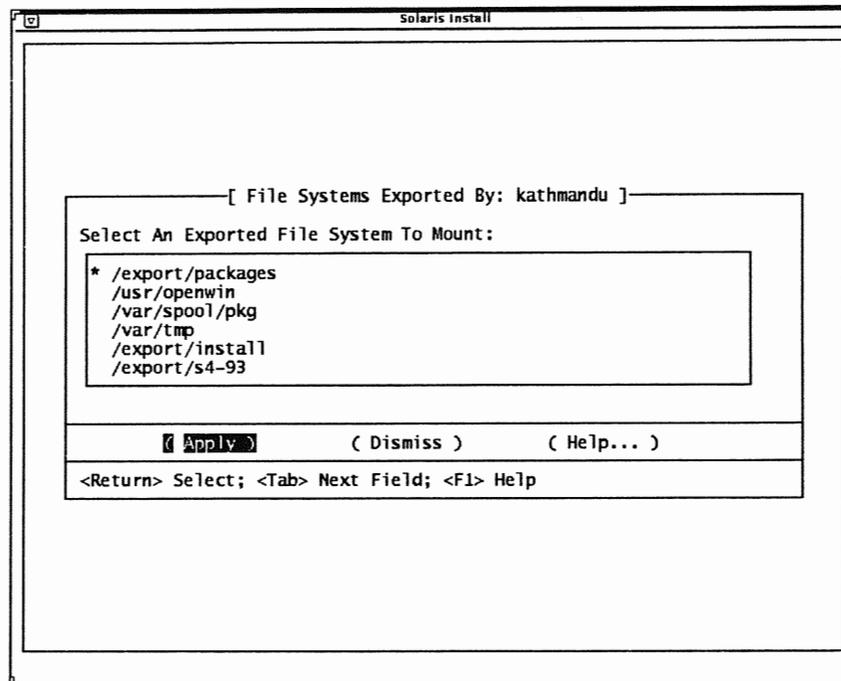


Select a remote file system using the arrow keys and press Return.

## Selecting Available File Systems

### File Systems Exported Menu

Move to the Apply button and press Return.





## Supplying Local Mount Point

### Add A New Remote File System Menu

The following menu is displayed.

Use the Tab key to move to the Local Mount Point option. Enter the mount point for the remote file system and press Return.

```
Solaris Install

[ Add A New Remote File System ]

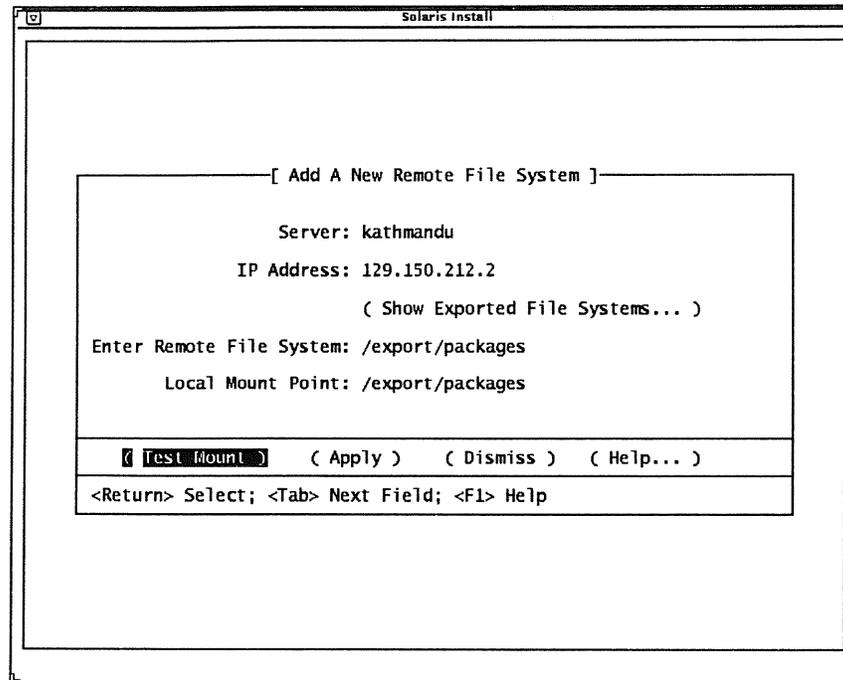
Server: kathmandu
IP Address: 129.150.212.2
( Show Exported File Systems... )
Enter Remote File System: /export/packages
Local Mount Point: /export/packages

( Test Mount ) ( Apply ) ( Dismiss ) ( Help... )
<Return> Commit; <Tab> Next Field; <F1> Help
```

# Test Mounting the Remote File System

## Add A New Remote File System Menu

Press Return on the Test Mount button.



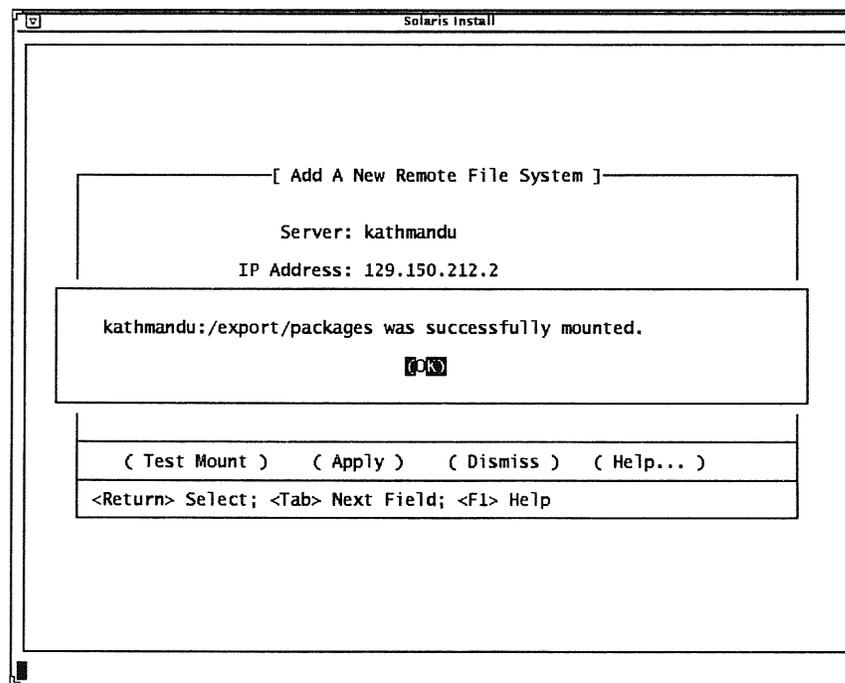


## Verifying Remote File System is Available

### Add A New Remote File System Menu

The message displayed verifies that the remote file system is accessible.

The remote file system information is added to the local system's `/etc/vfstab` file during the installation process. (This file is discussed in another module.)

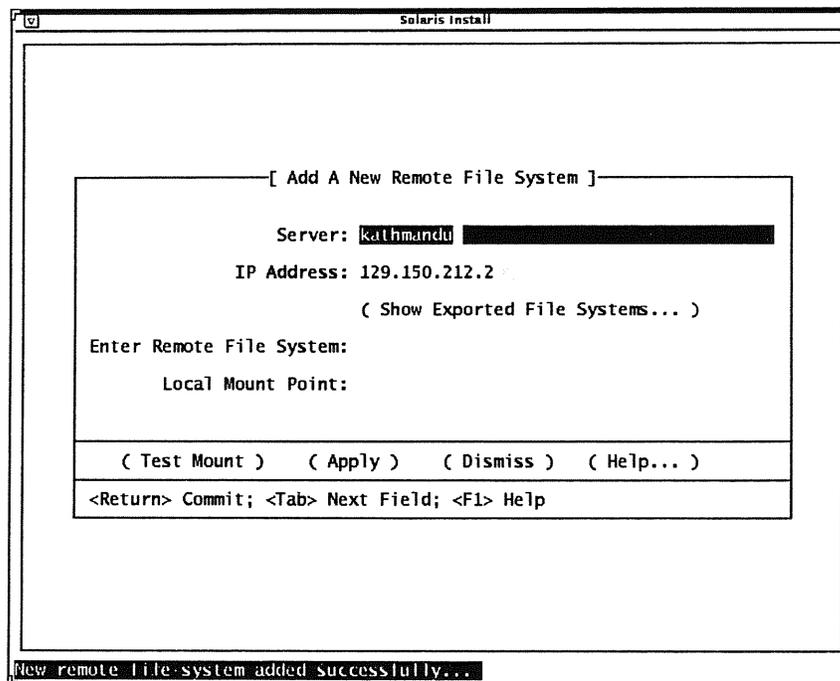


Press Return on the pop-up menu. Move to the Apply button and press Return.

## Applying Remote File System Information

### Add A New Remote File System Menu

Move to the Dismiss button and press Return.

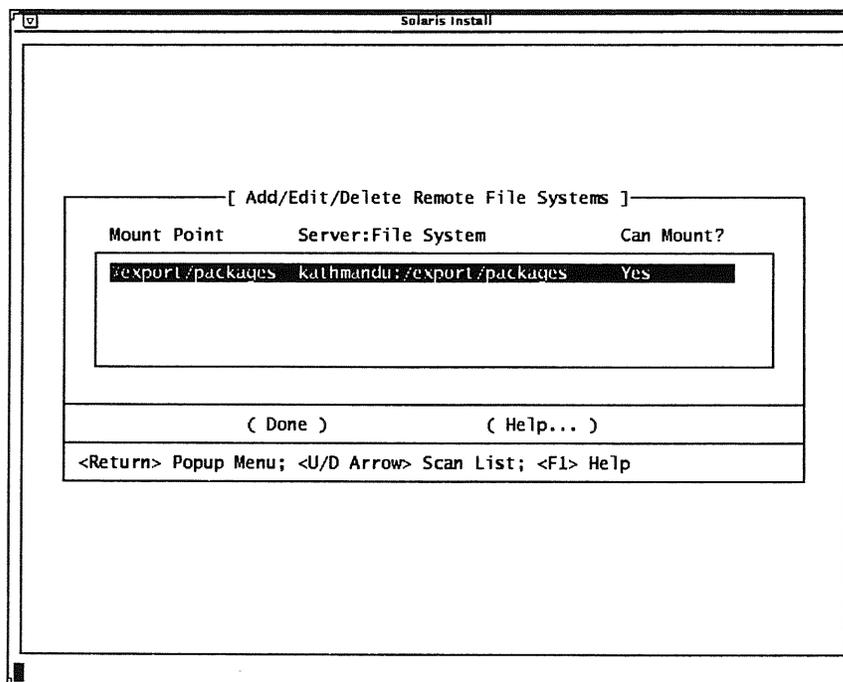




## Applying Remote File System Information

### Add/Edit/Delete Remote File Systems Menu

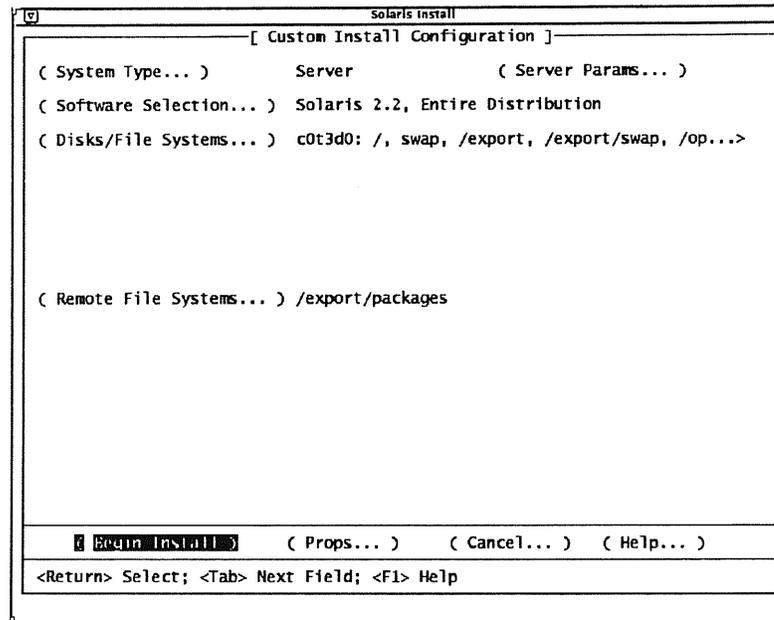
The following menu is displayed.



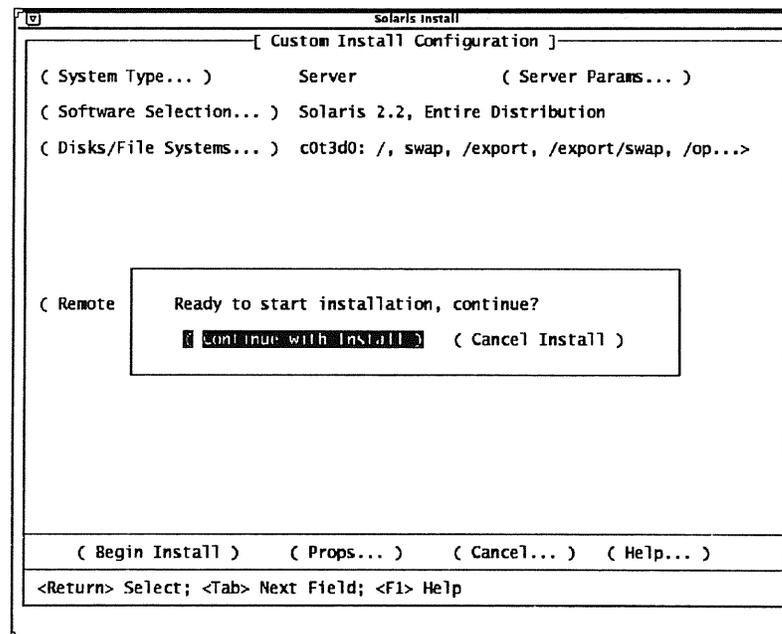
Move to the Done button and press Return.

## Starting the Installation

Use the Tab key to move to the Begin Install button and press Return.



Move to the Continue with Install button and press Return.





## Applying Root Password

Apply a root password to your system after the installation is complete.

```
Solaris Install
What is your root password?

A root password may contain any number of characters, but only the first eight
characters in the password are significant. For example, if you enter
'a1b2c3d4e5f6' as your root password, then 'a1b2c3d4' could also be used to
gain root access. If you do not want a root password, press RETURN.

You will be asked to type the root password twice. (It will not appear on the
screen as you type it.)

If you have questions consult your Install documentation.

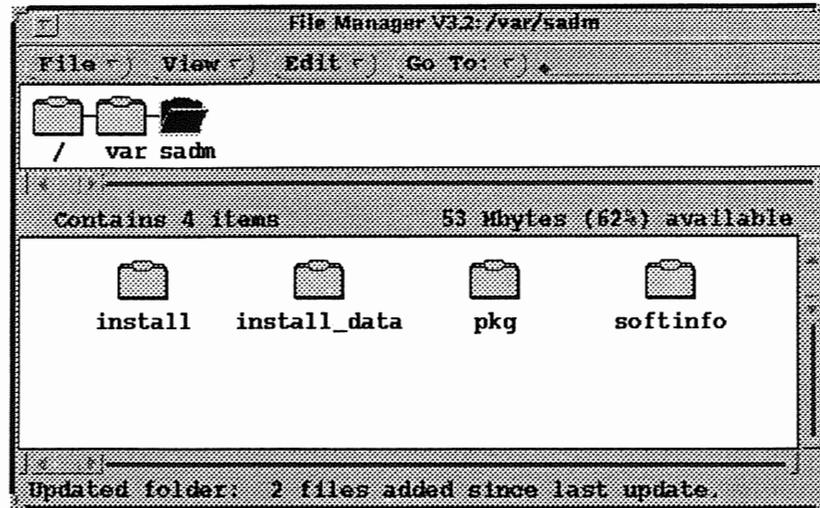
Root password: █

Press Return to continue.
```

The system is rebooted automatically once the root password is applied.

## Exploring Post-Installation Files

The `/var/sadm` directory contains sub-directories with summary information regarding the previous installation.



- `/var/sadm/install`

This directory contains the `contents` file, which is a listing of every object installed on the system.

- `/var/sadm/install_data`

This directory contains the `CLUSTER` file, which identifies the software configuration cluster that was used to install the system. It also contains the `install_log` file, which is a log of the installation process.

- `/var/sadm/pkg`

This directory contains a sub-directory for every package installed on the system, which includes detailed package information.

- `/var/sadm/softinfo`

This directory contains the `INST_RELEASE` file, which contains the Solaris version number.



## Summary

In this lesson you have learned about:

- The four Solaris 2.x supported configurations: networked standalone, dataless client, diskless client, and server
- The minimal hardware configuration for a custom installation
- The relationship between a configuration cluster, software cluster, and software package
- Disk partition requirements for a custom installation
- The sequence of steps to successfully perform a custom installation

## Exercise 2-1

The purpose of this lab is to install a server.

1. Complete the Pre-Installation form (on the following page) with your instructor's assistance.
2. Boot from the Solaris 2.x release CD-ROM.
3. Specify system information according to the following information:
  - Your system is connected to a network.
  - Your system is *not* a client of a name service.
  - Your system's network does not have sub-networks.
  - Your geographic region, date, and time is appropriate to your site.
4. Answer SunInstall questions according to the following information:
  - Choose Custom Install.
  - Choose Server.
  - Specify the number of diskless clients and the client architecture as directed by your instructor.
  - Install the Entire Distribution cluster. *or End user*
  - Reboot after the installation.
5. Type an alphanumeric root password, or as directed by your instructor.



## Exercise 2-1

Category	Your Configuration
System Configuration Type (standalone, server, dataless client)	
Hostname example: venus	
IP Address example: 129.150.28.79	
Subnet Mask example: 255.255.255.0	
Name Service (NIS, NIS+, or none)	
Name Service Domain Name example: solar.sys.com	
Name Service Server Hostname example: enterprise	
Name Service Server IP Address example: 129.150.28.150	
Software Configuration Cluster (core, end user, developer, or entire distribution)	
Disk Layout / swap /export /export/swap /opt /usr /export/home	

# *Answer Key*

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## Lesson 1: The Solaris 2.x Network Environment

### Exercise 1-1

1. Centralized resources such as printing and network information, in addition to local resources such as memory and CPU.
2. Remote file copying means the file exists on more than one system (using disk resources). File sharing means that only one copy exists on one system and is shared by everyone.
3. /  
  /usr  
  /export/home  
  /opt
4. /  
  /usr  
  /export/home  
  /opt  
  /export  
  /export/swap

---

## Lesson 2: Installing a Server

### Exercise 2-1

Follow the steps as described.

