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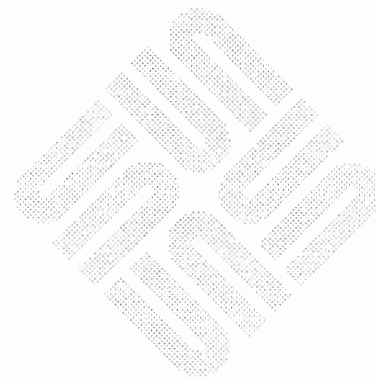
Preface

This manual is your guide to installing Release 4.1.1 of the Sun Operating System (hereafter referred to as “SunOS”). It will guide you through planning your installation and through performing the procedures to accomplish it.



Installing the SunOS has been reorganized to minimize the amount of information which must be read and understood in order to successfully complete any particular workstation installation. There are individual chapters describing the installation of a *standalone workstation*, a *homogeneous server*, a *heterogeneous server*, and a *dataless workstations*. You need only read Chapter 1 and then the chapter which is appropriate to your particular configuration.

The Appendixes include information which you’ll need only in specific circumstances. You will be referred to these appendixes when they are appropriate.





Introduction

Chapter 1 includes general information about the manual as a whole, and details the first steps required for all installations. It will help you decide whether to install your system as a *standalone*, *server*, or *dataless* workstation. It will also help you decide what installation method to use: *SunOS Pre-installed*, *Quick Installation*, or *Custom Installation*. The chapter will also lead you through information collection and decision making common to the installation of all workstations.



Don't skip the remainder of Chapter 1. It includes important information and procedures appropriate to *all* installations.

1.1. Document Conventions

The information in this section will help you use this manual more effectively by explaining the document conventions used.

Type Styles

This manual uses different type styles, or fonts, to distinguish between information you type from the keyboard, information the system displays, and variables (items that must be replaced by a value).

□ *listing*

Represents the system response that is displayed on your monitor or terminal screen. Listing font is also used for literal values (such as the names of files or utility programs) and for file listings and session output.

□ **bold listing**

Represents characters you type from the keyboard.

□ *italic*

Represents variables, for which you must substitute values. Also used for emphasis, particularly when introducing new terms.

Boxes

Boxes are used to display information as it appears on your video display.

- Unshaded boxes represent screen displays, system responses, or file listings.

```
...
standard daemons: update cron.
starting network daemons: inetd printer.
Sat Feb 17 13:40:15 PDT 1990

gemini login:
```

- Gray boxes represent a *dialog* between you and the system. Your entries are shown in **bold listing font**, while system responses are shown in regular listing font.

```
>b st()
Size: 523400+110912+144632 bytes
Copyright (c) 1990 by Sun Microsystems, Inc.
Available mem = 7348224
. . .
```

Icons

Icons are used as visual signposts.



- **Light Bulb**

Illuminates information that is nice to know, but not essential to the installation.

May provide background information, or explain *why* you are performing a procedure.



- **Pointing Hand**

Points to information that requires close attention.



- **Exploding Workstation**

Marks information that is *imperative* for you to read. If you skip over this material, you may damage your system or jeopardize the installation.

**Command Name
Nomenclature**

This manual follows SunOS convention when referring to commands and programs that are documented in the *SunOS Reference Manual*, commonly known as the “man pages.” As an example, the `passwd` command is written as “`passwd(1)`,” the numeral 1 indicating that the command is explained in section 1 of the man pages.

1.2. Related Documents

Necessary Reference Documents

The following are required documents which *must* be read before beginning your installation.

- *SunOS 4.1.1 Read This First*
- *SunOS 4.1.1 Release Manual*

Helpful Reference Documents

The following are manuals which you should have available for reference while planning and performing your installation. They are not necessary to completing your installation, but you may find them useful for a more complete understanding of the decisions you will be making and the procedures you will be performing.

- *System and Network Administration*
- *SunOS Reference Manual*

1.3. Preliminaries to Installing Your Workstation

Your first two tasks are to determine what method you will use to install your workstation and what its configuration will be.

Determine the workstation's configuration first.

Determining Workstation Configuration

Sun workstations are typically installed in groups connected by a *network*. This connection allows workstations to share resources of various kinds, including disk storage space. Workstations fall into the general categories of *servers*, which provide services to other workstations, and *clients* which use those services.

Choose the configuration below which applies to the workstation you will be installing. This decision is fundamental and will affect every phase of the installation.

- *diskless client*

If your system has no disk drive, it must be configured as a *diskless client* —a system that relies on other systems on the network for all services. Diskless clients require no software installation themselves. Rather, their resources are defined by the installation of the system which serves them.

- *standalone system*

A standalone system has one or more disks on which it maintains its own root (/) filesystem, swap space, /usr filesystem, and home directory. A standalone system does not require a server in order to boot and can function even if the network it is (optionally) connected to is down. If your system will not be part of a network, you **must** install it as a standalone system.

- *server*

A server provides services and file storage over the network to client systems which require those services in order to function. Clients are classified as

dataless or *diskless*, depending on whether or not they have their own local disk.

Servers are further classified as either *homogeneous* or *heterogeneous*. This classification is determined by the *architectures* of the clients which the server will support. A workstation's architecture is determined strictly by its hardware. See Table 1-1 — *Sun System Architectures*, to determine the architectures of your server and client machines.

- A server is *homogeneous* if all of its clients have the *same* kernel architecture as it does.
- A server is *heterogeneous* if any of its clients has a *different* kernel architecture than the server does.
- *dataless client*

A dataless client has a disk on which it maintains its own root filesystem and swap space, but mounts its `/usr` and `/home` filesystems from a server. This configuration can improve client and network performance (by swapping to its local disk), minimize overall disk space requirements (by sharing the large `/usr` filesystem on the server rather than maintaining a copy on every system), and simplify system administration (by requiring only the server, not the clients, to be backed up on a regular basis).

If you are going to install your system as a heterogeneous server, a homogeneous server, or as a dataless client proceed to Section 1.4, "Gathering Preliminary Information — Hardware." Each of these configurations requires that you perform a SunInstall *Custom Installation*.

If you have chosen to install as a standalone workstation, read the next section.

Standalone Installation: Which Method Should I Use?

You can install SunOS on a standalone workstation by one of three methods. The first two (SunOS Preinstalled, Quick Install) are easier to perform and designed for workstations with a single disk drive. If you have more than one disk drive attached to your workstation, you may want to perform a SunInstall *Custom Installation* and should proceed to Section 1.4, "Gathering Preliminary Information — Hardware." If your workstation has just one disk, read on.

SunOS Preinstalled?

Some Sun workstations are shipped from the factory with SunOS already installed on their internal (or external) disks. The workstations currently shipped this way are the Desktop SPARCstations. If you are installing one of these workstations you should turn immediately to the *Installation Guide* that was packed with the workstation.



If your workstation originally arrived pre-installed with an earlier release of SunOS you will have to install release 4.1.1 using either the Quick or Custom installation method. Be sure that you back up your personal files prior to beginning the installation of SunOS 4.1.1.

 Quick Installation?

If your workstation has a local media device (tape or CD-ROM drive), you have the option of using the *Quick Installation* option of SunInstall. Quick installation offers a choice of standard installations, each tailored to different needs and applications. In preparation, you need do little more than choose a hostname, IP address, and NIS domain name for your workstation.

Determine whether a standard installation will meet your needs by referring to the *Quick Install Guide* that is continued in this binder.

Custom Installation?

Custom installation lets you customize each phase of the installation—from setting up the filesystems to selecting exactly which software categories to load onto your disk. (You may have used this method if you've installed other SunOS releases.)

Proceed to Section 1.4, “Gathering Preliminary Information — Hardware,” below to begin a custom installation.

1.4. Gathering Preliminary Information — Hardware

Some of the information to be gathered while planning your installation is common to all workstation configurations. In Appendix F you will find Worksheets on which to record information about your installation so that you will have it at your fingertips when it is needed.

The hardware information to be recorded includes your system's architecture and the types of peripheral devices attached to it. Use a copy of the Preliminary Information Worksheet to record information as you work through this section.

 System Architectures

Each Sun system has an *application architecture* and a *kernel architecture*. *Application architecture* refers to the way in which systems interpret the binary code generated by application software. Two systems have the same application architecture if they can both run the same application *binaries*. All Sun-4 systems share the same application architecture; similarly, all Sun-3 systems have the same application architecture. Sun-3 and Sun-4 systems have different application architectures. Application binaries that run on a Sun-3 will not run on a Sun-4, and vice versa.

Kernel architecture refers to the hardware-specific portion of a SunOS kernel. Two systems have the same kernel architecture if the same SunOS kernel will run on both of them. Not all Sun-4 systems have the same kernel architecture. For example, the SunOS kernel that runs on the SPARCstation 1 (a type of Sun-4 system) will not run on a Sun-4/100 series system. The SPARCstation 1 has a *sun-4c* kernel architecture. Systems in the Sun-4/100 series have a *sun-4* kernel architecture.

Similarly, not all Sun-3 systems have the same kernel architecture. Some Sun-3 systems have *sun-3x* kernel architecture (Sun-3/80, Sun-3/470); others have *sun-3* kernel architecture (Sun-3/60, Sun-3/280.)



This manual refers to system architectures as *a-arch* (application architecture) and *k-arch* (kernel architecture). These are often combined as *a-arch.k-arch* pairs, for example: *sun4.sun4c*. Find your system model in Table 1-1, identify

the architecture pair that describes it, and record the information on the Preliminary Information Worksheet. (If you are installing a server, record this information for each client workstation as well.)

Table 1-1 *Sun System Architectures*

System	a-arch.k-arch
SPARCstation 1 (4/60)	sun4.sun4c
SPARCstation 1+ (4/65)	sun4.sun4c
SPARCstation SLC (4/20)	sun4.sun4c
SPARCstation IPC (4/40)	sun4.sun4c
SPARCstation 2 (4/75)	sun4.sun4c
SPARCstation 330 and 370	sun4.sun4
SPARCserver 300 and 400 series	sun4.sun4
Sun-4/100 Series	sun4.sun4
Sun-4/200 Series	sun4.sun4
Sun-4/300 Series	sun4.sun4
Sun-3/50	sun3.sun3
Sun-3/60	sun3.sun3
Sun-3/100 Series	sun3.sun3
Sun-3/200 Series	sun3.sun3
Sun-3/80	sun3.sun3x
Sun-3/470	sun3.sun3x
Sun-3/480	sun3.sun3x

Determining Sun Peripheral Device Abbreviations

You will need to know the device name and number for your media device (tape or CD-ROM drive); and device name and partition_designator for your system disk drive. Refer to Tables 1-2 and 1-3. Record the information on the Preliminary Information Worksheet.

Table 1-2 *Media Devices*

Media Device Description	Device Name
1/4" & 1/2" SCSI tape drive	st
1/2" tape drive (Xylogics controller)	xt
1/2" tape drive (Tapemaster controller)	mt
CD-ROM drive	sr

Media devices have a device number, usually zero (0). If your workstation has multiple SCSI media devices, each will have its own number: 0, 1, 2, or 3. The media device number is appended to the device name, so, for example, a 1/4" SCSI tape drive would most often be known as `st0`. For a listing of media device numbers, see Table 1-1 in the *Quick Install Guide* that comes with this document. For a listing of the boot syntax for each type of Sun architecture, see Table 1-3 in the *Quick Install Guide*.

Table 1-3 *System Disk Device Names*

Disk Device Description	Device Name
SCSI disk 0	sd0
SCSI disk 6	sd6
Xylogics 450/451 SMD disk 0	xy0
Xylogics 7053 SMD disk 0	xd0
IPI disk 0	id000

You need only determine the device name of your *system disk*; that is, the disk drive that your system will boot from. (SunInstall will automatically determine the device names of other disks for you.) The system disk will be device **6** for internal SCSI disks in the Sun-3/80 and SPARCstation 300 series workstations. For all others the system disk will be device **0**.



If you are unsure about the device name of your system disk, it is displayed when you boot MUNIX, as shown in the following examples.

The display:

```
xd0: <Fujitsu-M2372K cyl 743 alt 2 hd 27 sec 67>
```

indicates that the system disk is **xd0**. The display:

```
sd6: <SUN0669 cyl 1614 alt 2 hd 15 sec 54>
```

indicates system disk **sd6**.

System Console

Most Sun workstations are equipped with a graphics oriented bit mapped display as system console. If this is the case with your workstation record the console type *sun* on the Preliminary Information Worksheet. (Whether the monitor is a monochrome or color type makes no difference.)

Some systems, most often servers, use some type of non-graphics terminal as system console. In this case, record the `/etc/termcap` name for your terminal type (perhaps `wyse50` or `tvi925`) on the Preliminary Information Worksheet. Full instructions for determining the `/etc/termcap` name are given in Section F.1.1, "Preliminary Information Worksheet."

1.5. Gathering Preliminary Information — Software

Software information required for all systems, regardless of configuration, is described in the following sections. Record the information you discover on the Preliminary Information Worksheet or Host Form Worksheet, as instructed. (Your site's System or Network Administrator, if you have one, will be able to assist you with determining system names and addresses.)

Choosing a Time Zone

SunOS understands the concept of world time zones and will automatically adjust the system clock for Daylight Savings time when and where appropriate. Time zones are specified by name, such as `US/Central` or `Eire`. (If you are unsure of the correct time zone name for your region, wait until you begin the installation and use the help function of the SunInstall TIME ZONE screen. It will provide you with all of the valid time zone names.) Record the time zone name on the Preliminary Information Worksheet.

Choosing a Hostname

A system on a network is often called a *host*—its *hostname* is the name that uniquely identifies the system. You can use the `hostname(1)` command to display this information on an installed system, for example:

```
% hostname
alcatraz
```

If you need to choose a hostname, make sure the name you select is not already in use. The name must be unique within both your local area network and, if applicable, your NIS domain. (Refer to "Sun's Network Information Service" below for a brief description of NIS.)

In many networks the choice of a hostname is left up to the owner of the workstation (subject to the requirement of uniqueness). Workstation names often reflect some special interest of the owner, often with a touch of whimsy.

A hostname can be up to 64 characters long. Choose a name that starts with a lowercase letter, followed by any combination of lowercase letters, numbers, or hyphens (-). Record your hostname on the Host Form Worksheet.

Determining Your IP Address

If your workstation is going to be attached to a network you will need an IP address. Your network administrator can assign you an IP address or you can refer to Chapter 13 of the manual *System and Network Administration*.

Sun's Network Information Service

If your workstation is attached to a network, that network may use Sun's Network Information Service (NIS) in order to centrally administer information including hostnames, IP addresses, and user login names. Contact your network administrator to find out if your installation uses NIS, and if so, your domain name. For complete documentation refer to Chapter 16 of *System and Network Administration*.



Please note that prior to SunOS Release 4.1 the Network Information Service was known as "yellow pages" or "yp."

If your network uses NIS you must also determine whether your workstation is to be configured as an NIS *client*, *master*, or *slave*. Most workstations are NIS clients, simply using NIS services. One system in each domain is designated the NIS master, the central point of administration for the domain. There may also be one or more NIS slave systems, essentially backup systems to provide NIS services should the master be temporarily unavailable.

Record all of the appropriate information on the Host Form Worksheet.

Which Optional Software Should I Load?

The SunOS software is divided into five *required categories* and a variety of *optional categories*. Each category contains software that supports a particular need or application. By selecting among the optional categories you can tailor your system to your needs, including support for those functions that you will need while not wasting disk storage on software that you will never use.

It is important to note that some "optional" categories may be *required* in common situations, for example:

- If your system is on a network. (Networking)
- If you plan to use SunView™ or other window-based applications. (SunView_Users)
- If you plan to use OpenWindows™. (OpenWindows_Users and SunView_Users)
- If you need access to programming tools and debuggers. (Debugging)
- If you want access to the on-line manual pages so you can display formatted information from the *SunOS Reference Manual* on your screen. (Text and Manual)



To install all of the software from the SunOS release media requires about 125 megabytes of disk space (in addition to required swap space). Software categories that you choose not to include now can be added after the system is installed using `add_services(8)`, *provided that there is sufficient space available*.



If you are installing your system as a dataless client there is no need to select software. A dataless client has access to whatever software is loaded on its server. If you are installing your workstation as a dataless client, turn directly to Section 1.10, "Pre-Installation Checklist," below.

1.6. Category Classifications

To help you determine your software needs, Sun classifies each software category as one of the following types:

required Categories you *must* install for basic system functions.

Required: root, usr, Kvm, Install, and Networking

These include the SunOS kernel and root filesystem. SunInstall automatically installs all of the required software categories.

desirable Categories often needed because they are essential for many applications.

Example: Sys

This category enables you to build a custom kernel for your machine.

common A category you should strongly consider installing because it is commonly needed.

Example: SunView_Users

This category enables you to use SunView window-based tools and applications.

optional Categories you should consider based solely on your specific needs.

Examples: Manual and Text

These categories provide an on-line version of the *SunOS Reference Manual*. Whether you choose on-line manual pages depends on how useful you feel they'll be and whether your system disk has the space to accommodate them.

1.7. Choosing Your Software

Table 1-4 describes the software categories and notes their approximate sizes. Read the description of each category and decide whether you wish to load it. Check off each chosen category on the Software Form Worksheet.

If you are unsure of the categories, the next section describes a procedure to extract and list them.



Note that some categories, if chosen, also require that another category or categories (as noted in the "Prerequisites" column) be loaded as well in order for them to be used. For example, Manual (the manual pages) also requires that Text (the text formatting utilities) be loaded so that the manual pages can be formatted

and read on the workstation screen.

Table 1-4 *Software Categories and Descriptions*

Category	Size*	Description	Prerequisites
— Required —			
root	1.8	Contents of /, the root filesystem, including the SunOS kernel.	
usr	25.1	Required portions of /usr. Includes standard utilities, system programs, and library routines.	
Kvm	5.3	Kernel-architecture-dependent programs, such as ps(1), vmstat(8), and others.	
Install	1.0	Installation software and tools such as add_services(8), used to add software to an installed system in multiuser mode.	
Networking†	1.2 34.4	Required NFS software including programs such as rlogin(1C) and rcp(1C), and tools for network administration.	
— Desirable —			
Debugging	3.3	Debugging tools for programmers including dbxtool(1), a source-level debugger for C, Pascal, and Fortran-77 programs that runs in a windowed environment.	SunView_Users
RFS	1.1	Remote File System, an alternative to NFS in a System-V environment.	TLI, Sys
Sys	5.1	Software for building kernels and kernel configuration files for common configurations.	

Table 1-4 *Software Categories and Descriptions—Continued*

Category	Size *	Description	Prerequisites
System_V	5.8	Selected programs, include files, and libraries for UNIX‡ System-V compatibility and compliance with X/Open Portability Guide standards.	
TLI	0.1 48.6	Transport Layer Interface, a communications protocol used by RFS, an alternative to NFS in a System-V environment.	Sys
— Common —			
SunView_Users	3.0	Provides an environment to run SunView window-based tools, such as mailtool(1), dbxtool(1), sundiag(8), and many others.	
OpenWindows_Users	23.6	Provides an environment to run OpenWindows window-based tools, such as mailtool(1), filemgr(1), cm(1), and many others.	SunView_Users
OpenWindows_Fonts	8.2 83.4	Provides fonts for OpenWindows_Users.	
— Optional —			
Demo	5.5	Miscellaneous demonstration programs (selected source code and binaries).	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
OpenWindows_Demo	8.2	Miscellaneous demonstration programs (selected source code and binaries).	OpenWindows_Users
Games	3.7	Computer games, such as adventure(6), boggle(6), chesstool(6), and many others.	SunView_Users
Graphics	2.1	Software for programmers who wish to develop graphics-based applications in a SunView environment. (Includes CGI and SunCore.)	SunView_Users, SunView_Programmers

Table 1-4 *Software Categories and Descriptions—Continued*

Category	Size*	Description	Prerequisites
Manual	7.7	Source files for the on-line man pages. (The large size and relatively low usage of the manual pages may suggest installing them on just one or two servers on your network. Other workstations can then mount the /usr/share directory from a “man page server” to gain access to the manual pages.)	Text
Security	0.4	Software to provide enhanced password security and event-specific auditing, as specified for C2-level security.§	
Shlib_Custom	1.6	Software for programmers who wish to build their own shared libraries.	
SunView_Demo	0.6	SunView demonstration programs (selected source code and binaries).	SunView_Users, SunView_Programmers
OpenWindows_Programmers	10.2	Software for programmers who wish to develop window-based applications in an OpenWindows environment.	OpenWindows_Users, OpenWindows_Fonts
SunView_Programmers	2.1	Software for programmers who wish to develop window-based applications in a SunView environment. Most Sun graphics products require this category.	SunView_Users
Text	0.8	Text-processing software, including the nroff(1) and troff(1) formatting programs, standard macro packages, and preprocessors such as eqn(1) and tbl(1).	
User_Diag	2.7	Diagnostic programs, including sundiag(8), a window-based tool used to test system devices and peripherals.	SunView_Users
	419.2		



61.8 - without any windowing sw.
69 - with only sunview

Table 1-4 *Software Categories and Descriptions—Continued*

Category	Size*	Description	Prerequisites
uucp	0.7	Files to support uucp (1C), for system-to-system, serial-line network communications.	
Versatec	6.7	Spooling support for Versatec V-80 plotters.	

1.8. Listing Software Categories

The following two sections tell you how to find out which categories are on the SunOS release tape and on a CD-ROM, respectively. A third section shows you how to use the `list_files` command to display all the files within a category.

Extracting the Table of Contents from a Tape

To extract the table of contents from the installation tape:

1. Log on as root.
2. Mount the tape in your tape drive.
3. Enter the commands:

```
# mt -f /dev/nrstnumber asf 1
# dd if=/dev/nrstnumber | /usr/etc/install/xdrtoc
```

– *number* is to be replaced by the number (0–7) of the tape drive used

The following example shows the table of contents of a ¼-inch tape in tape device `st0`.

* Sizes are given in megabytes and are approximations.

† Required for networked systems.

‡ UNIX is a registered trademark of AT&T.

§ See *System and Network Administration Manual*, Chapter 19 — Administering C2 Security.

1/4-Inch Tape, Sun4c Kernel Architecture (Desktop SPARCsystems)

SunOS 4.1.1 700-2687-05 of Sun Aug 26 13:05:26 PDT 1990 from Sun Release Engineering

ARCH sun4c

VOLUME -1

Vol	File	Name	Size	Type
1	0	munix	3022848	image
1	1	XDRTOC	4096	toc
1	2	mini-root	7168000	image
1	3	root	74247	tarZ
1	4	usr	11283903	tarZ
1	5	Kvm	2654129	tarZ
1	6	Install	460015	tarZ
1	7	Networking	464665	tarZ
1	8	System_V	1898363	tarZ
1	9	Sys	2272839	tarZ
1	10	SunView_Users	1159329	tarZ
1	11	SunView_Demo	196749	tarZ
1	12	Text	348141	tarZ
1	13	Demo	1849348	tarZ
1	14	OpenWindows_Users	11608481	tarZ
1	15	OpenWindows_Demo	2365443	tarZ
1	16	OpenWindows_Fonts	7185071	tarZ
1	17	User_Diag	1754777	tarZ
1	18	Manual	2651509	tarZ
1	19	TLI	22333	tarZ
1	20	RFS	399127	tarZ
1	21	Debugging	1567287	tarZ
1	22	Copyright	1536	image
2	0	XDRTOC	4096	toc
2	1	XDRTOC	4096	toc
2	2	SunView_Programmers	865509	tarZ
2	3	Shlib_Custom	786881	tarZ
2	4	Graphics	836845	tarZ
2	5	uucp	286777	tarZ
2	6	Games	1788080	tarZ
2	7	Versatec	2398415	tarZ
2	8	Security	247673	tarZ
2	9	OpenWindows_Programmers	4683885	tarZ
2	10	Patch_IPC	139264	tarZ
2	11	Patch_C++_2.0	2953216	tarZ
2	12	Patch_TAAC	20480	tarZ
2	13	Copyright	1536	image

Extracting the Table of Contents from a CD-ROM

To list the table of contents on a CD-ROM:

1. Log on as root.
2. Mount the CD-ROM with the command:

```
# mount -rt hsfs /dev/sr0 /usr/etc/install/tar
```

3. Change directories to the release for which you want a table of contents:

```
# cd /usr/etc/install/tar/export/exec/kvm/k-arch_sunos_4_1_1
```

– Replace *k-arch* with the kernel architecture for which you want contents listed

4. Display the table of contents:

```
# /usr/etc/install/xdrtoc xdrtoc
```

The table of contents displayed is similar to that shown for tape in the preceding section.

list_files

Use the `list_files(8)` command to list all the files in a specific category on tape or CD-ROM. As root, enter:

```
#cd /usr/etc/install
#list_files devicenumber category [-a kernel arch] [-r release]
```

- *devicenumber* is the device number of your tape or CD-ROM.
- Replace *category* with the category whose files you want listed.
- “-a” is optional and used only with CD-ROM; if not entered, files belonging to the system’s own kernel architecture are listed; if entered, it is followed by the kernel architecture for which files are to be listed
- “-r” is optional and used only with CD-ROM; if not entered, files belonging to the system’s SunOS release are listed; if entered it is followed by the name of the release whose files are to be listed

For example, to list the files in the category “Text” on a release tape in device `st0`, you enter:

```
#cd /usr/etc/install
#list_files st0 Text
```

The following example lists the files in “Text” for the client of a server with a CD-ROM in device `sr0`. The client has sun3x kernel architecture; the server

can be of any architecture.

```
#cd /usr/etc/install
#list_files sr0 Text -a sun3x
```

1.9. Software Selection Guidelines

Some further suggestions to help you choose your optional software.

- Whether you need these categories depends entirely on your system hardware:

```
uucp
SunView_Users
OpenWindows_Users
Versatec
```

SunView_Users or OpenWindows_Users is very desirable if you have a bit mapped display.

- These categories depend on whether you need to access System-V network protocols:

```
RFS
TLI
```

- The system administrator typically decides which of the following categories to install. (The choice is yours if you're responsible for maintaining your own system.)

```
Security
Sys
User_Diag
```

Sys is strongly recommended. Without it, you'll be unable to build a new, more efficient kernel on your machine after installing your system. Security, on the other hand, is needed only to provide the C2-level security features described in Chapter 19 of *System and Network Administration*.

- The following categories are of particular interest to programmers and application developers:

```
Debugging
Graphics
Shlib_Custom
SunView_Programmers
OpenWindows_Programmers
System_V
```

Select both SunView_Users and SunView_Programmers if you plan to add Sun graphics products to your system.

- These categories are of general interest to the average system user:

Demo
 Games
 Manual
 SunView_Demo
 OpenWindows_Demo
 OpenWindows_Fonts
 System_V
 Text

In determining your need for demonstration programs (Demo), note that most programs come in source code format as well as executable binaries. To recompile programs from source code, you must first load the prerequisite categories on your system.

1.10. Pre-Installation Checklist

Complete the steps in the following checklist before you begin the installation.

Before you install a new system

— **Make sure the system hardware is functional.**

- Verify that all cables and connectors are hooked up and that the machine is plugged into a power supply of the proper voltage.
- Turn the machine on and verify a successful system self-test.
- As a final check, type a few characters to make sure the system responds to keystrokes.

Before you reinstall a previously installed system

Note: Not all of the commands and files listed here are applicable to all installations. For example, the /export/swap directory will be found only on servers.

— **Save to tape or diskette the output of each command: ***

```
__ mount
__ mount -p
__ dkinfo for each drive
__ grep 'hostname' /etc/hosts
__ grep client_name /etc/hosts for each client
__ ls -ls /export/swap
__ ls -ls /etc/hostname*
__ cat /etc/hostname.interface for each hostname file
__ domainname if you are using NIS
```

— **Save to tape or diskette a copy of each of:**

```
__ /.profile
__ /.rhosts
__ /.cshrc
__ /etc/fstab
```

* You may wish to print these as well.

— /etc/crontab	— /etc/passwd
— /etc/exports	— /etc/bootparams
— /etc/printcap	— /etc/gettytab
— /etc/group	— /etc/hosts
— /etc/host.equiv	— /etc/networks
— /etc/rc	— /etc/rc.boot
— /etc/rc.local	— /etc/remote
— /etc/ttytab	— /etc/aliases
— /etc/uucp/*	— /usr/local/*
— /usr/spool/cron/crontabs/*	

- **If you are upgrading from a release prior to 4.1, some formatting changes are required; see the `ttytab(4)` and `ttysoftcar(8)` man pages for more information.**
- **If you're installing a server, halt each of its clients.**
- **Boot the system in single user mode and run `fsck(8)` on each filesystem.**
- **Perform a full system back-up (level 0 dumps). (See Chapter 6, Section 6.1 of *System and Network Administration*.)**

Before you install *any* system

- **Locate all required software.**

Under some circumstances, you'll need more than just the Release 4.1.1 media for your own system architecture.

- To install a heterogeneous server, for example, you'll need additional media for client architectures. (Unless you are installing from CD-ROM, which includes all architectures on a single disk.)
- Unbundled software or third-party applications must either be reinstalled after you install Release 4.1.1 or extracted from backups.

- **Gather all necessary documentation.**

In addition to this manual, you may find *System and Network Administration*, the *SunOS 4.1.1 Release Manual*, and the manual supplied with your media device to be useful. Also, be sure that you have read the *SunOS 4.1.1 Read This First*.

— **Schedule sufficient time for the installation.**

Installation typically takes from 1/2 to 2-1/2 hours, depending on a combination of factors:

- Machine Performance
- Installation Complexity/Number of Clients
- Software Categories Selected
- Installation Method (local or remote)
- Media Type

Installation from xt half-inch and all SCSI tape drives, for example, suppresses rewinding between files and is much faster than installation from mt half-inch tape.



Allow additional time if you are reinstalling a previously installed system. If the system is running unbundled or third-party software, for example, you will need to reinstall the software or restore it from backups after you install Release 4.1.1.

Turn now to the chapter of this manual which matches your chosen system configuration:

- Chapter 2: Installing a Standalone Workstation
- Chapter 3: Installing a Homogeneous Server
- Chapter 4: Installing a Heterogeneous Server
- Chapter 5: Installing a Dataless Workstation

Installing a Standalone Workstation

Chapter 2 details the steps required to complete the installation of a Standalone Workstation using the Custom Installation method.

There are four general tasks to be completed:

- **Planning Your Installation**
Final planning, including determining the layout of your system disk(s).
- **Performing Preliminary Software Procedures**
Formatting and labeling your disk(s) (if necessary) and loading the software necessary to execute SunInstall.
- **Running SunInstall**
Executing the SunInstall software installation program to actually install the operating system software on your workstation.
- **Deciding What Still Needs to be Done**
Primary system administration procedures which you should carry out as soon as your system is installed.

2.1. Planning Your Installation — Disk Partitioning

Much of the planning required before you begin the actual installation of your workstation was completed as you worked through Chapter 1. At this point you should already have completed the Preliminary Information, Host Form, and Software Form Worksheets. This section will help you complete the final Worksheets: Partition Planning and Disk Form.



Go to Appendix F and pull out a copy of the Partition Planning Worksheet and the Disk Form Worksheet for each disk drive on your workstation. Refer to and fill in the Worksheets as you work through this section.

Disk drives used with Sun workstations are divided into as many as eight sections called *partitions* (labeled a through h). Each disk partition appears to the operating system and the user as though it were a separate disk drive, and each can be used for a specific purpose. An individual partition may be used in its *raw* state, most often as swap and paging space for the SunOS virtual memory system. Most partitions, however, will be structured as *filesystems* and used to store UNIX† files.

† UNIX is a registered trademark of AT&T.

Individual filesystems are designated to store various broad classes of files including operating system software, user data files, and perhaps such things as database files for application software. This section will help you to decide what partitions you should define for your disk(s), how to use each partition, and what size each partition should be.



If you are unfamiliar with computer disk drives and such terms as *partition*, *cylinder*, *sector*, and *head*, please refer to Appendix E, “Disk Structure and Disk Space Terminology.”

The SunInstall program provides a default disk layout for standalone systems that you can use “as is” or modify as needed. This layout only addresses the system disk and will have to be modified if your system has more than one disk drive.

If your system was previously installed as a standalone system, you may wish to base disk partitions on the existing disk layout.

Disk Layout — Default Partitions

The number of default partitions depends upon the capacity of your system disk. Table 2-1 shows the default layouts for standalone configurations.

Table 2-1 *Default Partitions for Standalone Systems (Release 4.1.1)*

Small Disks (130 MB or less)	Large Disks (over 130 MB)
a: /	a: /
b: (swap)	b: (swap)
c: (whole disk)	c: (whole disk)
d: —	d: —
e: —	e: —
f: —	f: —
g: /usr	g: /usr
h: —	h: /home

The default size (as shipped from the factory) of the root (/) and swap partitions varies depending on the type and capacity of the disk. Table 2-2 shows the default sizes.

Table 2-2 *Default root and swap Partition Sizes*

Disk Type	Disk Size	Root Size	Swap Size
sd	<130 MB	8 MB	16 MB
sd	>130<300 MB	8 MB	32 MB
sd	>300 MB	16 MB	32 MB
xd, xy and id	<600 MB	8 MB	16 MB
xd, xy and id	>600 MB	16 MB	32 MB

The root (/) Filesystem

Every SunOS *system disk* must have its a partition defined as the root (/) filesystem. The root filesystem consists of /, the root directory, and subdirectories such as /etc, /dev, /tmp, and /var.

The default root partition size should be usable for nearly all installations. About 3.5 MB of this space will be used by operating system files. The remainder is available for use by 'scratch' files created in the /tmp directory, and temporary log and spool files created in the /var directory.

The swap Partition

This area of the disk (normally the b partition of the system disk) is reserved to implement the virtual memory feature of SunOS. The default size will be adequate in many circumstances, but the following issues should be considered.

- Workstations with color monitors

A minimum of 24 MB of swap space is recommended if your workstation has a color monitor.

- Workstations with large main memories

Your swap space **must** be larger than the size of the memory installed in your workstation. For example, if your workstation has 32 MB of main memory, designate at least 34 MB for your swap area.

- Application programs

Some application programs require large amounts of swap space. As an example, LISP applications can require 40 MB or more of swap.

The c Partition

Every disk drive used with the SunOS operating system must, by convention, have a c partition defined. This partition is used by the operating system to reference the entire disk. It is defined automatically by Sun's `format(8S)` and `suninstall(8)` programs and should not be altered.

The /usr Filesystem

This filesystem is assigned, by convention, to the `g` partition of the system disk. It contains the bulk of the operating system files, including executable programs, program libraries, and documentation. It is also frequently used to hold unbundled application programs from Sun, application programs from other vendors, and locally developed programs. Some free space should be available in /usr in which to build a custom kernel for your workstation and to allow for the addition of new programs over time.

The partition size needed for /usr varies widely from installation to installation. Several factors should be examined to choose an appropriate size for your installation.

- Operating system software

Operating system files will require a minimum of about 35 MB to a maximum of about 125 MB, depending on which optional software categories you chose for your workstation in Chapter Introduction. Don't bother to add up the individual sizes listed in Table 1-4 exactly. SunInstall will do this for you during the installation process.

- Sun unbundled products

If you will be adding other Sun products to your workstation (programming languages, office automation, databases, etc), check the installation literature they provide to find the amount of space each will require in /usr. Total this figure and record it on the Partition Planning Worksheet.

- Products from other vendors

Again, refer to the literature provided with these products and record the total space required.

- Locally developed programs

Allow space for locally developed programs, if any.

- Free space

You should allow an additional 3 MB of space for use in building a custom kernel for your workstation. Still more free space over and above this is an excellent idea if the total disk space available allows. On most workstations programs and files get added to /usr from time to time and the filesystem slowly fills up, so plan ahead. **Running out of space in /usr after the system is installed is very inconvenient. Be as generous as you can within the constraints of the total disk space available to you. Figure all of your expected needs and then add some more, perhaps 20%, for good measure.**



To allow users to more easily manage free space, the standard layout for smaller disks does not provide a separate /home partition. This layout accommodates user home directories within the /usr filesystem in the subdirectory /usr/export/home. On larger disks where space available is not quite so critical /home is given its own partition. (The advantage of a separate /home partition is that it simplifies back up and system upgrade procedures.)

If your system disk size is less than 130 megabytes and a `/home` partition is not defined you do not need to calculate a size for the `/usr` filesystem. `/usr` will use all of the space not taken by the root and swap partitions, and be automatically sized for you by SunInstall.

The `/home` Filesystem

The `/home` filesystem is used for your personal home directory, will be empty when the installation completes, and will begin to fill as you establish your account (personal work area) and begin to use your workstation. An overall goal of disk partitioning strategy should be to maximize the space available to the user, commensurate with the resource needs of the operating system and application programs to support the user. To this end, in the default disk partitioning scheme (large disk) `/home` is automatically sized by SunInstall to encompass all of the space not claimed by the other partitions.

Disk Layout — Optional Partitions

In addition to the default partitions you may wish to define some others. These may be considered ‘fine tuning.’ Nearly all systems will operate just fine without them.

The `/tmp` Filesystem

The `/tmp` directory is, by default, contained within the root filesystem. It is intended for use as system ‘scratch’ file space; for example, intermediate files are created and deleted in `/tmp` by the C compiler as it runs. All files in `/tmp` are deleted each time the workstation is rebooted.

A new feature since SunOS release 4.1, *tmpfs*, allows a temporary filesystem to be made in operating system virtual memory. This has performance advantages, especially for short-lived scratch files, and allows some of the system swap partition to be used for file space on demand. As such, it is an excellent way to support `/tmp`, reducing the demand for space in the root filesystem and, at the same time, providing a potential performance improvement.[†]



NOTE: Files and directories created in a *tmpfs* filesystem are truly temporary. They disappear without recourse upon a `umount (8)` of the filesystem and each time the workstation is rebooted.

Using *tmpfs* to implement the `/tmp` directory may eliminate any need to expand the root partition from its default size. *tmpfs* is defined after your system has been installed. You need do nothing right now. Section 2.5, “Deciding What Still Needs to Be Done” at the end of this chapter includes instructions for configuring *tmpfs* at that time.

The `/var` Filesystem

The `/var` directory is, by default, contained within the root filesystem. It contains files that tend to vary in size; for example:

The `/var/tmp` directory provides a workspace for users and temporary storage for programs such as the `vi (1)` editor.

[†] See *System and Network Administration* and `tmpfs (4S)` for details.

Spooling programs create files in subdirectories of `/var/spool`, such as `/var/spool/mail` for incoming mail, `/var/spool/lpd` for queued print jobs, and so on.

System accounting information and log messages are collected in the `/var/adm` and `/var/log` directories.

Depending on system use, activity in `/var` can consume excessive amounts of space in the root filesystem. It may be appropriate to provide additional space in the root filesystem or, as an alternative, to create a separate `/var` filesystem. Asking yourself the following questions will help you decide if your system needs a `/var` partition and, if so, how big you should make it.

- Is your system a mail server?
Consider the number of users served and the anticipated amount of mail.
- Is your system a print server?
Consider the number of attached printers and the anticipated number and size of the print jobs.
- Is your system a uucp host?
Files will be stored in `/var` while waiting to be transmitted to remote systems.
- Is your system an NIS server?
Allow space for the NIS maps.
- Will your system use process-level accounting?
If not carefully maintained the accounting files quickly become very large.
- Will you use applications that create large temporary files in `/var`?
Consider the needs of all such programs.



It's unlikely that you need a separate partition for `/var` if you answered no to each of the preceding questions. If you choose to define a `/var` partition, 10 MB would be a minimum size. You might need considerably more space depending on the factors noted above.

Filesystems For Use By Applications

Some application software packages may recommend the creation of separate filesystems for their exclusive use. Check the literature received with any application software for possible requirements.

Disk Layout — Multiple Disk Drives

If your workstation hardware includes more than one disk drive you will need to decide what partitions and filesystems to define on each drive. (If you have only one disk drive skip ahead to Section 2.2, "Preliminary Software Procedures.")

The overall goals here are to make efficient use of the disk space available and to maximize performance by balancing the amount of activity on each of the disks as much as possible. Some guidelines follow. (For purposes of discussion we

- will suppose a system with two drives named `sd0` and `sd1`.)
- What Should Stay on the System Disk?** The root and `/usr` filesystems and the swap partition should remain on the system disk. This will allow the workstation to be booted even if the first drive is the only one running, an advantage should a failure occur on one of the other drives.
- Should You Define Multiple swap Partitions?** The SunOS operating system allows more than one partition to be defined for use as swap area. The system interleaves the use of multiple partitions, attempting to make equal use of each partition, thus improving performance. The amount of disk space that you have determined to use for swap can be split between partitions located on different disk drives. For example, if you have decided that you want 40 MB of swap area, you might specify two 20 MB swap partitions, one on `sd0b`, the other on `sd1b`. (Use of the `b` partition for swap space is not a requirement except on drive 0. We use `sd1b` here just for the sake of convention.)
- Procedures for designating multiple swap partitions will be presented later in this chapter. For now, simply note the partitions and sizes on your Disk Form Worksheets.
- Should You Move One or More Partitions?** The `/home` partition is a prime candidate for moving to the second drive. Just make the proper notations on your Partition and Disk Form Worksheets.
- If you have decided to designate a separate partition for the `/var` filesystem, put it on drive 1. Availability of a second drive may make creation of a `/var` filesystem attractive from a performance standpoint.
- Sample Layout For Two Disks** Table 2-3 suggests a layout for a workstation with two disk drives. An “*” in the *size* column indicates that the partition will be allocated whatever space is left on the disk after the other partitions have been defined.

Table 2-3 Sample Partition Layout — Two Disk Standalone Workstation

Disk Drive sd0			Disk Drive sd1		
<i>partition</i>	<i>designation</i>	<i>size (MB)</i>	<i>partition</i>	<i>designation</i>	<i>size (MB)</i>
a	/	8	a	/var	15
b	(swap)	20	b	(swap)	20
c	-	105	c	-	105
d	-	-	d	-	-
e	-	-	e	-	-
f	-	-	f	-	-
g	/usr	*	g	-	-
h	-	-	h	/home	*



Assigning partitions to certain partition letters (moving `/home` from `sd0h` to `sd1h`, for example) is not required. Maintaining the convention does, however, help to reduce confusion.

2.2. Preliminary Software Procedures

Now it's time to begin using the software tools provided for installing your workstation.

Selecting the Correct Media

First you'll need to select the correct installation media (tape or CD-ROM) with which to install your workstation. The label on the media should specify the same kernel architecture as you have noted for your workstation on Preliminary Information Worksheet. If your installation medium consists of multiple tapes, select the first one (labeled 1 of N , where N is the total number of tapes).

Mount the selected tape or CD-ROM in the drive you will be installing from.

Should You Format Your Disk?

You *format* a disk by using the utility program `format(8S)` to write control information used by the disk drive hardware onto a disk. Disk drives provided by Sun are formatted and labeled at the factory. Desktop SPARCstation systems are shipped with SunOS preinstalled.

For preinstalled disks, it is recommended that you check the disk in a nondestructive way to verify that any head movement that may have occurred during shipment has not affected the performance of your disk.

To check the disk, using the `format` command, follow these steps:

1. Select "Run Format" from the `install` script.
2. Choose `analyze` from the `format` menu.
3. Choose `read` from the `analyze` menu.

The `read` option tries to read every block on the disk, but does not destroy any information.

For new disks without preinstalled software, it is recommended that you reformat them. To format your disk(s), select "Run Format" in the MINIROOT install script. See Appendix A of this manual for instructions on running the `format` command. You can also run `format` manually from MINIROOT.

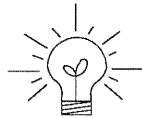
Resizing the root and swap Partitions

If you have elected to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see the Partition Planning Worksheet) you must run the `format` program before running SunInstall. Refer to Appendix A for the necessary instructions.

If you do not plan to alter the size of root or decrease the size of swap, continue with "Loading and Booting the Miniroot," below. (You can use the SunInstall program to make all other adjustments to partition sizes.)

Loading and Booting the Miniroot

SunInstall will be executed from a minimal version of the operating system called the *miniroot*. The miniroot is designed to be copied into the swap (b) partition of the system disk, thereby leaving the remaining partitions available for loading of the full operating system.



The miniroot copied to the swap area is temporary; as soon as the workstation is booted from the installed operating system it will be over-written by normal paging and swapping activity. If you need to use it again, it will have to be copied into the swap area again.

Individual miniroot load and boot procedures are given here for those systems which will be installed from an attached tape or CD-ROM drive (local installation). Procedures for loading the miniroot from a tape drive attached to another system on the network (remote installation) are given in Appendix B — "Loading and Booting the Miniroot from a Remote Tape." If you are loading the miniroot from a remote CD-ROM, refer to Appendix C — "Loading and Booting the Miniroot from a Remote CD-ROM."

In any case, once the miniroot is booted, continue with "Running SunInstall," Section 2.4 below.

Local Procedure from Tape

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt.* If the workstation is not displaying the PROM monitor prompt, hold down the `[L1/STOP]` key and press the `[A]` key and it should appear.†

Make sure that the first release tape is mounted on the system tape drive.

Refer to the Preliminary Information Worksheet to find your *tape* device designation (`xt`, `mt`, or `st`).

* Newer boot PROMS, particularly Desktop SPARCsystems, may display the `ok` prompt. Others will display the `>` prompt.

† If your workstation uses a non-Sun terminal as console use its `[BREAK]` key to get the PROM monitor prompt.

Replace the *tape* variable, enter the following command at the PROM monitor prompt:

For Sun3, 3x, or 4:

```
>b tape()
```

For Sun4c systems prior to SPARCstation 2:

```
ok boot tape()
or
> b tape()
```

For Sun4c systems beginning with SPARCstation 2:

```
ok boot tape
or
> b tape
```

Now proceed to Section 2.3, "Continuing the Miniroot Install," below.

Local Procedure from CD-ROM

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt.* If the workstation is not displaying the PROM monitor prompt, hold down the `[LI/STOP]` key and press the `[A]` key and it should appear.

To boot the miniroot from CD-ROM, enter the following command at the PROM monitor prompt:

For Sun4 systems:

```
> b sd(0,30,1)
```

For Sun4c systems prior to the SPARCstation 2:

```
> b sd(0,6,2)
or
ok boot sd(0,6,2)
```

For Sun4c systems beginning with the SPARCstation 2:

* Newer boot PROMS, particularly in the SPARCstation 1, may display the `ok` prompt. Others will display the `>` prompt.

2.3. Continuing the Miniroot Install

```
ok boot cdrom
   or
> b cdrom
```

After you successfully begin installing the miniroot, your system should display the following messages:

```
What would you like to do?
 1 - install SunOS mini-root
 2 - exit to single user shell
Enter a 1 or 2:
```

Follow these steps to continue the installation:

1. Enter **1** to indicate that you want to continue the installation.

If your system has only one disk, the miniroot is copied to that disk. If your system has more than one disk, you are asked to specify a disk number as illustrated in the following display:

```
Beginning system installation - probing for disks.
Which disk do you want to be your miniroot system disk?
 1 - sd0: disk description
 2 - sd1: disk description
 3 - exit to single user shell
Enter a 1, 2, or 3:
```

Enter **1** to select the system disk.

2. Before the miniroot is copied to the specified disk, you are given an opportunity to format and relabel the disk.

```
selected disk unit "sd0".
Do you want to format and/or label disk "sd0"?
 1 - yes, run format
 2 - no, continue with loading miniroot
 3 - no, exit to single user shell
Enter a 1, 2, or 3:
```



You do not need to run `format` unless you believe that something is wrong with the disk or you have chosen to resize the root or decrease the swap partition, or it is a new unlabeled disk from a third-party vendor.

3. Enter **2** to continue.

Messages such as those that follow are displayed:

```
checking writability of /dev/rsd0b
0+1 records in
1+0 records out
Extracting miniroot ...
```

Additional, media-specific messages are displayed. For tape installation, this process may take several minutes to complete. When the process is complete, the following message is displayed:

```
Mini-root installation complete.

What would you like to do?
  1 - reboot using the just-installed miniroot
  2 - exit into single user shell
Enter a 1 or 2:
```

4. Enter **1** to boot the miniroot.

Additional messages are displayed as the system boots.

```
syncing file systems... done
rebooting...
Booting from: sd(0,0,1)
root on sd0b fstype 4.2
Boot: vmunix
Size: 811008+114720+60112 bytes
SunOS Release 4.1.1(MINIROOT) #4: Tue Feb 13 01:10:16 PDT
Copyright (c) 1990 by Sun Microsystems, Inc.
.
.
.
WARNING: CLOCK GAINED 14 DAYS -- CHECK AND RESET THE DATE!
root on sd0b fstype 4.2
swap on sd0b fstype spec size 04070K
dump on sd0b fstype spec size 14056K
#
```

The process is complete when the root prompt (#) is displayed.



Now you are ready to invoke the SunInstall program, and continue with Section 2.4, "Running SunInstall," below.

2.4. Running SunInstall

SunInstall is an interactive, menu-driven program that operates in the following way:

1. You invoke the program and use its preliminary menus to set the system clock and to specify your console display device (Sun workstation or other terminal).
2. Next, you fill out a series of forms each describing a different aspect of the installation.
3. Then, upon confirmation from you, SunInstall begins the actual installation of your system, loading operating system software onto your disk(s).



If you are using a terminal (not a Sun bit mapped display) as system console and have not yet determined the `/etc/termcap` name for the terminal, now is the time to do it. See F.1.1 “Preliminary Information Worksheet” for complete instructions.

Starting the SunInstall Program

Invoke the SunInstall program from the miniroot as follows:

```
# suninstall
```

You are ready to use the program when this screen is displayed:

```

Welcome to SunInstall

Remember: Always back up your disks before beginning an installation.

SunInstall provides two installation methods:

1. Quick installation:

   This option provides an automatic installation with a choice
   of standard installations, and a minimum number of questions asked.

2. Custom installation:

   Choose this method if you want more freedom to configure your
   system. You must use this option if you are installing your
   system as a server.

Your choice (or Q to quit) >> 2

```

Entering Initial Information

The following steps will provide SunInstall information about your system's console terminal, the time zone you are in, and the current date and time.

These steps employ a simple convention.

- *enter*
denotes keyboard input with an ending **Return** (the ensuing action takes place when you press the **Return** key).
 - *type*
denotes keyboard input without a **Return** following. (The ensuing action takes place as soon as you type a character.)
1. Enter **2** in response to the SunInstall Welcome screen, selecting a custom installation.

SunInstall automatically checks for your terminal type. If you are using a Sun bit-mapped display, SunInstall does not ask for your terminal type and skips to the next step.

If you are not using a Sun bit-mapped display, SunInstall prompts you for your terminal type, as shown in Step 2.

Assumed Sun

```
Select your terminal type:
  1) Televideo 925
  2) Wyse Model 50
  3) Sun Workstation
  4) Other
```

```
>>
```

2. Enter a number from 1 to 3 to specify your terminal type from those listed, or 4 if your terminal is of some other type.

If you choose 4 (Other) SunInstall asks you to enter the name of your terminal as it appears in the `/etc/termcap` file. Refer to the Preliminary Information Worksheet for this information.

After you enter your terminal type SunInstall will ask for your local time zone name:

```
Enter the local time zone name (enter ? for help):
```

3. Although you can enter time zone information from the keyboard, it's easiest to use the on-line help facility:

Enter `?` to display the TIMEZONE menu.

```
TIMEZONE MENU
```

```
[?=help]
```

```
-----  
Select one of the following categories to display  
a screen of time zone names for that region
```

```
  X_ United States
```

```
    Canada
```

```
    Mexico
```

```
    South America
```

```
    Europe
```

```
    Asia
```

```
    Australia and New Zealand
```

```
    Greenwich Mean Time
```

```
Are you finished with this menu [y/n] ?
```

```
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

4. Move the cursor to the appropriate region name (by typing **Return**) and then type **x** to display a corresponding menu of time zones.

The UNITED STATES menu is shown here.

```

UNITED STATES MENU                                     [?=help]
-----
TIME ZONE NAME                                         AREA
_ US/Eastern                                           Eastern time zone, USA
X US/Central                                           Central time zone, USA
US/Mountain                                           Mountain time zone, USA
US/Pacific                                           Pacific time zone, USA
US/Pacific-New                                       Pacific time zone, USA
                                                    with proposed change to Daylight
                                                    Savings Time near election time
US/Alaska                                           Alaska time zone, USA
US/East-Indiana                                       Eastern time zone, USA
                                                    no Daylight Savings Time
US/Hawaii                                           Hawaii

Are you finished with this menu [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

5. Move the cursor to the appropriate time zone name and type **x**.
SunInstall prompts:

```

Are you finished with this menu [y/n] ? y

```

6. Enter **y** to exit this menu and redisplay the TIMEZONE menu.
7. Enter **y** again to exit the TIMEZONE menu.

SunInstall now asks you to confirm the current date and time, as in the following example:

```
Is this the correct date/time: Thu Feb 22 17:10:15 PDT 1990
[y/n] >> y
```

8. Enter **y** if the displayed information is correct. Otherwise, enter **n** and press the Return key. The Set Time screen appears. The format for the Set Time screen display depends on which time zone you selected. Press Delete, Control-U or the Backspace key to erase the sample response. Then enter the correct date and time using the format that is displayed for your time zone, and press the Return key.

As an example, on the third day of June, 1990 at three o'clock in the afternoon you could enter:

```
>> 03/06/90 03:00 pm
```

After you press the Return key, SunInstall would respond:

```
Is this the correct date/time: Sun Jun 3 15:00:12 PDT 1990
[y/n] >>
```

Enter **y** if the displayed information is correct and **n** if you want to try again. (Note that SunInstall displays in twenty-four hour time, thus three o'clock in the afternoon is displayed as 15:00.)

SunInstall sets the system clock and displays the Main Menu.

```

MAIN MENU [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

_ assign host information

exit SunInstall

[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

Now you are ready to begin filling out the SunInstall forms.

The Main Menu

The core of the installation process involves completing several *forms*, each one relating to a specific aspect of your configuration.

You select forms from the SunInstall Main Menu. When first displayed, the menu is as shown above, with just one menu item, *assign host information*, displayed. This is the current item, the one that is selected if you simply type **x** or **X**.

The main menu will reflect your progress as you work your way through the forms. When, for example, you've completed the *HOST Form* to assign host information, SunInstall marks that item with a plus sign (+) and requests disk information.

```

MAIN MENU [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

+ assign host information
_ assign disk information

```


The information on each completed form is automatically recorded in an installation database. A “+” before a menu item means the database contains the corresponding information. On the Form shown below all required forms have been completed.

```
MAIN MENU [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

+ assign host information
+ assign disk information
+ assign software information

_ start the installation
exit SunInstall

[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

Using the Main Menu

The SunInstall Main Menu allows you to use the following control keys:

SPACE move forward, by item, as far as the prompt line
RETURN

Control-F move forward through the menu items
Control-N

Control-B move backward through the menu items
Control-P

(The cursor-movement keys are noted on the message line at the bottom of the screen.)

Control-L repaint the screen should it become garbled

The choices on the Main Menu allow you to:

display a form

Move the cursor to the corresponding form name, and type **x** or **X**.

exit SunInstall

Move the cursor to `exit SunInstall`, and type **x** or **X**.

display general information about the menu use

Type `?` at any time to display an *On-Line Help Screen*. See Figure 2-1 below for one example. Press **Return** to redisplay the Main Menu when you are through viewing the help text.

start the installation

When you have completed the last required form, the Main Menu displays:

`start the installation`

Type **x** or **X** to begin the installation of your system.

Figure 2-1 *On-Line Help Screen*

ON-LINE HELP FOR MENUS	
KEYS	PURPOSE
CONTROL B	move to previous item
CONTROL P	move to previous item
CONTROL F	move to next item
CONTROL N	move to next item
<RETURN>	move to next item
<SPACE>	move to next item
x or X	select an item
CONTROL L	repaint screen
CONTROL C	abort

Press <return> to continue ...

Completing the HOST Form

From the SunInstall Main Menu, complete the HOST Form as follows:

1. Select assign host information.
2. Complete the form, referring to your Host Form Worksheet and using the following example as a guide.

```

HOST FORM                                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Workstation Information :
  Name : diphthong vivaldi
  Type : x[standalone] [server] [dataless]

Network Information :
  Ethernet Interface : [none] x[le0]
  Internet Address   : 195.5.2.15 128.99.68.12
  NIS Type           : x[none] [master] [slave] x[client]
  Domain name       : em_city.oz.com

Misc Information :
  Reboot after completed : [y] x[n]

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```



This example form is the first of many to appear in this procedure. Each uses the same conventions.

- System-specific items are italicized.
- User entries are boldfaced.

Thus, the example Ethernet interface (*le0*) is system-specific information SunInstall displayed, while the example hostname (*diphthong*) and IP address (*195.5.2.15*) are system-specific information the user entered.

When you have completed the last screen field, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

3. Enter **y** to exit the form.

The message updating databases ... is briefly displayed, followed by the Main Menu.

Completing the DISK Form

From the SunInstall Main Menu complete the DISK Form as follows:

1. Select assign disk information.

SunInstall polls the disk drives and lists their device numbers in the Attached Disk Devices field. The form will look like this for most systems with one SCSI disk:

```
DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    [sd0]
```

2. Select the system disk from among the devices listed. (The system disk will usually be the first one listed.)

SunInstall then expands the DISK Form:

```
DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    x[sd0]

Disk Label: [default] [use existing] [modify existing]
Free Hog Disk Partition : [d] x[e] [f] [g] x[h]
Display Unit      : x[Mbytes] [Kbytes] [blocks] [cylinders]
```

Steps 3 through 5 explain how to complete the new fields.

3. In the Disk Label field, choose a starting disk label. The choices are:
 - default
Displays the standard partitions for your system configuration. This is the correct choice for new installations and most installations of existing systems as well.
 - use existing
Displays the partitions already defined on the disk but does not allow them to be changed. If you are reinstalling a previously installed system, and you don't want to modify the existing disk partitions, select

this option. Note that only the partition sizes are filled in; you must enter the `MOUNT PT` fields by hand.

- `modify existing`
Displays the existing partitions on the selected disk and allows them to be changed. Again, the `MOUNT PT` fields must be entered by hand.

4. SunInstall will choose the partition normally associated with users' home directories as the default for the *Free-Hog Disk Partition*. In most cases this will be correct.



If you have a small disk (under 130 MB), partition `g` will be marked as the free-hog partition. The example forms in this procedure assume that you are installing SunOS Release 4.1.1 on a large disk, therefore partition `h` is the free-hog partition.

The *Free-Hog*



The SunInstall program will help you prepare a disk layout that it will use later to define physical disk partitions. As you refine the layout, the program automatically sees that the total amount of disk space in use by the defined partitions equals the total space available on the disk. SunInstall does so by automatically adjusting the size of one partition on each disk: the *free-hog* partition.

As the other partitions are increased or decreased in size the free-hog is decreased or increased to maintain the correct total. It is common to designate the partition that will hold the users' personal directories (usually `/home`) as the free-hog. This results in the users having as much disk space as possible for doing their work commensurate with the specific disk space needs of the operating system.

The term *free-hog* only refers to the special role the partition plays while you're using the SunInstall program. **There is no free-hog partition on an installed system; the concept is meaningless apart from the SunInstall program.** Also note that since the size of the free-hog is relative to that of the other partitions it is not possible to directly change the size of the free-hog. (That is, you cannot type in the `SIZE` field for the free-hog on the `DISK Form`).

5. In the `Display Unit` field, specify how you want partition sizes displayed in the `SIZE` column. The example forms display partition sizes in Mbytes (the default), but you can also use Kbytes, blocks, or cylinders. (Refer to

Appendix E — “Disk Structure and Disk Space Terminology” for general information about blocks and cylinders.)



Only the integer portion of the partition size is displayed. The displayed size of a 35.75 MB partition, for example, is 35, not 35.7 or 35.8. **The actual size will be rounded to the nearest cylinder when SunInstall physically relabels the disk.**

When you make your choice, SunInstall displays a partition table that reflects the selected label. If you selected `default` at step 3, the `MOUNT_PT` and `PRESERVE*` columns will be filled in. (The columns will otherwise be empty.) Following is a possible default partition table for a standalone system.

PARTITION	START_CYL	BLOCKS	SIZE	MOUNT_PT	PRESERVE (Y/N)
a	0	32025	16	/	n
b	61	59850	30		
c	0	639450	327		
d	0	0	0	/usr	n
e	0	0	0	/usr/users	n
f	0	0	0		
g	175	90300	45	/usr	n
h	347	457275	228	/home	n

- To implement your disk plan, complete the `SIZE`, `MOUNT_PT`, and `PRESERVE` column for each required filesystem and any others you have chosen to define. If a column already contains a value, you can type `Return` to use the displayed value. Leave the `MOUNT_PT` columns blank for all `c` partitions and for any partitions which will be used for swap space.



If you've chosen to use the existing disk partitions, you might wish to preserve the `home` partition so you won't have to restore user home directories from tape after you install Release 4.1.1. **Do not preserve the `/` and `/usr` partitions!**

The root (/) Partition

The size displayed for your root partition (the `a` partition of your system disk) will reflect the current size of the partition on the disk. If you used `format` to adjust the size of the root this is a good opportunity to check your work, verifying that the partition is the size you intended. **Remember: you cannot change the size of the `a` partition on the system disk within SunInstall.**

* If you type `y` in the `PRESERVE(Y/N)` column, SunInstall will not re-make the filesystem in that partition. This provides a means to retain existing data in user partitions such as `/home`. **If the `START_CYL` or `SIZE` of a partition changes, it cannot be preserved. SunInstall will notify you if you attempt to preserve a partition that does not meet these criteria.**

The swap Partition

The size displayed for your swap partition (the `b` partition of your system disk) will also reflect the current size of the partition on the disk. If you need to *increase* the size of the partition, do so now. Simply press **Return** until the cursor is next to the swap partition's `SIZE` field, backspace over the current size, and enter the new size you desire. Note that at the same time SunInstall will automatically decrease the size of the designated free-hog partition by a similar amount. **Remember: you cannot decrease the size of the `b` partition of the system disk within SunInstall.**

The `/usr` Partition

How you size the `/usr` partition is perhaps the most important part of your disk plan. In order to let SunInstall automatically calculate the size of `/usr` necessary to accommodate the SunOS operating system software intentionally *under-size* the partition at this time. To do so, press **Return** until the cursor is next to the `SIZE` field for the `/usr` partition. Then type **Delete** to backspace over the current `SIZE` and enter `5`. Note that, at the same time that the size of `/usr` is decreased, the size of the designated free-hog partition will increase by a like amount.

Later on, when software selection has been completed, `/usr` will be almost *exactly* the size needed to accommodate the SunOS software chosen. Then you will return to the DISK Form to expand `/usr` as per your Partition Planning Worksheet.

PARTITION	START_CYL	BLOCKS	SIZE	MOUNT_PT	PRESERVE (Y/N)
a	0	32025	16	/	n
b	61	59850	30		
c	0	639450	327		
d	0	0	0		
e	0	0	0		
f	0	0	0		
g	175	9975	5	/usr	n
h	194	537600	269	/home	n



The size of the `/usr` partition need not and cannot be directly changed if `/usr` is the free-hog.

When you complete the table, SunInstall prompts

O.K. to use this partition table [y/n] ?

- Enter **y** to use the displayed table or **n** if you wish to change it.

When you accept the table, SunInstall prompts

Are you finished with this form [y/n]? **y**

- Enter **y** if you are defining only one disk. Otherwise, enter **n** and fill out additional DISK Forms until you have completed one for each of your disk drives. Then enter **y**, indicating that you are finished with the DISK Forms.

Completing the SOFTWARE Form

From the SunInstall Main Menu, complete the SOFTWARE Form as follows:

- Select assign software information from the Main Menu.

SunInstall displays the SOFTWARE form.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]
```

- Select add new release.

SunInstall requests the device name and location of the device on which the Release 4.1.1 media resides.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
Media Device           : x[st0] [st1] [st2] [st_]* [xt0] [mt0] [fd0] [sr0]
Media location         : x[local] [remote]
```

- Complete the **Media Information** fields, using the following examples as a guide.

* Selecting [st_] will allow you to specify the st device number manually. This feature allows selection of SCSI devices 3-7 when necessary.

Example for quarter-inch Tape in Local Drive:

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device       : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media Location    : x[local] [remote]
```

Example for half-inch Tape in Remote Drive:



When reading from a media device attached to a remote system make sure that the hostname of the system being installed is included in the `/.rhosts` file of the remote system.

Note that including the hostname of the system being installed in the `/.rhosts` file allows superuser (root) access to the remote system from your workstation. For increased security, be sure to remove the hostname from the `/.rhosts` file once you have completed the installation.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device       : [st0] [st1] [st2] [st_] x[xt0] [mt0] [fd0] [sr0]
  Media location    : [local] x[remote]
  Media Host        : persephone
  Media Host's Internet Address : 195.5.2.16
```

Having gathered the information needed to access the Release 4.1.1 media, SunInstall prompts:

Ok to use these values to read the table of contents [y/n] ?

4. Enter **y** if the values are correct or **n** if you need to change any of them.

When you elect to use the displayed information, SunInstall expands the form as shown below.

```

local

SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
  Media Device       : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location    : x[local] [remote]

Choice:  [all] [default] [required] [own choice]
Executables path: /usr
Kernel executables path: /usr/kvm

```

5. Specify your software selection method by choosing one of the following:

- | | |
|------------|--|
| all | Automatically selects all SunOS software categories. |
| default | Automatically selects the <i>default</i> software categories, and then asks you to pick the other software you want. |
| required | Automatically selects the <i>required</i> categories, without allowing you to pick additional software. |
| own choice | Automatically selects the <i>required</i> categories, and then asks you to pick the other software you want. |

(The default software selection includes all required categories and selected common and desirable categories as shown in Table 2-4. See Table 1-4 for detailed information about the listed categories.)

Table 2-4 *Default Software for Networked Systems*

Required Categories	Common and Desirable Categories
root	Debugging
usr	RFS
Kvm	SunView_Users
Install	Sys
Networking	System_V
	TLI

6. Press **Return** in the following fields to use the standard paths to executable files.

```
Executables path:
Kernel executables path:
```

SunInstall prompts:

Ok to use these values to select Software Categories [y/n] ?



Software selection will begin when you answer this prompt. Read the remainder of this step to preview the selection process *before* responding to this prompt.

Unless you selected `all` or `required` at step 5, you'll be able to pick exactly which optional software to install. SunInstall will display category names, one by one, and prompt:

```
Select this media file [y/n] ?
```

Software selection is in progress in the following example.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
Media Device      : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
Media location   : x[local] [remote]

Choice:  [all] [default] [required] x[own choice]
Executables path: /usr
Kernel executables path: /usr/kvm

Destination fs:  /usr (sd0g)
Hog: sd0h       47210496
Size :          31334400

Name: SunView_Programmers (optional)
Size :          2150400

Select this media file [y/n] ? _ status: not selected
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

In the example, "SunView_Programmers" is the software category presented. Answering **y** to the `Select this media file [y/n] ?` prompt will mark this category for installation on your system. Answering **n** will skip it. In either case, SunInstall will then go on to present the next category for your consideration.

A variety of disk space parameters are also presented, as the following details show:

```
Choice: [all] [default] [required] x[own c
  Executables path: /usr
  Kernel executables path: /usr/kvm

Destination fs: /usr (sd0g)

Name: SunView_Programmers (optional)
```

The destination filesystem is /usr.

The software category and its type.

Indicators at the right-hand side of the screen show—in bytes—the size of the software category, the current size of the free-hog partition, and the changing state of the destination filesystem. The following detail examines this region more closely.

```
] x[own choice]
usr
ath: /usr/kvm
```

```

                                47210496
Hog: sd0h 31334400
Size: 2150400
```

Available space in destination filesystem.‡
Current size of the free-hog partition.
Size of the displayed software category.

- Unless you wish to change your software selection method, enter **y** to use the displayed values and begin software selection.

‡ Pay particularly close attention to this value if your /usr partition is the designated free-hog. When software selection is complete it will represent the space available in /usr for Sun unbundled products, products from other vendors, locally developed programs, and general free space.

After all of the categories have been presented and responded to, SunInstall summarizes the selected categories for you:

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
  Media Device       : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location    : x[local] [remote]

Choice:  [all] [default] [required] x[own choice]
Executables path: /usr
Kernel executables path: /usr/kvm

Media Filenames:
root          SunView_Users
usr           SunView_Programmers
Kvm           Text
Install       Manual
Networking

Ok to use this architecture configuration [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

8. Enter **y** to use the configuration or **n** if you wish to go back and try again.

When you elect to use the configuration, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

9. Enter **y** to exit the form and redisplay the Main Menu.

Rechecking Partition Sizes

The Main Menu should now be displayed, with the cursor next to the item:

```
start the installation
```



Before you select **start the installation** follow these steps to check and adjust the current partition sizes.

1. Press **(Control-B)** to move the cursor back through the menu items.
2. Select assign disk information.

The DISK Form is displayed once more.

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    [sd0]

```

3. Select each disk in turn.

The **Disk Label** field contains a new item, `data file`. This item displays the disk label from the installation database, where all of the information you've entered so far is stored.

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    x[sd0]

Disk Label: [default] [use existing] [modify existing] [data file]
Free Hog Disk Partition : [d] [e] [f] [g] x[h]
Display Unit      : x[Mbytes] [Kbytes] [blocks] [cylinders]

```

4. Select `data file` to display the new partition sizes. Since you last viewed the form, two partitions should have changed:

- The `/usr` partition should be larger.
- The free-hog partition should be smaller.

SunInstall took space from the free-hog partition to expand the `/usr` partition when you selected software. The `/usr` partition is now just the size needed to accommodate the software you selected.

If partition sizes have not changed (perhaps `/usr` was the free-hog) skip to step 6. Otherwise, adjust the partition size as described in the step 5.

5. Finish sizing the `/usr` partition:

Refer to your Partition Planning Worksheet to find the amount of space you have decided to allow above and beyond that required by the operating system files (space for other files and free space for expansion). Add that space to the current size of `/usr` and edit the `SIZE` field accordingly.

6. Unless you want to make additional changes to the table, press **Return** enough times to reach the prompt line:

Ok to use this partition table [y/n] ?

and enter **y**.

7. SunInstall will display:

Are you finished with this form [y/n] ?

If you have more disk drives to check answer **n** and repeat steps 3 through 6 for each drive. When all disks have been checked enter **y** to redisplay the Main Menu.

Letting SunInstall Run

The Main Menu should now be displayed. Move the cursor to:

```
start the installation
```

Type **x** to begin the installation.

Your screen will reflect the progress of the installation as SunInstall labels the disk, creates the specified filesystems, and loads software from the Release 4.1.1 media. Depending on the software categories you chose earlier, you may be asked to load additional media, as shown in the following example:

```
System Installation Begins:
Label disk(s):
    sd0
Create/check filesystems:
Creating new filesystem for / on sd0a
newfs /dev/rsd0a >> /etc/install/suninstall.log 2> &1
. . .
Extracting sunos.4.1.1.sun4c 'root' media file ...
Extracting sunos.4.1.1.sun4c 'usr' media file ...
Extracting sunos.4.1.1.sun4c 'Kvm' media file ...
Extracting sunos.4.1.1.sun4c 'Install' media file ...
Extracting sunos.4.1.1.sun4c 'Networking' media file ...
Please mount sun4.sunos.4.1.1 release media #2
Press <return> to continue
```

If There's a Problem

If SunInstall should, for some reason, fail or have to be aborted during its run, it will save the data files that were created as you filled in the forms. You can remedy the problem and then re-invoke SunInstall, going directly to "start the installation." SunInstall may prompt:

```
Some software has already been loaded.
Are you sure you want to restart the installation (y/n) ?
```

Answering "y" will have SunInstall restart its run using the data you have already entered.

When SunInstall Completes

What happens after SunInstall extracts the last software category depends on how you filled in the `Reboot after completed` field on the HOST Form.

- If you selected `y`, your system boots automatically. Booting messages appear, followed by a `login` prompt. Refer to Section 2.5, “Deciding What Still Needs to Be Done” for further instructions.
- If you selected `n`, the `#` prompt reappears. Your system is still running the `miniroot`.

Installing a Small Kernel

Pre-configured small kernels are available for the following configurations:

- Sun-3/50 and Sun-3/60 with up to 2 SCSI disks, 1 SCSI tape
- Sun-3/80 with up to 4 SCSI disks, 2 SCSI tapes
- Sun-4/110 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 330 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 1, 1+ and 2 with up to 4 SCSI disks, 1 Floppy Disk, 2 SCSI tapes
- All other Desktop SPARCsystems

If you want to install an appropriate pre-configured kernel do so by executing:

```
# install_small_kernel
```

The utility is self-explanatory and will ask you for confirmation before making any changes to the system.

Configuring an NIS master or slave

NIS masters and slaves should be configured before they are booted in multi-user mode. See Chapter 16 of the *System and Network Administration* manual for details.

Booting Up Your Workstation

To boot your new operating system from the `#` prompt do the following:

```
# sync; sync; reboot
```

2.5. Deciding What Still Needs to Be Done

Several basic system administration tasks should be completed following the installation of your system.

Logging In and Setting the root Password

As supplied the SunOS operating system does not have a password protecting the superuser (`root`) login. Login as “`root`” and then use the `passwd(1)` command to set the password of your choice.

Configuring for Multiple swap Partitions

If you have defined multiple swap partitions, you must add a line to the `/etc/fstab` file for each additional swap area. For example, you define `sd1b` as a swap partition by adding the following line in the `/etc/fstab` file:

```
/dev/sdlb swap swap rw 0 0
```

Then enter:

```
# swapon -a
```

(From now on `swapon` will be executed automatically each time the system is booted.)

Configuring for tmpfs

If you have decided to use the tmpfs virtual file system for the `/tmp` directory do the following:

- Add this line to the file `/etc/fstab`:

```
swap /tmp tmp rw 0 0
```

- Enter:

```
# mount /tmp
```

- In the file `/etc/rc.local` find the line:

```
#mount /tmp
```

and remove the sharp sign (#):

```
mount /tmp
```

From now on, the `/tmp` directory will be mounted automatically each time the system is booted.

- When you build and install a custom kernel include the following line in the kernel configuration file:

```
options TMPFS # tmp (anonymous memory) file system
```

(The tmpfs facility is included in the `GENERIC` kernel.)

Building and Installing a Custom Kernel

For best workstation performance you should make and install a custom operating system *kernel*. The kernel is a program which is loaded into memory when your workstation is booted and which then controls all aspects of system operation. The default kernel is called the *GENERIC* kernel. This kernel includes the software necessary to access all of Sun's peripheral hardware. While this is useful during installation it also means that the kernel includes much more software,

and is therefore much larger, than is required for any specific system. This excessive size means an inefficient kernel which uses up memory that can be put to better use and provide improved performance.

Complete instructions for creating and installing a custom kernel for your workstation are given in Chapter 9 of the *System and Network Administration Manual*, Reconfiguring the System Kernel.



If you chose to install a `GENERIC_SMALL` kernel at the conclusion of running SunInstall that kernel will provide improved performance as compared to the `GENERIC` kernel. You may still, however, see some further improvement by creating a kernel matched to your specific configuration.

Setting Up Your Personal Account

Refer to the manuals *Getting Started with SunOS: Beginner's Guide* and *Setting Up Your SunOS Environment: Beginner's Guide* for assistance.

For Desktop SPARCstations, refer to your Owner's Set for information on setting up your personal account.

Customizing Your Environment

Refer to Chapter 8 of *System and Network Administration Manual*, Administering Workstations, Section 8.1. Here you will find the information you need for setting up user home directories, enabling electronic mail, etc.

Backing Up Your New System

Once you have customized your system to suit your needs it should be *backed up*. This means recording the information contained on your disks onto a different media, usually tape, for safekeeping. Chapter 6, Section 6.1 of *System and Network Administration* contains the information you will need.

Installing a Homogeneous Server

Chapter 3 details the steps required to complete the installation of a Homogeneous Server System using the Custom Installation method.

There are four general tasks to be completed:

□ **Planning Your Installation**

Final planning, including determining the layout of your system disk(s) and the configuration of each of the Diskless Client workstations which the server will support.

□ **Performing Preliminary Software Procedures**

Formatting and labeling your disk(s) (if necessary) and loading the software necessary to execute SunInstall.

□ **Running SunInstall**

Executing the SunInstall software installation program to actually install the operating system software on your workstation.

□ **Deciding What Still Needs to be Done**

Primary system administration procedures which you should carry out as soon as your system is installed.

3.1. Planning Your Installation — Disk Partitioning

Much of the planning required before you begin the actual installation of your workstation was completed as you worked through Chapter 1. At this point you should already have completed the Preliminary Information, Host Form, and Software Form Worksheets. This section will help you complete the final Worksheets: Partition Planning, Disk Form, and Client Form.



Go to Appendix F and pull out one copy of the Partition Planning Worksheet. Also get a copy of the Disk Form Worksheet for each disk drive attached to your system, and a copy of the Client Form Worksheet for each Diskless Client workstation that will be supported by the server. Refer to and fill in the Worksheets as you work through this section.

Disk drives used with Sun workstations are divided into as many as eight sections called *partitions* (labeled a through h). Each disk partition looks to the operating system and the user as though it were a separate disk drive, and each may be used for a specific purpose. An individual partition may be used in its

raw state, most often as swap and paging space for the SunOS virtual memory system. Most partitions, however, will be structured as *filesystems* and used to store UNIX files.

Individual filesystems are designated to store various broad classes of files including operating system software, user data files, and perhaps such things as database files for application software. This section will help you to decide what partitions you should define for your disk(s), how to use each partition, and what size each partition should be.



If you are unfamiliar with computer disk drives and such terms as *partition*, *cylinder*, *sector*, and *head*, please refer to Appendix E, “Disk Structure and Disk Space Terminology.”

The SunInstall program provides a default disk layout for homogeneous server systems that you can use “as is” or modify as needed. This layout only addresses the system disk and will have to be modified if your system has more than one disk drive.

If your system was previously installed as a homogeneous server, you may wish to base disk partitions on the existing disk layout.

Disk Layout — Default Partitions

The number of default partitions depends upon the capacity of your system disk. Table 3-1 shows the default layouts for homogeneous server configurations.

Table 3-1 *Default Partitions for Homogeneous Servers (Release 4.1.1)*

Partition	Assignment
a:	/
b:	(swap)
c:	(whole disk)
d:	/export
e:	/export/swap
f:	—
g:	/usr
h:	/home

The default size (as shipped from the factory) of the root (/) and swap partitions varies depending on the type and capacity of the disk. Table 3-2 shows the default sizes.

Table 3-2 *Default root and swap Partition Sizes*

Disk Type	Disk Size	Root Size	Swap Size
sd	<130 MB	8 MB	16 MB
sd	>130<300 MB	8 MB	32 MB
sd	>300 MB	16 MB	32 MB
xd, xy and id	<600 MB	8 MB	16 MB
xd, xy and id	>600 MB	16 MB	32 MB

The root (/) Filesystem

Every SunOS *system disk* must have its `a` partition defined as the root (/) filesystem. The root filesystem consists of /, the root directory, and subdirectories such as /etc, /dev, /tmp, and /var.

The default root partition size should be usable for nearly all installations. About 3.5 MB of this space will be used by operating system files. The remainder is available for use by 'scratch' files created in the /tmp directory, and temporary log and spool files created in the /var directory.

The swap Partition

This area of the disk (normally the `b` partition of the system disk) is reserved to implement the virtual memory feature of SunOS. (Note: This area is used only by the server system. Swap space for its clients is provided elsewhere.) The default size will be adequate in many circumstances, but the following issues should be considered.

- Workstations with color monitors

A minimum of 24 MB of swap space is recommended if your workstation has a color monitor.

- Workstations with large main memories

Your swap space **must** be larger than the size of the memory installed in your workstation. For example, if your workstation has 32 MB of main memory, designate at least 34 MB for your swap area.

- Application programs

Some application programs require large amounts of swap space. As an example, LISP applications can require 40 MB or more of swap.

The `c` Partition

Every disk drive used with the SunOS operating system must, by convention, have a `c` partition defined. This partition is used by the operating system to reference the entire disk. It is defined automatically by Sun's `format(8S)` and `suninstall(8)` programs and should not be altered.

The /export Filesystem

This filesystem is assigned, by convention, to the `d` partition of the system disk. In its `/export/root` subdirectory it will contain the root (`/`) filesystems of the diskless clients supported by the server, each in its own subdirectory. (That is, `/export/root/client1` for the diskless client `client1`, `/export/root/client2` for the diskless client `client2`, and so on.) These subdirectories will include the `/etc`, `/dev`, `/tmp`, and `/var` subdirectories of each client.

A good rule of thumb is to allow approximately 5 MB of space in the `/export` partition for each client supported by the server or *planned* for in the near future. About 3 MB of this space per client will be used by operating system files. The aggregate space remaining will be shared by the clients.

The /export/swap Filesystem

This filesystem is assigned, by convention, to the `e` partition of the system disk. It holds the files used by the server's diskless clients for swap space. Each client has its own swap file. For example, the diskless client `client1` would use the swap file `/export/swap/client1`.

To choose a size for the `/export/swap` partition, determine the required swap space for each individual client using the same criteria as you did for the server itself (see "The Swap partition" above). (Record these at this time on a Client Form Worksheet for each client.) Then add up a total for all of the clients. Remember to allow space for clients that you plan to add to the server in the near future. The default is 16 MB per client.

The /usr Filesystem

This filesystem is assigned, by convention, to the `g` partition of the system disk. It contains the bulk of the operating system files, including executable programs, program libraries, and documentation. It is also frequently used to hold unbundled application programs from Sun, application programs from other vendors, and locally developed programs. The content of `/usr` is shared by the homogeneous server with its clients. Some free space should be available in `/usr` in which to build a custom kernel for your workstation and to allow for the addition of new programs over time.

The partition size needed for `/usr` varies widely from installation to installation. Several factors should be examined to choose an appropriate size for your installation.

- Operating system software

Operating system files will require a minimum of about 35 MB to a maximum of about 125 MB, depending on which optional software categories you chose for your workstation in Chapter 1. Don't bother to add up the individual sizes listed in Table 1-4 exactly. SunInstall will do this for you during the installation process.

- Sun unbundled products

If you will be adding other Sun products to your workstation (programming languages, office automation, databases, etc), check the installation literature they provide to find the amount of space each will require in `/usr`. Total

this figure and record it on the Partition Planning Worksheet.

- Products from other vendors

Again, refer to the literature provided with these products and record the total space required.

- Locally developed programs

Allow space for locally developed programs, if any.

- Free space

You should allow an additional 3 MB of space for use in building a custom kernel for your workstation. Still more free space over and above this is an excellent idea if the total disk space available allows. On most workstations programs and files get added to `/usr` from time to time and the filesystem slowly fills up, so plan ahead. **Running out of space in `/usr` after the system is installed is very inconvenient. Be as generous as you can within the constraints of the total disk space available to you. Figure all of your expected needs and then add some more, perhaps 20%, for good measure.**

The `/home` Filesystem

The `/home` filesystem is used for user home directories, will be empty when the installation completes, and will begin to fill as you establish user accounts (personal work areas). An overall goal of disk partitioning strategy should be to maximize the space available to users, commensurate with the resource needs of the operating system and application programs to support the users. To this end, in the default disk partitioning scheme `/home` is automatically sized by SunInstall to encompass all of the space not claimed by the other partitions.

Disk Layout — Optional Partitions

In addition to the default partitions you may wish to define some others. These may be considered ‘fine tuning.’ Nearly all systems will operate just fine without them.

The `/tmp` Filesystem

The `/tmp` directory is, by default, contained within the root filesystem. It is intended for use as system ‘scratch’ file space; for example, intermediate files are created and deleted in `/tmp` by the C compiler as it runs. All files in `/tmp` are deleted each time the workstation is rebooted.

A new feature since SunOS 4.1, *tmpfs*, allows a temporary filesystem to be made in operating system virtual memory. This has performance advantages, especially for short-lived scratch files, and allows some of the system swap partition to be used for file space on demand. As such, it is an excellent way to support `/tmp`, reducing the demand for space in the root filesystem and, at the same time, providing a potential performance improvement.[†]

[†] See *System and Network Administration* and `tmpfs(4S)` for details.



NOTE: Files and directories created in a tmpfs filesystem are truly temporary. They disappear without recourse upon a `mount(8)` of the filesystem and each time the workstation is rebooted.

Planning on using tmpfs to implement the `/tmp` directory may eliminate any need to expand the root partition from its default size. Tmpfs is defined after your system has been installed. You need do nothing right now. Section 3.6, “Deciding What Still Needs to Be Done” at the end of this chapter includes instructions for configuring tmpfs at that time.

The `/var` Filesystem

The `/var` directory is, by default, contained within the root filesystem. It contains files that tend to vary in size; for example:

The `/var/tmp` directory provides a workspace for users and temporary storage for programs such as the `vi(1)` editor.

Spooling programs create files in subdirectories of `/var/spool`, such as `/var/spool/mail` for incoming mail, `/var/spool/lpd` for queued print jobs, and so on.

System accounting information and log messages are collected in the `/var/adm` and `/var/log` directories.

The `/var/yp` directory holds NIS database information on NIS master and slave systems.

Depending on system use, activity in `/var` can consume excessive amounts of space in the root filesystem. It may be appropriate to provide additional space in the root filesystem or, as an alternative, to create a separate `/var` filesystem. Asking yourself the following questions will help you decide if your system needs a `/var` partition and, if so, how big you should make it.

- Is your system a mail server?
Consider the number of users served and the anticipated amount of mail.
- Is your system a print server?
Consider the number of attached printers and the anticipated number and size of the print jobs.
- Is your system a uucp host?
Files will be stored in `/var` while waiting to be transmitted to remote systems.
- Is your system an NIS server?
Allow space for the NIS maps.
- Will your system use process-level accounting?
If not carefully maintained the accounting files quickly become very large.

- Will you use applications that create large temporary files in `/var`?

Consider the needs of all such programs.



It's unlikely that you need a separate partition for `/var` if you answered no to each of the preceding questions. If you choose to define a `/var` partition, 10 MB would be a minimum size. You might need considerably more space depending on the factors noted above.

Filesystems For Use By Applications

Some application software packages may recommend the creation of separate filesystems for their exclusive use. Check the literature received with any application software for possible requirements.

Disk Layout — Multiple Disk Drives

If your workstation hardware includes more than one disk drive you will need to decide what partitions and filesystems to define on each drive. (If you have only one disk drive skip ahead to Section 3.3, "Preliminary Software Procedures.")

The overall goals here are to make efficient use of the disk space available and to maximize performance by balancing the amount of activity on each of the disks as much as possible. Some guidelines follow. (For purposes of discussion we will suppose a system with two drives named `sd0` and `sd1`.)

What Should Stay on the System Disk?

The root and `/usr` filesystems and the swap partition should remain on the system disk. This will allow the workstation to be booted even if the first drive is the only one running, an advantage should a failure occur on one of the other drives.

Should You Define Multiple swap Partitions?

The SunOS operating system allows more than one partition to be defined for use as swap area. The system interleaves the use of multiple partitions, attempting to make equal use of each partition, thus improving performance. The amount of disk space that you have determined to use for swap can be split between partitions located on different disk drives. For example, if you have decided that you want 40 MB of swap area, you might specify two 20 MB swap partitions, one on `sd0b`, the other on `sd1b`. (Use of the `b` partition for swap space is not a requirement except on drive 0. We use `sd1b` here just for the sake of convention.)

Procedures for designating multiple swap partitions will be presented later in this chapter. For now, simply note the partitions and sizes on your Disk Form Worksheets.

Should You Move One or More Partitions?

The `/home` partition is a prime candidate for moving to the second drive. Just make the proper notations on your Partition and Disk Form Worksheets.

Moving the `/export` partition off of the system drive will likely help performance by evening out the activity on your disks.

If you have decided to designate a separate partition for the `/var` filesystem, put it on drive 1. Availability of a second drive may make creation of a `/var`

filesystem attractive from a performance standpoint.

Sample Layout For Two Disks

Table 3-3 suggests a layout for a workstation with two disk drives. An “*” in the *size* column indicates that the partition will be allocated whatever space is left on the disk after the other partitions have been defined.

Table 3-3 *Sample Partition Layout — Two Disk Homogeneous Server*

Disk Drive sd0			Disk Drive sd1		
<i>partition</i>	<i>designation</i>	<i>size (MB)</i>	<i>partition</i>	<i>designation</i>	<i>size (MB)</i>
a	/	15	a	/var	15
b	(swap)	20	b	(swap)	20
c	-	327	c	-	327
d	-	-	d	/export	35
e	/export/swap	128	e	-	-
f	-	-	f	-	-
g	/usr	*	g	-	-
h	-	-	h	/home	*



Assigning partitions to certain partition letters (moving /home from sd0h to sd1h, for example) is not required. Maintaining the convention does, however, help to reduce confusion.

3.2. Planning Your Installation — Diskless Clients

Complete a Client Worksheet for each of your Diskless Clients. As noted on the Worksheet, most of the information required will be filled in by SunInstall automatically. Record the information requested in boldface type for all clients.

Record information for the other fields only if you plan a somewhat unusual configuration. As an example; if you will be supporting a large number of clients and have several disk drives you might choose to distribute their swap files between two or more filesystems (perhaps named /export/swapA and /export/swapB) rather than in the more conventional /export/swap.

3.3. Preliminary Software Procedures

Now it's time to begin using the software tools provided for installing your workstation.

Selecting the Correct Media

First you'll need to select the correct installation media (tape or CD-ROM) with which to install your workstation. The label on the media should specify the same kernel architecture as you have noted for your workstation on Preliminary Information Worksheet. If your installation medium consists of multiple tapes, select the first one (labeled 1 of N , where N is the total number of tapes).

Should You Format Your Disk?

Mount the selected tape or CD-ROM in the drive you will be installing from.

You *format* a disk by using the utility program `format(8S)` to write control information used by the disk drive hardware onto a disk. Disk drives provided by Sun are formatted and labeled at the factory. Desktop SPARCstation systems are shipped with SunOS preinstalled.

For preinstalled disks, it is recommended that you check the disk in a nondestructive way to verify that any head movement that may have occurred during shipment has not affected the performance of your disk.

To check the disk, using the `format` command, follow these steps:

1. Select "Run Format" from the `install` script.
2. Choose `analyze` from the `format` menu.
3. Choose `read` from the `analyze` menu.

The `read` option tries to read every block on the disk, but does not destroy any information.

For new disks without preinstalled software, it is recommended that you reformat them. To format your disk(s), select "Run Format" in the MINIROOT install script. See Appendix A of this manual for instructions on running the `format` command. You can also run `format` manually from MINIROOT.

Resizing the root and swap Partitions

If you have elected to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see the Partition Planning Worksheet) you must run the `format` program before running SunInstall. Refer to Appendix A for the necessary instructions.

If you do not plan to alter the size of root or decrease the size of swap, continue with "Loading and Booting the Miniroot," below. (You can use the SunInstall program to make all other adjustments to partition sizes.)

Loading and Booting the Miniroot

SunInstall will be executed from a minimal version of the operating system called the *miniroot*. The miniroot is designed to be copied into the swap (b) partition of the system disk, thereby leaving the remaining partitions available for loading of the full operating system.



The miniroot copied to the swap area is temporary; as soon as the workstation is booted from the installed operating system it will be over-written by normal paging and swapping activity. If you need to use it again, it will have to be copied into the swap area again.

Individual miniroot load and boot procedures are given here for those systems which will be installed from an attached tape or CD-ROM drive (local installation). Procedures for loading the miniroot from a tape drive attached to another system on the network (remote installation) are given in Appendix B — "Loading and Booting the Miniroot from a Remote Tape." If you are loading the miniroot from a remote CD-ROM, refer to Appendix C — "Loading and Booting the

Miniroot from a Remote CD-ROM.”

In any case, once the miniroot is booted, continue with “Running SunInstall,” Section 3.5 below.

Local Procedure from Tape

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt.* If the workstation is not displaying the PROM monitor prompt, hold down the `[L1/STOP]` key and press the `[A]` key and it should appear.†

Make sure that the first release tape is mounted on the system tape drive.

Refer to the Preliminary Information Worksheet to find your *tape* device designation (`xt`, `mt`, or `st`).

Replace the *tape* variable, enter the following command at the PROM monitor prompt:

For Sun3, 3x, or 4:

```
>b tape()
```

For Sun4c systems prior to SPARCstation 2:

```
ok boot tape()
   or
> b tape()
```

For Sun4c systems beginning with SPARCstation 2:

```
ok boot tape
   or
> b tape
```

Now proceed to Section 3.4, “Continuing the Miniroot Install,” below.

Local Procedure from CD-ROM

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt.* If the workstation is not displaying the PROM monitor prompt, hold down the `[L1/STOP]` key and press the `[A]` key and it should appear.

To boot the miniroot from CD-ROM, enter the following command at the PROM monitor prompt:

* Newer boot PROMS, particularly in the SPARCstation 1, may display the `ok` prompt. Others will display the `>` prompt.

† If your workstation uses a non-Sun terminal as console use its `[BREAK]` key to get the PROM monitor prompt.

For Sun4 systems:

```
> b sd(0,30,1)
```

For Sun4c systems prior to the SPARCstation 2:

```
> b sd(0,6,2)
      or
ok boot sd(0,6,2)
```

For Sun4c systems beginning with the SPARCstation 2:

```
ok boot cdrom
      or
> b cdrom
```

3.4. Continuing the Miniroot Install

After you successfully begin installing the miniroot, your system should display the following messages:

```
What would you like to do?
 1 - install SunOS mini-root
 2 - exit to single user shell
Enter a 1 or 2:
```

Follow these steps to continue the installation:

1. Enter **1** to indicate that you want to continue the installation.

If your system has only one disk, the miniroot is copied to that disk. If your system has more than one disk, you are asked to specify a disk number as illustrated in the following display:

```
Beginning system installation - probing for disks.
Which disk do you want to be your miniroot system disk?
 1 - sd0:  disk description
 2 - sd1:  disk description
 3 - exit to single user shell
Enter a 1, 2, or 3:
```

Enter **1** to select the system disk.

2. Before the miniroot is copied to the specified disk, you are given an opportunity to format and relabel the disk.

```
selected disk unit "sd0".
Do you want to format and/or label disk "sd0"?
  1 - yes, run format
  2 - no, continue with loading miniroot
  3 - no, exit to single user shell
Enter a 1, 2, or 3:
```



You do not need to run `format` unless you believe that something is wrong with the disk, or you have chosen to resize the root or decrease the swap partition, or it is a new unlabeled disk from a third-party vendor.

3. Enter **2** to continue.

Messages such as those that follow are displayed:

```
checking writability of /dev/rsd0b
0+1 records in
1+0 records out
Extracting miniroot ...
```


Additional, media-specific messages are displayed. For tape installation, this process may take several minutes to complete. When the process is complete, the following message is displayed:

```
Mini-root installation complete.

What would you like to do?
  1 - reboot using the just-installed miniroot
  2 - exit into single user shell
Enter a 1 or 2:
```

4. Enter **1** to boot the miniroot.

Additional messages are displayed as the system boots.

```
syncing file systems... done
rebooting...
Booting from: sd(0,0,1)
root on sd0b fstype 4.2
Boot: vmunix
Size: 811008+114720+60112 bytes
SunOS Release 4.1.1(MINIROOT) #4: Tue Feb 13 01:10:16 PDT
Copyright (c) 1990 by Sun Microsystems, Inc.
.
.
.
WARNING: CLOCK GAINED 14 DAYS -- CHECK AND RESET THE DATE!
root on sd0b fstype 4.2
swap on sd0b fstype spec size 04070K
dump on sd0b fstype spec size 14056K
#
```

The process is complete when the root prompt (#) is displayed.



Now you are ready to invoke the SunInstall program, and continue with Section 3.5, “Running SunInstall,” below.

3.5. Running SunInstall

SunInstall is an interactive, menu-driven program that operates in the following way:

1. You invoke the program and use its preliminary menus to set the system clock and to specify your console display device (Sun workstation or other terminal).
2. Next, you fill out a series of forms each describing a different aspect of the installation.
3. Then, upon confirmation from you, SunInstall begins the actual installation of your system, loading operating system software onto your disk(s).



If you are using a terminal (not a Sun bit mapped display) as system console and have not yet determined the `/etc/termcap` name for the terminal, now is the time to do it. See F.1.1 “Preliminary Information Worksheet” for complete instructions.

Starting the SunInstall Program

Invoke the SunInstall program from the miniroot as follows:

```
# suninstall
```

You are ready to use the program when this screen is displayed:

```

                                Welcome to SunInstall

Remember: Always back up your disks before beginning an installation.

SunInstall provides two installation methods:

1. Quick installation:

This option provides an automatic installation with a choice
of standard installations, and a minimum number of questions asked.

2. Custom installation:

Choose this method if you want more freedom to configure your
system. You must use this option if you are installing your
system as a server.

Your choice (or Q to quit) >>

```

Entering Initial Information

The following steps will provide SunInstall information about your system’s console terminal, the time zone you are in, and the current date and time.

These steps employ a simple convention.

- *enter*
denotes keyboard input with an ending `[Return]` (the ensuing action takes place when you press the `[Return]` key).
- *type*
denotes keyboard input without a `[Return]` following. (The ensuing action takes place as soon as you type a character.)

1. Enter **2** in response to the SunInstall Welcome screen, selecting a custom installation.

SunInstall automatically checks for your terminal type. If you are using a Sun bit-mapped display, SunInstall does not ask for your terminal type and skips to the next step.

If you are not using a Sun bit-mapped display, SunInstall prompts you for your terminal type, as shown in Step 2.

```
Select your terminal type:  
  1) Televideo 925  
  2) Wyse Model 50  
  3) Sun Workstation  
  4) Other
```

```
>>
```

2. Enter a number from 1 to 3 to specify your terminal type from those listed, or 4 if your terminal is of some other type.

If you choose 4 (Other) SunInstall asks you to enter the name of your terminal as it appears in the `/etc/termcap` file. Refer to the "Preliminary Information Worksheet" for this information.

After you enter your terminal type SunInstall will ask for your local time zone name:

```
Enter the local time zone name (enter ? for help):
```

3. Although you can enter time zone information from the keyboard, it's easiest to use the on-line help facility:

Enter ? to display the TIMEZONE menu.

```
TIMEZONE MENU                                     [?=help]
-----
Select one of the following categories to display
a screen of time zone names for that region

  _ United States
    Canada
    Mexico
    South America
    Europe
    Asia
    Australia and New Zealand
    Greenwich Mean Time

Are you finished with this menu [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

4. Move the cursor to the appropriate time zone name (by typing `[Return]`) and then type `x` to display a corresponding menu of time zones.

The UNITED STATES menu is shown here.

```

UNITED STATES MENU                                     [?=help]
-----
  TIME ZONE NAME                                     AREA
  _ US/Eastern                                       Eastern time zone, USA
    US/Central                                       Central time zone, USA
    US/Mountain                                       Mountain time zone, USA
    US/Pacific                                       Pacific time zone, USA
    US/Pacific-New                                   Pacific time zone, USA
                                                    with proposed change to Daylight
                                                    Savings Time near election time
    US/Alaska                                       Alaska time zone, USA
    US/East-Indiana                                  Eastern time zone, USA
                                                    no Daylight Savings Time
    US/Hawaii                                       Hawaii

Are you finished with this menu [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

SunInstall prompts:

```

Are you finished with this menu [y/n] ?

```

5. Enter `y` to exit this menu and redisplay the TIMEZONE menu.
6. Enter `y` again to exit the TIMEZONE menu.

SunInstall now asks you to confirm the current date and time, as in the following example:

```
Is this the correct date/time: Thu Feb 22 17:10:15 PDT 1990
[y/n] >>
```

7. Enter **y** if the displayed information is correct. Otherwise, enter **n** and press the Return key. The Set Time screen appears. The format for the Set Time screen display depends on which time zone you selected. Press Delete, Control-U or the Backspace key to erase the sample response. Then enter the correct date and time using the format that is displayed for your time zone, and press the Return key.

As an example, on the third day of June, 1990 at three o'clock in the afternoon you could enter:

```
>> 03/06/90 03:00 pm
```

After you press the Return key, SunInstall would respond:

```
Is this the correct date/time: Sun Jun 3 15:00:12 PDT 1990
[y/n] >>
```

Enter **y** if the displayed information is correct and **n** if you want to try again. (Note that SunInstall displays in twenty-four hour time, thus three o'clock in the afternoon is displayed as 15:00.)

SunInstall sets the system clock and displays the Main Menu.

```

MAIN MENU                                                     [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

  _ assign host information

                                exit SunInstall

[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

Now you are ready to begin filling out the SunInstall forms.

The Main Menu

The core of the installation process involves completing several *forms*, each one relating to a specific aspect of your configuration.

You select forms from the SunInstall Main Menu. When first displayed, the menu is as shown above, with just one menu item, *assign host information*, displayed. This is the current item, the one that is selected if you simply type **x** or **X**.

The main menu will reflect your progress as you work your way through the forms. When, for example, you've completed the HOST Form to assign host information, SunInstall marks that item with a plus sign (+) and requests disk information.

```

MAIN MENU                                                     [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

  + assign host information
  _ assign disk information

```

The information on each completed form is automatically recorded in an installation database. A “+” before a menu item means the database contains the corresponding information. On the Form shown below all required forms have been completed.

```
MAIN MENU [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

+ assign host information
+ assign disk information
+ assign software information
+ assign client information

_ start the installation
exit SunInstall

[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```


Using the Main Menu

The SunInstall Main Menu allows you to use the following keys to move the cursor about the screen:

SPACE
RETURN move forward, by item, as far as the prompt line

Control-F
Control-N move forward through the menu items

Control-B
Control-P move backward through the menu items

(The cursor-movement keys are noted on the message line at the bottom of the screen.)

Control-L repaint the screen should it become garbled

The choices on the Main Menu allow you to:

display a form

Move the cursor to the corresponding form name, and type **x** or **X**.

exit SunInstall

Move the cursor to `exit SunInstall`, and type **x** or **X**.

display general information about the menu use

Type `?` at any time to display an *On-Line Help Screen*. See Figure 3-1 below for one example. Press **Return** to redisplay the Main Menu when you are through viewing the help text.

start the installation

When you have completed the last required form, the Main Menu displays:

```
start the installation
```

Type **x** or **X** to begin the installation of your system.

Figure 3-1 *On-Line Help Screen*

ON-LINE HELP FOR MENUS	
KEYS	PURPOSE
CONTROL B	move to previous item
CONTROL P	move to previous item
CONTROL F	move to next item
CONTROL N	move to next item
<RETURN>	move to next item
<SPACE>	move to next item
x or X	select an item
CONTROL L	repaint screen
CONTROL C	abort

Press <return> to continue ...

Completing the HOST Form

From the SunInstall Main Menu, complete the HOST Form as follows:

1. Select assign host information.
2. Complete the form, referring to your Host Form Worksheet and using the following example as a guide.

```

HOST FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Workstation Information :
  Name : diphthong
  Type : [standalone] x[server] [dataless]

Network Information :
  Ethernet Interface : [none] x[le0]

  Internet Address   : 195.5.2.15
  NIS Type           : [none] [master] [slave] x[client]
  Domain name       : em_city.oz.com

Misc Information :
  Reboot after completed : [y] x[n]

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```



This example form is the first of many to appear in this procedure. Each uses the same conventions.

- System-specific items are italicized.
- User entries are boldfaced.

Thus, the example Ethernet interface (*le0*) is system-specific information SunInstall displayed, while the example hostname (*diphthong*) and IP address (*195.5.2.15*) are system-specific information the user entered.

When you have completed the last screen field, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

3. Enter **y** to exit the form.

The message updating databases ... is briefly displayed, followed by the Main Menu.

Completing the DISK Form

From the SunInstall Main Menu complete the DISK Form as follows:

1. Select assign disk information.

SunInstall polls the disk drives and lists their device numbers in the Attached Disk Devices field. The form will look like this for most systems with one SCSI disk:

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    [sd0]

```

2. Select the system disk from among the devices listed. (The system disk will usually be the first one listed.)

SunInstall then expands the DISK Form:

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    x[sd0]

Disk Label: [default] [use existing] [modify existing]
Free Hog Disk Partition : [d] [e] [f] [g] x[h]
Display Unit      : x[Mbytes] [Kbytes] [blocks] [cylinders]

```

Steps 3 through 5 explain how to complete the new fields.

3. In the Disk Label field, choose a starting disk label. The choices are:
 - default
Displays the standard partitions for your system configuration. This is the correct choice for new installations and most installations of existing systems as well.
 - use existing
Displays the partitions already defined on the disk but does not allow them to be changed. If you are reinstalling a previously installed system, and you don't want to modify the existing disk partitions, select this option. Note that only the partition sizes are filled in; you must enter the MOUNT PT fields by hand.
 - modify existing
Displays the existing partitions on the selected disk and allows them to be changed. Again, the MOUNT PT fields must be entered by hand.
4. SunInstall will choose the partition normally associated with users' home directories as the default for the *Free-Hog Disk Partition*. In most cases this

will be correct.



If you have a small disk (under 130 MB), partition `g` will be marked as the free-hog partition. The example forms in this procedure assume that you are installing SunOS Release 4.1.1 on a large disk, therefore partition `h` is the free-hog partition.

The *Free-Hog*



The SunInstall program will help you prepare a disk layout that it will use later to define physical disk partitions. As you refine the layout, the program automatically sees that the total amount of disk space in use by the defined partitions equals the total space available on the disk. SunInstall does so by automatically adjusting the size of one partition on each disk: the *free-hog* partition.

As the other partitions are increased or decreased in size the free-hog is decreased or increased to maintain the correct total. It is common to designate the partition that will hold the users' personal directories (usually `/home`) as the free-hog. This results in the users having as much disk space as possible for doing their work commensurate with the specific disk space needs of the operating system.

The term *free-hog* only refers to the special role the partition plays while you're using the SunInstall program. **There is no free-hog partition on an installed system; the concept is meaningless apart from the SunInstall program.** Also note that since the size of the free-hog is relative to that of the other partitions it is not possible to directly change the size of the free-hog. (That is, you cannot type in the `SIZE` field for the free-hog on the DISK Form).

5. In the **Display Unit** field, specify how you want partition sizes displayed in the `SIZE` column. The example forms display partition sizes in Mbytes (the default), but you can also use Kbytes, blocks, or cylinders. (Refer to Appendix E — "Disk Structure and Disk Space Terminology" for general information about blocks and cylinders.)



Only the integer portion of the partition size is displayed. The displayed size of a 35.75 MB partition, for example, is 35, not 35.7 or 35.8. **The actual size will be rounded to the nearest cylinder when SunInstall physically relabels the disk.**

When you make your choice, SunInstall displays a partition table that reflects the selected label. If you selected `default` at step 3, the `MOUNT PT` and

PRESERVE* columns will be filled in. (The columns will otherwise be empty.)
Following is a default partition table for a homogeneous server system.

PARTITION	START_CYL	BLOCKS	SIZE	MOUNT_PT	PRESERVE (Y/N)
a	0	32025	16	/	n
b	61	59850	30		
c	0	639450	327		
d	175	12075	6	/export	n
e	198	64050	32	/export/swap	n
f	0	0	0		
g	320	90300	45	/usr	n
h	492	381150	190	/home	n

6. To implement your disk plan, complete the SIZE, MOUNT_PT, and PRESERVE column for each required filesystem and any others you have chosen to define. If a column already contains a value, you can type **Return** to use the displayed value. Leave the MOUNT_PT columns blank for all c partitions and for any partitions which will be used for swap space.



If you've chosen to use the existing disk partitions, you might wish to preserve the /home partition so you won't have to restore user home directories from tape after you install Release 4.1.1. **Do not preserve the /, /usr, and /export partitions!**

The root (/) Partition

The size displayed for your root partition (the a partition of your system disk) will reflect the current size of the partition on the disk. If you used `format` to adjust the size of the root this is a good opportunity to check your work, verifying that the partition is the size you intended. **Remember: you cannot change the size of the a partition on the system disk within SunInstall.**

The swap Partition

The size displayed for your swap partition (the b partition of your system disk) will also reflect the current size of the partition on the disk. If you need to *increase* the size of the partition, do so now. Simply press **Return** until the cursor is next to the swap partition's SIZE field, backspace over the current size, and enter the new size you desire. Note that at the same time SunInstall will automatically decrease the size of the designated free-hog partition by a similar amount. **Remember: you cannot decrease the size of the b partition of the system disk within SunInstall.**

* If you type `y` in the PRESERVE(Y/N) column, SunInstall will not re-make the filesystem in that partition. This provides a means to retain existing data in user partitions such as /home. **If the START_CYL or SIZE of a partition changes, it cannot be preserved. SunInstall will notify you if you attempt to preserve a partition that does not meet these criteria.**

The /export Partition

By default, the /export partition is sized to fit two clients. For the time being, however, you can leave it as it is regardless of the number of clients you will support. Later on, as you define your diskless clients, SunInstall will automatically expand the partition, allowing approximately 5 MB for each client defined. We'll return to the Disk Form to review the size of this and the other partitions after client definition has been completed.

If your disk plan calls for moving the /export partition to another disk drive, begin to do so at this time. For now, just enter "0" (zero) in the SIZE field of the partition. When you do so the MOUNT PT and PRESERVE fields will automatically be erased, and the disk space that had been assigned to /export will be added the free-hog partition. When you move on to defining the partition tables on your other disk drives you'll re-define the partition there.

The /export/swap Partition

Like /export the /export/swap partition is initially sized to fit two typical clients. SunInstall will automatically total the swap space sizes that you assign for your clients and expand the partition as appropriate.

Like the /export partition, if you have decided to move /export/swap to another disk drive, prepare to do so by changing the SIZE field to 0 (zero) MB on this disk.

The /usr Partition

How you size the /usr partition is perhaps the most important part of your disk plan. In order to let SunInstall automatically calculate the size of /usr necessary to accommodate the SunOS operating system software intentionally *under-size* the partition at this time. To do so, press **Return** until the cursor is next to the SIZE field for the /usr partition. Then type **Delete** to backspace over the current SIZE and enter **5**. Note that, at the same time that the size of /usr is decreased, the size of the designated free-hog partition will increase by a like amount.

Later on, when software selection has been completed, /usr will be almost *exactly* the size needed to accommodate the SunOS software chosen. Then you will return to the DISK Form to expand /usr as per your Partition Planning Worksheet.

PARTITION	START_CYL	BLOCKS	SIZE	MOUNT_PT	PRESERVE (Y/N)
a	0	32025	16	/	n
b	61	59850	30		
c	0	639450	327		
d	175	12075	6	/export	n
e	198	64050	32	/export/swap	n
f	0	0	0		
g	320	9975	5	/usr	n
h	339	461475	231	/home	n



The size of the `/usr` partition need not and cannot be directly changed if `/usr` is the free-hog.

The `/home` Partition

If a `/home` partition is defined and is intended to remain on the system disk you can leave it as is, defined as the free-hog and adjusting automatically as changes are made to the other partitions on the disk.

If your disk plan calls for moving `/home` to another disk, remove it from the system disk now. Since `/home` is currently designated as the free-hog it is not possible to directly specify its SIZE. To do so, back up through the DISK Form by typing **Control-B** until the cursor enters the **Free Hog Disk Partition** field. Use the space bar to move to the `[g]` field and then select that partition by typing **x**. Now press **Return** to move down through the Form. Notice that the cursor will skip the `g` partition SIZE field (it is now the free-hog) but will enter the SIZE field for partition `h`, the `/home` partition. Press **Delete** to backspace over the field and then enter `0` to delete the partition.

When you complete the table, SunInstall prompts

O.K. to use this partition table [y/n] ?

- Enter **y** to use the displayed table or **n** if you wish to change it.

When you accept the table, SunInstall prompts

Are you finished with this form [y/n]?

- Enter **y** if you are defining only one disk. Otherwise, enter **n** and fill out additional DISK Forms until you have completed one for each of your disk drives. Then enter **y**, indicating that you are finished with the DISK Forms.

Completing the SOFTWARE Form

From the SunInstall Main Menu, complete the SOFTWARE Form as follows:

1. Select assign software information from the Main Menu.
SunInstall displays the SOFTWARE form.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  [add new release]  [edit existing release]
```

2. Select add new release.

SunInstall requests the device name and location of the device on which the Release 4.1.1 media resides.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
  Media Device       : [st0] [st1] [st2] [st_]* [xt0] [mt0] [fd0] [sr0]
  Media location    : [local] [remote]
```

3. Complete the **Media Information** fields, using the following examples as a guide.

* Selecting [st_] will allow you to specify the st device number manually. This feature allows selection of SCSI devices 3-7 when necessary.

Example for quarter-inch Tape in Local Drive:

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device       :  x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media Location    :  x[local] [remote]
```

Example for half-inch Tape in Remote Drive:



When reading from a media device attached to a remote system make sure that the hostname of the system being installed is included in the `/.rhosts` file of the remote system.

Note that including the hostname of the system being installed in the `/.rhosts` file allows superuser (root) access to the remote system from your workstation. For increased security, be sure to remove the hostname from the `/.rhosts` file once you have completed the installation.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device       :  [st0] [st1] [st2] [st_] x[xt0] [mt0] [fd0] [sr0]
  Media location    :  [local] x[remote]
  Media Host        :  persephone
  Media Host's Internet Address :  195.5.2.16
```

Having gathered the information needed to access the Release 4.1.1 media, SunInstall prompts:

```
Ok to use these values to read the table of contents [y/n] ?
```

4. Enter **y** if the values are correct or **n** if you need to change any of them.

When you elect to use the displayed information, SunInstall expands the form as shown below.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
  Media Device       : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location    : x[local] [remote]

Choice:  [all] [default] [required] [own choice]
Executables path: /usr
Kernel executables path: /usr/kvm
```

5. Specify your software selection method by choosing one of the following:

- | | |
|------------|--|
| all | Automatically selects all SunOS software categories. |
| default | Automatically selects the <i>default</i> software categories, and then asks you to pick the other software you want. |
| required | Automatically selects the <i>required</i> categories, without allowing you to pick additional software. |
| own choice | Automatically selects the <i>required</i> categories, and then asks you to pick the other software you want. |

(The default software selection includes all required categories and selected common and desirable categories as shown in Table 3-4. See Table 1-4 for detailed information about the listed categories.)

Table 3-4 *Default Software for Networked Systems*

Required Categories	Common and Desirable Categories
root	Debugging
usr	RFS
Kvm	SunView_Users
Install	Sys
Networking	System_V
	TLI

6. Press **Return** in the following fields to use the standard paths to executable files.

```
Executables path:
Kernel executables path:
```

SunInstall prompts:

```
Ok to use these values to select Software Categories [y/n] ?
```



Software selection will begin when you answer this prompt. Read the remainder of this step to preview the selection process *before* responding to this prompt.

Unless you selected `all` or `required` at step 5, you'll be able to pick exactly which optional software to install. SunInstall will display category names, one by one, and prompt:

```
Select this media file [y/n] ?
```

Software selection is in progress in the following example.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
  Media Device       : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location    : x[local] [remote]

Choice:  [all] [default] [required] x[own choice]
  Executables path: /usr
  Kernel executables path: /usr/kvm

Destination fs: /usr (sd0g)
Hog: sd0h      47210496
              31334400
Name: SunView_Programmers (optional)
              Size : 2150400

Select this media file [y/n] ? _          status: not selected
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

In the example, "SunView_Programmers" is the software category presented. Answering **y** to the `Select this media file [y/n] ?` prompt will mark this category for installation on your system. Answering **n** will skip it. In either case, SunInstall will then go on to present the next category for your consideration.

A variety of disk space parameters are also presented, as the following details show:

```
Choice: [all] [default] [required] x[own c
Executables path: /usr
Kernel executables path: /usr/kvm

Destination fs: /usr (sd0g)

Name: SunView_Programmers (optional)
```

The destination filesystem is /usr.

The software category and its type.

Indicators at the right-hand side of the screen show—in bytes—the size of the software category, the current size of the free-hog partition, and the changing state of the destination filesystem. The following detail examines this region more closely.

```
] x[own choice]
usr
ath: /usr/kvm
```

```

                                47210496
Hog: sd0h    31334400
Size: 2150400
```

Available space in destination filesystem.‡
Current size of the free-hog partition.
Size of the displayed software category.

7. Unless you wish to change your software selection method, enter **y** to use the displayed values and begin the selection.

‡ Pay particularly close attention to this value if your /usr partition is the designated free-hog. When software selection is complete it will represent the space available in /usr for Sun unbundled products, products from other vendors, locally developed programs, and general free space.

After all of the categories have been presented and responded to, SunInstall summarizes the selected categories for you:

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device      : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location   : x[local] [remote]

Choice:  [all] [default] [required] x[own choice]
  Executables path: /usr
  Kernel executables path: /usr/kvm

Media Filenames:
  root          SunView_Users
  usr           SunView_Programmers
  Kvm           Text
  Install      Manual
  Networking

Ok to use this architecture configuration [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

8. Enter **y** to use the configuration or **n** if you wish to go back and try again.

When you elect to use the configuration, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

9. Enter **y** to exit the form and redisplay the Main Menu.

Completing the CLIENT Form

(If the client and server share the same architecture, then completing this form is optional.) From the SunInstall Main Menu complete the CLIENT Form as follows:

1. Select assign client information.

SunInstall will display the CLIENT Form.

```

CLIENT FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Architecture Type : _[sun4.sunos.4.1.1]
Client name       :
Choice           : [create] [delete] [display] [edit]

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```

2. The **Architecture Type** field will display the name of the SunOS 4.1.1 release and the kernel architecture type of your server (and clients). Type **x** to accept the **Architecture Type**.
3. The cursor will move into the **Client name** field. Enter the hostname of your first diskless client.
4. As the cursor moves into the **Choice** field select **[create]**. SunInstall will display a form like the this:

```

CLIENT FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Architecture Type : x[sun4.sunos.4.1.1]
Client name       : squid-lips
Choice           : x[create] [delete] [display] [edit]
Root fs : /export/root (sd1d)           6291456      Hog : sd1h 284164096
Swap fs : /export/swap (sd0e)           33554432     Hog : sd0g 256901120

Client Information :
  Internet Address      : 195.5.2._
  Ethernet Address     : 8:0:20:1:00:00
  NIS Type              : [none] x[client]
  Domain name          : em_city.oz.com
  Swap size (e.g. 8B, 8K, 8M) : 16M
  Path to Root         : /export/root/squid-lips
  Path to Swap         : /export/swap/squid-lips
  Path to Executables  : /usr
  Path to Kernel Executables : /usr/kvm
  Path to Home         : /home/diphthong
  Terminal type        : sun

Ok to use these values [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```



The `Root fs` and `Swap fs` lines provide partition size and associated free hog information similar to that displayed by the SOFTWARE Form. The partitions monitored here will vary depending on the partitions defined by the `Path to Root` and `Path to Swap` fields.

5. Each line of *Client Information* should be checked and, perhaps, edited. An explanation of each line follows:

- Internet Address

The network portion of the client's internet address has already been filled in for you. Just append the correct host number to complete the address, for example; `195.5.2.` might become `195.5.2.20`.

- Ethernet Address

Backspace over and fill in the correct Ethernet address for this client.

- NIS Type

Diskless workstations can be NIS clients, or not use NIS at all. SunInstall will pick the reasonable default depending on whether or not you are configuring the server for NIS (in the HOST Form).

- Domain name

The same as for the server, if NIS is being used.

- Swap size (e.g. 8B, 8K, 8M)

The size of the swap file that will be assigned to this client. A reasonable default is provided. Refer back to your Client Form Worksheet to see if you've planned something different.

If you choose to change the **Swap size** you can specify the new size in bytes (B), kilobytes (K) or megabytes (M). (As you change the swap file size you may see the sizes of the `/export/swap` partition and its associated free-hog partition automatically adjust.)

- Path to Root

This is the directory on the server that will form the client's root (`/`) directory. The default is `/export/root/clientname`.

- Path to Swap

This is the file on the server that the client will use for swap space. The default is `/export/swap/clientname`.

- Path to Executables

The server's directory that the client will mount as its `/usr`. Should not need to be changed.

- Path to Kernel Executables

The server's directory that the client will mount as its `/usr/kvm`. Should not need to be changed.

- Path to Home

Where users' home directories will reside.

- Terminal type

The console terminal type of the client. Will need to be changed only if the client does not have a Sun bit mapped monitor.

6. When you are satisfied with the client information that you have entered, move the cursor down to `Ok` to use these values `[y/n]` ? and enter **y**.
7. The CLIENT Form will display again, this time with the name of the newly defined client noted.

```
CLIENT FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Architecture Type : x[sun4.sunos.4.1.1]
Client name       : squid-lips
Choice            : x[create] [delete] [display] [edit]

sun4.sunos.4.1.1 Clients:

squid-lips

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]
```

If you have more clients to define enter **n**. You can then create another client the same way you did the first. You also have the option (in the **Choice** field) to delete, display or edit clients that you've already defined.

8. Continue to cycle through the CLIENT Form creating clients until you've taken care of all those that your server is intended to support. Finally, enter **y** in response to the `Are you finished with this form [y/n] ?` prompt.



If you will be adding more diskless clients to your server in the near future you may find it convenient to define those workstations now in order to "pre-allocate" space in the appropriate partitions. Even if you use hostnames like *dummy1* and *dummy2* and the default Ethernet address when defining these clients it will still be relatively easy to complete their configuration when the new workstations become available.

Rechecking Partition Sizes



The Main Menu should now be displayed, with the cursor next to the item:

start the installation

Before you select **start the installation** follow these steps to check and adjust the current partition sizes.

1. Press **Control-B** to move the cursor back through the menu items.
2. Select assign disk information.

The DISK Form is displayed once more.

```
DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    [sd0]
```

3. Select each disk in turn.

The **Disk Label** field contains a new item, **data file**. This item displays the disk label from the installation database, where all of the information you've entered so far is stored.

```
DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    x[sd0]

Disk Label: [default] [use existing] [modify existing] x[data file]
Free Hog Disk Partition : [d] [e] [f] [g] x[h]
Display Unit      : x[Mbytes] [Kbytes] [blocks] [cylinders]
```

4. Select **data file** to display the new partition sizes. Since you last viewed the form, several partitions have likely changed in size:
 - The **/usr** partition may be larger.
 - The **/export** partition may be larger.
 - The **/export/swap** partition may be larger.
 - The **free-hog** partition should be smaller.

SunInstall took space from the free-hog partition to expand the **/usr** partition when you selected software. The **/usr** partition is now just the size

needed to accommodate the software you selected.

If partition sizes have not changed (perhaps `/usr` was the free-hog) skip to step 6. Otherwise, adjust the partition size as described in the step 5.

5. Finish sizing your partitions:

□ `/usr`

Refer to your Partition Planning Worksheet to find the amount of space you have decided to allow above and beyond that required by the operating system files (space for other files and free space for expansion). Add that space to the current size of `/usr` and edit the `SIZE` field accordingly.

□ `/export`

Check the size of the `/export` partition. Add an appropriate amount of space if you expect to be adding more clients to the server soon.

□ `/export/swap`

Check the size of the `/export/swap` partition. Add space for additional clients, if planned.

6. Finally, press `[Return]` enough times to reach the prompt line:

```
Ok to use this partition table [y/n] ?
```

and enter `y`.

7. SunInstall will display:

```
Are you finished with this form [y/n] ?
```

If you have more disk drives to check answer `n` and repeat steps 3 through 6 for each drive. When all disks have been checked enter `y` to redisplay the Main Menu.

Letting SunInstall Run

The Main Menu should now be displayed. Move the cursor to:

```
start the installation
```

Type `x` to begin the installation.

Your screen will reflect the progress of the installation as SunInstall labels the disk, creates the specified filesystems, and loads software from the Release 4.1.1 media. Depending on the software categories you chose earlier, you may be asked to load additional media, as shown in the following example:

```

System Installation Begins:
Label disk(s):
    sd0
Create/check filesystems:
Creating new filesystem for / on sd0a
newfs /dev/rsd0a >> /etc/install/suninstall.log 2> &1
. . .
Extracting sunos.4.1.1.sun4 'root' media file ...
Extracting sunos.4.1.1.sun4 'usr' media file ...
Extracting sunos.4.1.1.sun4 'Kvm' media file ...
Extracting sunos.4.1.1.sun4 'Install' media file ...
Extracting sunos.4.1.1.sun4 'Networking' media file ...
Please mount sun4.sunos.4.1.1 release media #2
Press <return> to continue

```

If There's a Problem

If SunInstall should, for some reason, fail or have to be aborted during its run, it will save the data files that were created as you filled in the forms. You can remedy the problem and then re-invoke SunInstall, going directly to “start the installation.” SunInstall may prompt:

```

Some software has already been loaded.
Are you sure you want to restart the installation (y/n) ?

```

Answering “y” will have SunInstall restart its run using the data you have already entered.

When SunInstall Completes

What happens after SunInstall extracts the last software category depends on how you filled in the Reboot after completed field on the HOST Form.

- If you selected **y**, your system boots automatically. Booting messages appear, followed by a `login` prompt. Refer to Section 3.6, “Deciding What Still Needs to Be Done” for further instructions.
- If you selected **n**, the `#` prompt reappears. Your system is still running the miniroot.

Installing a Small Kernel

Pre-configured small kernels are available for the following configurations:

- Sun-3/50 and Sun-3/60 with up to 2 SCSI disks, 1 SCSI tape
- Sun-3/80 with up to 4 SCSI disks, 2 SCSI tapes
- Sun-4/110 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 330 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 1, 1+ and 2 with up to 4 SCSI disks, 1 Floppy Disk, 2 SCSI tapes
- All other Desktop SPARCsystems

If you want to install an appropriate pre-configured kernel do so by executing:

```
# install_small_kernel
```

Configuring an NIS master or slave

The utility is self-explanatory and will ask you for confirmation before making any changes to the system. It is capable of installing small kernels for your diskless clients as well as for your server.

NIS masters and slaves should be configured before they are booted in multi-user mode. See Chapter 16 of the *System and Network Administration* manual for details.

Booting Up Your Workstation

To boot your new operating system from the # prompt do the following:

```
# sync; sync; reboot
```

3.6. Deciding What Still Needs to Be Done

Several basic system administration tasks should be completed following the installation of your system.

Logging In and Setting the root Password

As supplied the SunOS operating system does not have a password protecting the superuser (root) login. Login as “**root**” and then use the `passwd(1)` command to set the password of your choice.

Configuring for Multiple swap Partitions

If you have defined multiple swap partitions, you must add a line to the `/etc/fstab` file for each additional swap area. For example, you define `sd1b` as a swap partition by adding the following line in the `/etc/fstab` file:

```
/dev/sd1b swap swap rw 0 0
```

Then enter:

```
# swapon -a
```

(From now on `swapon` will be executed automatically each time the system is booted.)

Configuring for tmpfs

If you have decided to use the `tmpfs` virtual file system for the `/tmp` directory do the following:

- Add this line to the file `/etc/fstab`:

```
swap /tmp tmp rw 0 0
```

- Enter:

```
# mount /tmp
```

- In the file `/etc/rc.local` find the line:

```
#mount /tmp
```

and remove the sharp sign (#):

```
mount /tmp
```

From now on, the `/tmp` directory will be mounted automatically each time the system is booted.

- When you build and install a custom kernel include the following line in the kernel configuration file:

```
options TMPFS # tmp (anonymous memory) file system
```

(The `tmpfs` facility is included in the `GENERIC` kernel.)

Building and Installing a Custom Kernel

For best workstation performance you should make and install a custom operating system *kernel*. The kernel is a program which is loaded into memory when your workstation is booted and which then controls all aspects of system operation. The default kernel is called the *GENERIC* kernel. This kernel includes the software necessary to access all of Sun's peripheral hardware. While this is useful during installation it also means that the kernel includes much more software, and is therefore much larger, than is required for any specific system. This excessive size means an inefficient kernel which uses up memory that can be put to better use and provide improved performance.

Complete instructions for creating and installing a custom kernel for your workstation are given in Chapter 9 of the *System and Network Administration Manual*, Reconfiguring the System Kernel.



If you chose to install a `GENERIC_SMALL` kernel at the conclusion of running `SunInstall` that kernel will provide improved performance as compared to the `GENERIC` kernel. You may still, however, see some further improvement by creating a kernel matched to your specific configuration.

Setting Up User Accounts

Refer to the manuals *System and Network Administration*, *Getting Started with SunOS: Beginner's Guide*, and *Setting Up Your SunOS Environment: Beginner's Guide* for assistance.

Customizing Your Environment

Refer to Chapter 8 of *System and Network Administration Manual*, Administering Workstations, Section 8.1. Here you will find the information you need for setting up user home directories, enabling electronic mail, etc.

Backing Up Your New System

Once you have customized your system to suit your needs it should be *backed up*. This means recording the information contained on your disks onto a different media, usually tape, for safekeeping. Chapter 6, Section 6.1 of *System and Network Administration* contains the information you will need.

Booting Up Your Clients

Once the server is up and running you can begin to boot your client workstations over the net. Refer to *System and Network Administration* for complete information on administering your network.

Installing a Heterogeneous Server

Chapter 4 details the steps required to complete the installation of a Heterogeneous Server System using the Custom Installation method.

There are four general tasks to be completed:

□ **Planning Your Installation**

Final planning, including determining the layout of your system disk(s) and the configuration of each of the Diskless Client workstations which the server will support.

□ **Performing Preliminary Software Procedures**

Formatting and labeling your disk(s) (if necessary) and loading the software necessary to execute SunInstall.

□ **Running SunInstall**

Executing the SunInstall software installation program to actually install the operating system software on your workstation.

□ **Deciding What Still Needs to be Done**

Primary system administration procedures which you should carry out as soon as your system is installed.

Since the release of SunOS 4.0.3 it has been necessary to draw a distinction between the *kernel architecture* and the *application architecture* of a workstation. Similarly, there is a distinction to be made between heterogeneous servers that support clients of differing kernel architectures (but like application architectures) and those that support clients of differing application architectures.

The most obvious consequence of this distinction is in the amount of disk space required to implement each configuration. Workstations of like application architecture can share nearly all SunOS software. The exception is the content of the `/usr/kvm` directory tree, about 8 megabytes of files approximately half of which is the content of `/usr/kvm/sys`, the Sys files used to build custom kernels. Thus, servers which support clients of the same application architecture, but of differing kernel architectures, will require only 4 to 8 MB more disk space to install than a comparable homogeneous server.

When a server supports clients of a differing application architecture considerably more disk space is required. Nearly the entire content of the `/usr`

filesystem must be duplicated in order to provide programs which can be run by the clients of the differing application architecture. The only files which are shared by all workstations, regardless of architecture, are those in the `/usr/share` directory tree. These total about 9 MB, the most significant portion of which is the man pages (about 7 megabytes) located in `/usr/share/man`.

To illustrate, a heterogeneous server supporting all four current Sun architectures and including all optional software categories would require the following (very approximate) amount of disk space for SunOS files:

Table 4-1 *Disk Requirements for a Server Supporting All Client Architectures*

	Architectures				Totals
	sun4.sun4	sun4.sun4c	sun3.sun3	sun3.sun3x	
<code>/usr*</code>	108 MB		104 MB		212 MB
<code>/usr/kvm†</code>	9 MB	9 MB	8 MB	8 MB	34 MB
<code>/usr/share‡</code>	9 MB				9 MB
	Grand total				255 MB

The type of heterogeneous server you are installing has an affect on your choice of optional software categories.

- When choosing software for the server also consider the needs of clients of the same application architecture.
- For clients of the same application architecture as the server, but differing kernel architectures, the Kvm category is required. The only optional category is Sys, which you should choose if you want to be able to build custom kernels for those clients. (Highly recommended.)
- If you will support clients of an application architecture different from that of the server (typically sun3 clients of a sun4 server), you will need to choose optional software for that architecture. Get a second copy of the Software Form Worksheet and fill it out, keeping in mind the needs of all clients of the second application architecture. (Don't be concerned about duplication. If, for example, you choose the man pages twice, SunInstall will recognize that the category is sharable by all architectures and load it only once.)

* Files sharable by systems of like *application* architecture.

† Files *not* sharable across differing architectures.

‡ Files sharable by *all* architectures.

- If your server will support more than one kernel architecture of the differing application architecture (perhaps sun3.sun3 and sun3.sun3x clients on a sun4.sun4 server) fill out just one Software Form Worksheet which covers the optional software needs of all clients of that application architecture. Then decide whether you will load the optional Sys files for each kernel architecture individually.

4.1. Planning Your Installation — Disk Partitioning

Much of the planning required before you begin the actual installation of your workstation was completed as you worked through Chapter 1. At this point you should already have completed the Preliminary Information, Host Form, and Software Form Worksheets. This section will help you complete the final Worksheets: Partition Planning, Disk Form, and Client Form.



Go to Appendix F and pull out one copy of the Partition Planning Worksheet. Also get a copy of the Disk Form Worksheet for each disk drive attached to your system, and a copy of the Client Form Worksheet for each Diskless Client workstation that will be supported by the server. Refer to and fill in the Worksheets as you work through this section.

Disk drives used with Sun workstations are divided into as many as eight sections called *partitions* (labeled a through h). Each disk partition looks to the operating system and the user as though it were a separate disk drive, and each may be used for a specific purpose. An individual partition may be used in its *raw* state, most often as swap and paging space for the SunOS virtual memory system. Most partitions, however, will be structured as *filesystems* and used to store UNIX files.

Individual filesystems are designated to store various broad classes of files including operating system software, user data files, and perhaps such things as database files for application software. This section will help you to decide what partitions you should define for your disk(s), how to use each partition, and what size each partition should be.



If you are unfamiliar with computer disk drives and such terms as *partition*, *cylinder*, *sector*, and *head*, please refer to Appendix E, “Disk Structure and Disk Space Terminology.”

The SunInstall program provides a default disk layout for heterogeneous server systems that you can use “as is” or modify as needed. This layout only addresses the system disk and will have to be modified if your system has more than one disk drive.

If your system was previously installed as a heterogeneous server, you may wish to base disk partitions on the existing disk layout.

Disk Layout — Default Partitions

The number of default partitions depends upon the capacity of your system disk. Table 4-2 shows the default layouts for heterogeneous server configurations.

Table 4-2 *Default Partitions for Heterogeneous Servers (Release 4.1.1)*

Partition	Assignment
a:	/
b:	(swap)
c:	(whole disk)
d:	/export
e:	/export/swap
f:	—
g:	/usr
h:	/home

The default size (as shipped from the factory) of the root (/) and swap partitions varies depending on the type and capacity of the disk. Table 4-3 shows the default sizes.

Table 4-3 *Default root and swap Partition Sizes*

Disk Type	Disk Size	Root Size	Swap Size
sd	<130 MB	8 MB	16 MB
sd	>130 <300 MB	8 MB	32 MB
sd	>300 MB	16 MB	32 MB
xd, xy and id	<600 MB	8 MB	16 MB
xd, xy and id	>600 MB	16 MB	32 MB

The root (/) Filesystem

Every SunOS *system disk* must have its a partition defined as the root (/) filesystem. The root filesystem consists of /, the root directory, and subdirectories such as /etc, /dev, /tmp, and /var.

The default root partition size should be usable for nearly all installations. About 3.5 MB of this space will be used by operating system files. The remainder is available for use by 'scratch' files created in the /tmp directory, and temporary log and spool files created in the /var directory.

The swap Partition

This area of the disk (normally the `b` partition of the system disk) is reserved to implement the virtual memory feature of SunOS. (Note: This area is used only by the server system. Swap space for its clients is provided elsewhere.) The default size will be adequate in many circumstances, but the following issues should be considered.

- Workstations with color monitors

A minimum of 24 MB of swap space is recommended if your workstation has a color monitor.
- Workstations with large main memories

Your swap space **must** be larger than the size of the memory installed in your workstation. For example, if your workstation has 32 MB of main memory, designate at least 34 MB for your swap area.
- Application programs

Some application programs require large amounts of swap space. As an example, LISP applications can require 40 MB or more of swap.

The `c` Partition

Every disk drive used with the SunOS operating system must, by convention, have a `c` partition defined. This partition is used by the operating system to reference the entire disk. It is defined automatically by Sun's `format(8S)` and `suninstall(8)` programs and should not be altered.

The `/export` Filesystem

This filesystem is assigned, by convention, to the `d` partition of the system disk. In its `/export/root` subdirectory it will contain the root (`/`) filesystems of the diskless clients supported by the server, each in its own subdirectory. (That is, `/export/root/client1` for the diskless client `client1`, `/export/root/client2` for the diskless client `client2`, and so on.) These subdirectories will include the `/etc`, `/dev`, `/tmp`, and `/var` subdirectories of each client.

A good rule of thumb is to allow approximately 5 MB of space in the `/export` partition for each client supported by the server or *planned* for in the near future. About 3 MB of this space per client will be used by operating system files. The aggregate space remaining will be shared by the clients.

On a heterogeneous server `/export` also contains, by default, the `/export/exec` directory tree. This tree stores the files required to support the heterogeneous architectures. The `/usr` files for the differing application architecture (if any) are stored in `/export/exec`. Files for the various kernel architectures as stored in `/export/exec/kvm`.

The files necessary to support clients of the same application architecture but different kernel architecture from the server (`/usr/kvm`) will add only 4 to 8 MB to the size of `/export`. The files necessary to support clients of a different application architecture may require considerable space in `/export`, depending on the optional software chosen.

The /export/swap Filesystem

This filesystem is assigned, by convention, to the `e` partition of the system disk. It holds the files used by the server's diskless clients for swap space. Each client has its own swap file. For example, the diskless client *client1* would use the swap file `/export/swap/client1`.

To choose a size for the `/export/swap` partition, determine the required swap space for each individual client using the same criteria as you did for the server itself (see "The Swap partition" above). (Record these at this time on a Client Form Worksheet for each client.) Then add up a total for all of the clients. Remember to allow space for clients that you plan to add to the server in the near future. The default is 16 MB per client.

The /usr Filesystem

This filesystem is assigned, by convention, to the `g` partition of the system disk. It contains the bulk of the operating system files, including executable programs, program libraries, and documentation. It is also frequently used to hold unbundled application programs from Sun, application programs from other vendors, and locally developed programs. The content of `/usr` is shared by the heterogeneous server with clients of its own application architecture. Some free space should be available in `/usr` in which to build a custom kernel for your workstation and to allow for the addition of new programs over time.

The partition size needed for `/usr` varies widely from installation to installation. Several factors should be examined to choose an appropriate size for your installation.

- Operating system software

Operating system files will require a minimum of about 35 MB to a maximum of about 125 MB, depending on which optional software categories you chose for your workstation in Chapter 1. Don't bother to add up the individual sizes listed in Table 1-4 exactly. SunInstall will do this for you during the installation process.

- Sun unbundled products

If you will be adding other Sun products to your workstation (programming languages, office automation, databases, etc), check the installation literature they provide to find the amount of space each will require in `/usr`. Total this figure and record it on the Partition Planning Worksheet.

- Products from other vendors

Again, refer to the literature provided with these products and record the total space required.

- Locally developed programs

Allow space for locally developed programs, if any.

- Free space

Allow an additional 3 MB of space for use in building a custom kernel for your workstation. Still more free space is an excellent idea if the total disk space available allows. On most workstations programs and files get added

to `/usr` from time to time and the filesystem slowly fills up, so plan ahead. **Running out of space in `/usr` after the system is installed is very inconvenient. Be as generous as you can within the constraints of the total disk space available to you. Figure all of your expected needs and then add some more, perhaps 20%, for good measure.**

The `/home` Filesystem

The `/home` filesystem is used for user home directories, will be empty when the installation completes, and will begin to fill as you establish user accounts (personal work areas). An overall goal of disk partitioning strategy should be to maximize the space available to users, commensurate with the resource needs of the operating system and application programs to support the users. To this end, in the default disk partitioning scheme `/home` is automatically sized by SunInstall to encompass all of the space not claimed by the other partitions.

Disk Layout — Optional Partitions

In addition to the default partitions you may wish to define some others. These may be considered ‘fine tuning.’ Nearly all systems will operate just fine without them.

The `/tmp` Filesystem

The `/tmp` directory is, by default, contained within the root filesystem. It is intended for use as system ‘scratch’ file space; for example, intermediate files are created and deleted in `/tmp` by the C compiler as it runs. All files in `/tmp` are deleted each time the workstation is rebooted.

A new feature since SunOS 4.1, *tmpfs*, allows a temporary filesystem to be made in operating system virtual memory. This has performance advantages, especially for short-lived scratch files, and allows some of the system swap partition to be used for file space on demand. As such, it is an excellent way to support `/tmp`, reducing the demand for space in the root filesystem and, at the same time, providing a potential performance improvement.[†]



NOTE: Files and directories created in a *tmpfs* filesystem are truly temporary. They disappear without recourse upon a `umount(8)` of the filesystem and each time the workstation is rebooted.

Planning on using *tmpfs* to implement the `/tmp` directory may eliminate any need to expand the root partition from its default size. *tmpfs* is defined after your system has been installed. You need do nothing right now. Section 4.6, “Deciding What Still Needs to Be Done” at the end of this chapter includes instructions for configuring *tmpfs* at that time.

The `/var` Filesystem

The `/var` directory is, by default, contained within the root filesystem. It contains files that tend to vary in size; for example:

The `/var/tmp` directory provides a workspace for users and temporary storage for programs such as the `vi(1)` editor.

[†] See *System and Network Administration* and `tmpfs(4S)` for details.

Spooling programs create files in subdirectories of `/var/spool`, such as `/var/spool/mail` for incoming mail, `/var/spool/lpd` for queued print jobs, and so on.

System accounting information and log messages are collected in the `/var/adm` and `/var/log` directories.

The `/var/yp` directory holds NIS database information on NIS master and slave systems.

Depending on system use, activity in `/var` can consume excessive amounts of space in the root filesystem. It may be appropriate to provide additional space in the root filesystem or, as an alternative, to create a separate `/var` filesystem. Asking yourself the following questions will help you decide if your system needs a `/var` partition and, if so, how big you should make it.

- Is your system a mail server?
Consider the number of users served and the anticipated amount of mail.
- Is your system a print server?
Consider the number of attached printers and the anticipated number and size of the print jobs.
- Is your system a uucp host?
Files will be stored in `/var` while waiting to be transmitted to remote systems.
- Is your system an NIS server?
Allow space for the NIS maps.
- Will your system use process-level accounting?
If not carefully maintained the accounting files quickly become very large.
- Will you use applications that create large temporary files in `/var`?
Consider the needs of all such programs.



It's unlikely that you need a separate partition for `/var` if you answered no to each of the preceding questions. If you choose to define a `/var` partition, 10 MB would be a minimum size. You might need considerably more space depending on the factors noted above.

Filesystems For Use By Applications

Some application software packages may recommend the creation of separate filesystems for their exclusive use. Check the literature received with any application software for possible requirements.

Disk Layout — Multiple Disk Drives

If your workstation hardware includes more than one disk drive you will need to decide what partitions and filesystems to define on each drive. (If you have only one disk drive skip ahead to Section 4.3, “Preliminary Software Procedures.”)

The overall goals here are to make efficient use of the disk space available and to maximize performance by balancing the amount of activity on each of the disks as much as possible. Some guidelines follow. (For purposes of discussion we will suppose a system with two drives named `sd0` and `sd1`.)

What Should Stay on the System Disk?

The root and `/usr` filesystems and the swap partition should remain on the system disk. This will allow the workstation to be booted even if the first drive is the only one running, an advantage should a failure occur on one of the other drives.

Should You Define Multiple swap Partitions?

The SunOS operating system allows more than one partition to be defined for use as swap area. The system interleaves the use of multiple partitions, attempting to make equal use of each partition, thus improving performance. The amount of disk space that you have determined to use for swap can be split between partitions located on different disk drives. For example, if you have decided that you want 40 MB of swap area, you might specify two 20 MB swap partitions, one on `sd0b`, the other on `sd1b`. (Use of the `b` partition for swap space is not a requirement except on drive 0. We use `sd1b` here just for the sake of convention.)

Procedures for designating multiple swap partitions will be presented later in this chapter. For now, simply note the partitions and sizes on your Disk Form Worksheets.

Should You Move One or More Partitions?

The `/home` partition is a prime candidate for moving to the second drive. Just make the proper notations on your Partition and Disk Form Worksheets.

Moving the `/export` partition off of the system drive will likely help performance by evening out the activity on your disks.

If you have decided to designate a separate partition for the `/var` filesystem, put it on drive 1. Availability of a second drive may make creation of a `/var` filesystem attractive from a performance standpoint.

Sample Layout For Two Disks

Table 4-4 suggests a layout for a workstation with two disk drives. An “*” in the *size* column indicates that the partition will be allocated whatever space is left on the disk after the other partitions have been defined.

Table 4-4 Sample Partition Layout — Two Disk Heterogeneous Server

Disk Drive sd0			Disk Drive sd1		
<i>partition</i>	<i>designation</i>	<i>size (MB)</i>	<i>partition</i>	<i>designation</i>	<i>size (MB)</i>
a	/	15	a	/var	15
b	(swap)	20	b	(swap)	20
c	-	327	c	-	327
d	-	-	d	/export	35
e	/export/swap	128	e	-	-
f	-	-	f	-	-
g	/usr	*	g	-	-
h	-	-	h	/home	*



Assigning partitions to certain partition letters (moving /home from sd0h to sd1h, for example) is not required. Maintaining the convention does, however, help to reduce confusion.

4.2. Planning Your Installation — Diskless Clients

Complete a Client Worksheet for each of your Diskless Clients. As noted on the Worksheet, most of the information required will be filled in by SunInstall automatically. Record the information requested in boldface type for all clients.

Record information for the other fields only if you plan a somewhat unusual configuration. As an example; if you will be supporting a large number of clients and have several disk drives you might choose to distribute their swap files between two or more filesystems (perhaps named /export/swapA and /export/swapB) rather than in the more conventional /export/swap.

4.3. Preliminary Software Procedures

Now it's time to begin using the software tools provided for installing your workstation.

Selecting the Correct Media

First you'll need to select the correct installation media (tape or CD-ROM) with which to install your workstation. The label on the media should specify the same kernel architecture as you have noted for your workstation on Preliminary Information Worksheet. If your installation medium consists of multiple tapes, select the first one (labeled 1 of N , where N is the total number of tapes).

Mount the selected tape or CD-ROM in the drive you will be installing from.

Should You Format Your Disk?

You *format* a disk by using the utility program `format (8S)` to write control information used by the disk drive hardware onto a disk. Disk drives provided by Sun are formatted and labeled at the factory. Desktop SPARCstation systems are shipped with SunOS preinstalled.

For preinstalled disks, it is recommended that you check the disk in a nondestructive way to verify that any head movement that may have occurred during shipment has not affected the performance of your disk.

To check the disk, using the `format` command, follow these steps:

1. Select "Run Format" from the `install` script.
2. Choose `analyze` from the `format` menu.
3. Choose `read` from the `analyze` menu.

The `read` option tries to read every block on the disk, but does not destroy any information.

For new disks without preinstalled software, it is recommended that you reformat them. To format your disk(s), select "Run Format" in the MINIROOT install script. See Appendix A of this manual for instructions on running the `format` command. You can also run `format` manually from MINIROOT.

Resizing the root and swap Partitions

If you have elected to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see the Partition Planning Worksheet) you must run the `format` program before running SunInstall. Refer to Appendix A for the necessary instructions.

If you do not plan to alter the size of root or decrease the size of swap, continue with "Loading and Booting the Miniroot," below. (You can use the SunInstall program to make all other adjustments to partition sizes.)

Loading and Booting the Miniroot

SunInstall will be executed from a minimal version of the operating system called the *miniroot*. The miniroot is designed to be copied into the swap (b) partition of the system disk, thereby leaving the remaining partitions available for loading of the full operating system.



The miniroot copied to the swap area is temporary; as soon as the workstation is booted from the installed operating system it will be over-written by normal paging and swapping activity. If you need to use it again, it will have to be copied into the swap area again.

Individual miniroot load and boot procedures are given here for those systems which will be installed from an attached tape or CD-ROM drive (local installation). Procedures for loading the miniroot from a tape drive attached to another system on the network (remote installation) are given in Appendix B — "Loading and Booting the Miniroot from a Remote Tape." If you are loading the miniroot from a remote CD-ROM, refer to Appendix C — "Loading and Booting the Miniroot from a Remote CD-ROM."

In any case, once the miniroot is booted, continue with “Running SunInstall,” Section 4.5 below.

Local Procedure from Tape

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt. * If the workstation is not displaying the PROM monitor prompt, hold down the `LI/STOP` key and press the `A` key and it should appear.† Make sure that the first release tape is mounted on the system tape drive.

Refer to the Preliminary Information Worksheet to find your *tape* device designation (`xt`, `mt`, or `st`).

Replace the *tape* variable, enter the following command at the PROM monitor prompt:

For Sun3, 3x, or 4:

```
>b tape()
```

For Sun4c systems prior to SPARCstation 2:

```
ok boot tape()
   or
> b tape()
```

For Sun4c systems beginning with SPARCstation 2:

```
ok boot tape
   or
> b tape
```

Now proceed to Section 4.4, “Continuing the Miniroot Install,” below.

Local Procedure from CD-ROM

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt. * If the workstation is not displaying the PROM monitor prompt, hold down the `LI/STOP` key and press the `A` key and it should appear.

To boot the miniroot from CD-ROM, enter the following command at the PROM monitor prompt:

For Sun4 systems:

† If your workstation uses a non-Sun terminal as console use its `BREAK` key to get the PROM monitor prompt.

* Newer boot PROMS, particularly Desktop SPARCsystems, may display the `ok` prompt. Others will display the `>` prompt.

```
> b sd(0,30,1)
```

For Sun4c systems prior to the SPARCstation 2:

```
> b sd(0,6,2)
      or
ok boot sd(0,6,2)
```

For Sun4c systems beginning with the SPARCstation 2:

```
ok boot cdrom
      or
> b cdrom
```

4.4. Continuing the Miniroot Install

After you successfully begin installing the miniroot, your system should display the following messages:

```
What would you like to do?
 1 - install SunOS mini-root
 2 - exit to single user shell
Enter a 1 or 2:
```

Follow these steps to continue the installation:

1. Enter **1** to indicate that you want to continue the installation.

If your system has only one disk, the miniroot is copied to that disk. If your system has more than one disk, you are asked to specify a disk number as illustrated in the following display:

```
Beginning system installation - probing for disks.
Which disk do you want to be your miniroot system disk?
 1 - sd0: disk description
 2 - sd1: disk description
 3 - exit to single user shell
Enter a 1, 2, or 3:
```

Enter **1** to select the system disk.

2. Before the miniroot is copied to the specified disk, you are given an opportunity to format and relabel the disk.

```
selected disk unit "sd0".
Do you want to format and/or label disk "sd0"?
  1 - yes, run format
  2 - no, continue with loading miniroot
  3 - no, exit to single user shell
Enter a 1, 2, or 3:
```



You do not need to run `format` unless you believe that something is wrong with the disk, or you have chosen to resize the root or decrease the swap partition, or it is a new unlabeled disk from a third-party vendor.

3. Enter **2** to continue.

Messages such as those that follow are displayed:

```
checking writability of /dev/rsd0b
0+1 records in
1+0 records out
Extracting miniroot ...
```

Additional, media-specific messages are displayed. For tape installation, this process may take several minutes to complete. When the process is complete, the following message is displayed:

```
Mini-root installation complete.

What would you like to do?
  1 - reboot using the just-installed miniroot
  2 - exit into single user shell
Enter a 1 or 2:
```

4. Enter **1** to boot the miniroot.

Additional messages are displayed as the system boots.

```
syncing file systems... done
rebooting...
Booting from: sd(0,0,1)
root on sd0b fstype 4.2
Boot: vmunix
Size: 811008+114720+60112 bytes
SunOS Release 4.1.1(MINIROOT) #4: Tue Feb 13 01:10:16 PDT
Copyright (c) 1990 by Sun Microsystems, Inc.
.
.
.
WARNING: CLOCK GAINED 14 DAYS -- CHECK AND RESET THE DATE!
root on sd0b fstype 4.2
swap on sd0b fstype spec size 04070K
dump on sd0b fstype spec size 14056K
#
```

The process is complete when the root prompt (#) is displayed.



Now you are ready to invoke the SunInstall program, and continue with Section 4.5, “Running SunInstall,” below.

4.5. Running SunInstall

SunInstall is an interactive, menu-driven program that operates in the following way:

1. You invoke the program and use its preliminary menus to set the system clock and to specify your console display device (Sun workstation or other terminal).
2. Next, you fill out a series of forms each describing a different aspect of the installation.
3. Then, upon confirmation from you, SunInstall begins the actual installation of your system, loading operating system software onto your disk(s).



If you are using a terminal (not a Sun bit mapped display) as system console and have not yet determined the `/etc/termcap` name for the terminal, now is the time to do it. See F.1.1 "Preliminary Information Worksheet" for complete instructions.

Starting the SunInstall Program

Invoke the SunInstall program from the miniroot as follows:

```
# suninstall
```

You are ready to use the program when this screen is displayed:

```

Welcome to SunInstall

Remember: Always back up your disks before beginning an installation.

SunInstall provides two installation methods:

1. Quick installation:

This option provides an automatic installation with a choice
of standard installations, and a minimum number of questions asked.

2. Custom installation:

Choose this method if you want more freedom to configure your
system. You must use this option if you are installing your
system as a server.

Your choice (or Q to quit) >>

```

Entering Initial Information

The following steps will provide SunInstall information about your system's console terminal, the time zone you are in, and the current date and time.

These steps employ a simple convention.

- *enter*
denotes keyboard input with an ending `Return` (the ensuing action takes place when you press the `Return` key).
- *type*
denotes keyboard input without a `Return` following. (The ensuing action takes place as soon as you type a character.)

1. Enter **2** in response to the SunInstall Welcome screen, selecting a custom installation.

SunInstall automatically checks for your terminal type. If you are using a Sun bit-mapped display, SunInstall does not ask for your terminal type and skips to the next step.

If you are not using a Sun bit-mapped display, SunInstall prompts you for your terminal type, as shown in Step 2.

```
Select your terminal type:  
  1) Televideo 925  
  2) Wyse Model 50  
  3) Sun Workstation  
  4) Other
```

```
>>
```

2. Enter a number from 1 to 3 to specify your terminal type from those listed, or 4 if your terminal is of some other type.

If you choose 4 (Other) SunInstall asks you to enter the name of your terminal as it appears in the `/etc/termcap` file. Refer to the Preliminary Information Worksheet for this information.

After you enter your terminal type SunInstall will ask for your local time zone name:

```
Enter the local time zone name (enter ? for help):
```

3. Although you can enter time zone information from the keyboard, it's easiest to use the on-line help facility:

Enter ? to display the TIMEZONE menu.

```
TIMEZONE MENU                                     [?=help]
-----
Select one of the following categories to display
a screen of time zone names for that region

  _ United States
    Canada
    Mexico
    South America
    Europe
    Asia
    Australia and New Zealand
    Greenwich Mean Time

Are you finished with this menu [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

Move the cursor to the appropriate region name (by typing `Return`) and then type `x` to display a corresponding menu of time zones.

The UNITED STATES menu is shown here.

```

UNITED STATES MENU                                     [?=help]
-----
TIME ZONE NAME          AREA
_ US/Eastern            Eastern time zone, USA
  US/Central            Central time zone, USA
  US/Mountain           Mountain time zone, USA
  US/Pacific            Pacific time zone, USA
  US/Pacific-New        Pacific time zone, USA
                        with proposed change to Daylight
                        Savings Time near election time
  US/Alaska             Alaska time zone, USA
  US/East-Indiana        Eastern time zone, USA
                        no Daylight Savings Time
  US/Hawaii             Hawaii

Are you finished with this menu [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

1. Move the cursor to the appropriate time zone name and type `x`.

SunInstall prompts:

```

Are you finished with this menu [y/n] ?

```

2. Enter `y` to exit this menu and redisplay the TIMEZONE menu.
3. Enter `y` again to exit the TIMEZONE menu.

SunInstall now asks you to confirm the current date and time, as in the following example:

```
Is this the correct date/time: Thu Feb 22 17:10:15 PDT 1990
[y/n] >>
```

4. Enter **y** if the displayed information is correct. Otherwise, enter **n** and press the Return key. The Set Time screen appears. The format for the Set Time screen display depends on which time zone you selected. Press Delete, Control-U or the Backspace key to erase the sample response. Then enter the correct date and time using the format that is displayed for your time zone, and press the Return key.

As an example, on the third day of June, 1990 at three o'clock in the afternoon you could enter:

```
>> 03/06/90 03:00 pm
```

After you press the Return key, SunInstall would respond:

```
Is this the correct date/time: Sun Jun 3 15:00:12 PDT 1990
[y/n] >>
```

Enter **y** if the displayed information is correct and **n** if you want to try again. (Note that SunInstall displays in twenty-four hour time, thus three o'clock in the afternoon is displayed as 15:00.)

SunInstall sets the system clock and displays the Main Menu.

```

MAIN MENU                                                     [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

_ assign host information

exit SunInstall

[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

Now you are ready to begin filling out the SunInstall forms.

The Main Menu

The core of the installation process involves completing several *forms*, each one relating to a specific aspect of your configuration.

You select forms from the SunInstall Main Menu. When first displayed, the menu is as shown above, with just one menu item, *assign host information*, displayed. This is the current item, the one that is selected if you simply type **x** or **X**.

The main menu will reflect your progress as you work your way through the forms. When, for example, you've completed the *HOST Form* to assign host information, SunInstall marks that item with a plus sign (+) and requests disk information.

```

MAIN MENU                                                     [?=help]
-----
Sun Microsystems System Installation Tool

( + means the data file(s) exist(s) )

+ assign host information
_ assign disk information

```

The information on each completed form is automatically recorded in an installation database. A “+” before a menu item means the database contains the corresponding information. On the Form shown below all required forms have been completed.

```
MAIN MENU [?=help]
```

```
-----  
Sun Microsystems System Installation Tool
```

```
( + means the data file(s) exist(s) )
```

```
+ assign host information
```

```
+ assign disk information
```

```
+ assign software information
```

```
+ assign client information
```

```
_ start the installation
```

```
exit SunInstall
```

```
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]
```

Using the Main Menu

The SunInstall Main Menu allows you to use the following keys to move the cursor about the screen:

SPACE
RETURN move forward, by item, as far as the prompt line

Control-F
Control-N move forward through the menu items

Control-B
Control-P move backward through the menu items

(The cursor-movement keys are noted on the message line at the bottom of the screen.)

Control-L repaint the screen should it become garbled

The choices on the Main Menu allow you to:

display a form

Move the cursor to the corresponding form name, and type **x** or **X**.

exit SunInstall

Move the cursor to `exit SunInstall`, and type **x** or **X**.

display general information about the menu use

Type `?` at any time to display an *On-Line Help Screen*. See Figure 4-1 below for one example. Press **Return** to redisplay the Main Menu when you are through viewing the help text.

start the installation

When you have completed the last required form, the Main Menu displays:

```
start the installation
```

Type **x** or **X** to begin the installation of your system.

Figure 4-1 *On-Line Help Screen*

ON-LINE HELP FOR MENUS	
KEYS	PURPOSE
CONTROL B	move to previous item
CONTROL P	move to previous item
CONTROL F	move to next item
CONTROL N	move to next item
<RETURN>	move to next item
<SPACE>	move to next item
x or X	select an item
CONTROL L	repaint screen
CONTROL C	abort

Press <return> to continue ...

Completing the HOST Form

From the SunInstall Main Menu, complete the HOST Form as follows:

1. Select assign host information.
2. Complete the form, referring to your Host Form Worksheet and using the following example as a guide.


```

HOST FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Workstation Information :
  Name : diphthong
  Type : [standalone] x[server] [dataless]

Network Information :
  Ethernet Interface : [none] x[le0]

  Internet Address   : 195.5.2.15
  NIS Type           : [none] [master] [slave] x[client]
  Domain name       : em_city.oz.com

Misc Information :
  Reboot after completed : [y] x[n]

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```



This example form is the first of many to appear in this procedure. Each uses the same conventions.

- System-specific items are italicized.
- User entries are boldfaced.

Thus, the example Ethernet interface (*le0*) is system-specific information SunInstall displayed, while the example hostname (*diphthong*) and IP address (*195.5.2.15*) are system-specific information the user entered.

When you have completed the last screen field, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

3. Enter **y** to exit the form.

The message updating databases ... is briefly displayed, followed by the Main Menu.

Completing the DISK Form

From the SunInstall Main Menu complete the DISK Form as follows:

1. Select assign disk information.

SunInstall polls the disk drives and lists their device numbers in the Attached Disk Devices field. The form will look like this for most systems with one SCSI disk:

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    [sd0]

```

2. Select the system disk from among the devices listed. (The system disk will usually be the first one listed.)

SunInstall then expands the DISK Form:

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    x[sd0]

Disk Label: [default] [use existing] [modify existing]
Free Hog Disk Partition : [d] [e] [f] [g] x[h]
Display Unit      : x[Mbytes] [Kbytes] [blocks] [cylinders]

```

Steps 3 through 5 explain how to complete the new fields.

3. In the Disk Label field, choose a starting disk label. The choices are:
 - default
Displays the standard partitions for your system configuration. This is the correct choice for new installations and most installations of existing systems as well.
 - use existing
Displays the partitions already defined on the disk but does not allow them to be changed. If you are reinstalling a previously installed system, and you don't want to modify the existing disk partitions, select this option. Note that only the partition sizes are filled in; you must enter the MOUNT PT fields by hand.
 - modify existing
Displays the existing partitions on the selected disk and allows them to be changed. Again, the MOUNT PT fields must be entered by hand.
4. SunInstall will choose the partition normally associated with users' home directories as the default for the *Free-Hog Disk Partition*. In most cases this

will be correct.



If you have a small disk (under 130 MB), partition `g` will be marked as the free-hog partition. The example forms in this procedure assume that you are installing SunOS Release 4.1.1 on a large disk, therefore partition `h` is the free-hog partition.

The *Free-Hog*



The SunInstall program will help you prepare a disk layout that it will use later to define physical disk partitions. As you refine the layout, the program automatically sees that the total amount of disk space in use by the defined partitions equals the total space available on the disk. SunInstall does so by automatically adjusting the size of one partition on each disk: the *free-hog* partition.

As the other partitions are increased or decreased in size the free-hog is decreased or increased to maintain the correct total. It is common to designate the partition that will hold the users' personal directories (usually `/home`) as the free-hog. This results in the users having as much disk space as possible for doing their work commensurate with the specific disk space needs of the operating system.

The term *free-hog* only refers to the special role the partition plays while you're using the SunInstall program. **There is no free-hog partition on an installed system; the concept is meaningless apart from the SunInstall program.** Also note that since the size of the free-hog is relative to that of the other partitions it is not possible to directly change the size of the free-hog. (That is, you cannot type in the `SIZE` field for the free-hog on the DISK Form).

5. In the **Display Unit** field, specify how you want partition sizes displayed in the `SIZE` column. The example forms display partition sizes in Mbytes (the default), but you can also use Kbytes, blocks, or cylinders. (Refer to Appendix E — "Disk Structure and Disk Space Terminology" for general information about blocks and cylinders.)



Only the integer portion of the partition size is displayed. The displayed size of a 35.75 MB partition, for example, is 35, not 35.7 or 35.8. **The actual size will be rounded to the nearest cylinder when SunInstall physically relabels the disk.**

When you make your choice, SunInstall displays a partition table that reflects the selected label. If you selected `default` at step 3, the `MOUNT`

PT and PRESERVE* columns will be filled in. (The columns will otherwise be empty.) Following is a default partition table for a heterogeneous server system.

PARTITION	START_CYL	BLOCKS	SIZE	MOUNT PT	PRESERVE (Y/N)
a	0	32025	16	/	n
b	61	59850	30		
c	0	639450	327		
d	175	12075	6	/export	n
e	198	64050	32	/export/swap	n
f	0	0	0		
g	320	90300	45	/usr	n
h	492	381150	190	/home	n

6. To implement your disk plan, complete the SIZE, MOUNT PT, and PRESERVE column for each required filesystem and any others you have chosen to define. If a column already contains a value, you can type **Return** to use the displayed value. Leave the MOUNT PT columns blank for all c partitions and for any partitions which will be used for swap space.



If you've chosen to use the existing disk partitions, you might wish to preserve the /home partition so you won't have to restore user home directories from tape after you install Release 4.1.1. **Do not preserve the /, /usr, and /export partitions!**

The root (/) Partition

The size displayed for your root partition (the a partition of your system disk) will reflect the current size of the partition on the disk. If you used format to adjust the size of the root this is a good opportunity to check your work, verifying that the partition is the size you intended. **Remember: you cannot change the size of the a partition on the system disk within SunInstall.**

The swap Partition

The size displayed for your swap partition (the b partition of your system disk) will also reflect the current size of the partition on the disk. If you need to *increase* the size of the partition, do so now. Simply press **Return** until the cursor is next to the swap partition's SIZE field, backspace over the current size, and enter the new size you desire. Note that at the same time SunInstall will automatically decrease the size of the designated free-hog partition by a similar amount. **Remember: you cannot decrease the size of the b partition of the system disk within SunInstall.**

* If you type **y** in the PRESERVE(Y/N) column, SunInstall will not re-make the filesystem in that partition. This provides a means to retain existing data in user partitions such as /home. **If the START_CYL or SIZE of a partition changes, it cannot be preserved. SunInstall will notify you if you attempt to preserve a partition that does not meet these criteria.**

The /export Partition

By default, the /export partition is sized to fit two clients. For the time being, however, you can leave it as it is regardless of the number of clients you will support. Later on, as you select software for and define your diskless clients, SunInstall will automatically expand the partition, taking the space necessary to store the software to support heterogeneous clients and allowing approximately 5 MB for each client defined. We'll return to the Disk Form to review the size of this and the other partitions after client definition has been completed.

If your disk plan calls for moving the /export partition to another disk drive, begin to do so at this time. For now, just enter "0" (zero) in the SIZE field of the partition. When you do so the MOUNT PT and PRESERVE fields will automatically be erased, and the disk space that had been assigned to /export will be added the free-hog partition. When you move on to defining the partition tables on your other disk drives you'll re-define the partition there.

The /export/swap Partition

Like /export the /export/swap partition is initially sized to fit two typical clients. SunInstall will automatically total the swap space sizes that you assign for your clients and expand the partition as appropriate.

Like the /export partition, if you have decided to move /export/swap to another disk drive, prepare to do so by changing the SIZE field to 0 (zero) MB on this disk.

The /usr Partition

How you size the /usr partition is perhaps the most important part of your disk plan. In order to let SunInstall automatically calculate the size of /usr necessary to accommodate the SunOS operating system software intentionally *under-size* the partition at this time. To do so, press **Return** until the cursor is next to the SIZE field for the /usr partition. Then type **Delete** to backspace over the current SIZE and enter **5**. Note that, at the same time that the size of /usr is decreased, the size of the designated free-hog partition will increase by a like amount.

Later on, when software selection has been completed, /usr will be almost *exactly* the size needed to accommodate the SunOS software chosen. Then you will return to the DISK Form to expand /usr as per your Partition Planning Worksheet.

PARTITION	START_CYL	BLOCKS	SIZE	MOUNT_PT	PRESERVE (Y/N)
a	0	32025	16	/	n
b	61	59850	30		
c	0	639450	327		
d	175	12075	6	/export	n
e	198	64050	32	/export/swap	n
f	0	0	0		
g	320	9975	5	/usr	n
h	339	461475	231	/home	n



The size of the `/usr` partition need not and cannot be directly changed if `/usr` is the free-hog.

The `/home` Partition

If a `/home` partition is defined and is intended to remain on the system disk you can leave it as is, defined as the free-hog and adjusting automatically as changes are made to the other partitions on the disk.

If your disk plan calls for moving `/home` to another disk, remove it from the system disk now. Since `/home` is currently designated as the free-hog it is not possible to directly specify its SIZE. To do so, back up through the DISK Form by typing `Control-B` until the cursor enters the **Free Hog Disk Partition** field. Use the space bar to move to the `[g]` field and then select that partition by typing `x`. Now press `Return` to move down through the Form. Notice that the cursor will skip the `g` partition SIZE field (it is now the free-hog) but will enter the SIZE field for partition `h`, the `/home` partition. Press `Delete` to backspace over the field and then enter `0` to delete the partition.

When you complete the table, SunInstall prompts

O.K. to use this partition table [y/n] ?

- Enter `y` to use the displayed table or `n` if you wish to change it.

When you accept the table, SunInstall prompts

Are you finished with this form [y/n]?

- Enter `y` if you are defining only one disk. Otherwise, enter `n` and fill out additional DISK Forms until you have completed one for each of your disk drives. Then enter `y`, indicating that you are finished with the DISK Forms.

Completing the SOFTWARE Form

From the SunInstall Main Menu, complete the SOFTWARE Form as follows:

1. Select assign software information from the Main Menu.
SunInstall displays the SOFTWARE form.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  [add new release]  [edit existing release]
```

2. Select add new release.

SunInstall requests the device name and location of the device on which the Release 4.1.1 media resides.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
Media Device   : [st0] [st1] [st2] [st_]* [xt0] [mt0] [fd0] [sr0]
Media location : [local] [remote]
```

3. Complete the **Media Information** fields, using the following examples as a guide.

* Selecting [st_] will allow you to specify the st device number manually. This feature allows selection of scsi devices 3-7 when necessary.

Example for quarter-inch Tape in Local Drive:

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
Media Device       :  x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
Media Location    :  x[local] [remote]
```

Example for half-inch Tape in Remote Drive:



When reading from a media device attached to a remote system make sure that the hostname of the system being installed is included in the `/.rhosts` file of the remote system.

Note that including the hostname of the system being installed in the `/.rhosts` file allows superuser (root) access to the remote system from your workstation. For increased security, be sure to remove the hostname from the `/.rhosts` file once you have completed the installation.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
Media Device       :  [st0] [st1] [st2] [st_] x[xt0] [mt0] [fd0] [sr0]
Media location    :  [local] x[remote]
Media Host        :  persephone
Media Host's Internet Address :  195.5.2.16
```

Having gathered the information needed to access the Release 4.1.1 media, SunInstall prompts:

Ok to use these values to read the table of contents [y/n] ?

4. The release media appropriate to the kernel architecture of the server should be loaded in the media device. Enter **y** if the values are correct or **n** if you need to change any of them.

When you elect to use the displayed information, SunInstall expands the form as shown below.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device       : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location    : x[local] [remote]

Choice: [all] [default] [required] [own choice]
Executables path: /usr
Kernel executables path: /usr/kvm
```

5. Specify your software selection method by choosing one of the following:

all	Automatically selects all SunOS software categories.
default	Automatically selects the <i>default</i> software categories, and then asks you to pick the other software you want.
required	Automatically selects the <i>required</i> categories, without allowing you to pick additional software.
own choice	Automatically selects the <i>required</i> categories, and then asks you to pick the other software you want.

(The default software selection includes all required categories and selected common and desirable categories as shown in Table 4-5. See Table 1-4 for detailed information about the listed categories.)

Table 4-5 *Default Software for Networked Systems*

Required Categories	Common and Desirable Categories
root	Debugging
usr	RFS
Kvm	SunView_Users
Install	Sys
Networking	System_V
	TLI

6. Press **Return** in the following fields to use the standard paths to executable files.

Executables path:

Kernel executables path:

SunInstall prompts:

Ok to use these values to select Software Categories [y/n] ?



Software selection will begin when you answer this prompt. Read the remainder of this step to preview the selection process *before* responding to this prompt.

Unless you selected `all` or `required` at step 5, you'll be able to pick exactly which optional software to install. SunInstall will display category names, one by one, and prompt:

Select this media file [y/n] ?

Software selection is in progress in the following example.

```

SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device      : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location   : x[local] [remote]

Choice:  [all] [default] [required] x[own choice]
  Executables path: /usr
  Kernel executables path: /usr/kvm

Destination fs: /usr (sd0g)
Name: SunView_Programmers (optional)
Hog: sd0h 31334400
Size : 2150400

Select this media file [y/n] ? _ status: not selected
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

In the example, “SunView_Programmers” is the software category presented. Answering **y** to the Select this media file [y/n] ? prompt will mark this category for installation on your system. Answering **n** will skip it. In either case, SunInstall will then go on to present the next category for your consideration.

A variety of disk space parameters are also presented, as the following details show:

```

Choice:  [all] [default] [required] x[own c
  Executables path: /usr
  Kernel executables path: /usr/kvm

Destination fs: /usr (sd0g)

Name: SunView_Programmers (optional)

```

The destination filesystem is /usr.

The software category and its type.

Indicators at the right-hand side of the screen show—in bytes—the size of the software category, the current size of the free-hog partition, and the changing state of the destination filesystem. The following detail examines this region more closely.

```
] x[own choice]
usr
ath: /usr/kvm
```

```
                                47210496
Hog: sd0h 31334400
Size: 2150400
```

Available space in destination filesystem.‡
Current size of the free-hog partition.
Size of the displayed software category.

7. Unless you wish to change your software selection method, enter **y** to use the displayed values and begin the selection.

After all of the categories have been presented and responded to, SunInstall summarizes the selected categories for you:

‡ Pay particularly close attention to this value if your `/usr` partition is the designated free-hog. When software selection is complete it will represent the space available in `/usr` for Sun unbundled products, products from other vendors, locally developed programs, and general free space.

```

SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
    x[add new release] [edit existing release]

Media Information:
    Media Device       : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
    Media location    : x[local] [remote]

Choice: [all] [default] [required] x[own choice]
    Executables path: /usr
    Kernel executables path: /usr/kvm

Media Filenames:
    root              SunView_Users
    usr               SunView_Programmers
    Kvm               Text
    Install           Manual
    Networking

Ok to use this architecture configuration [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

8. Enter **y** to use the configuration or **n** if you wish to go back and try again.

When you elect to use the configuration, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

9. Enter **n** to redisplay the SOFTWARE Form.



Now is the time to select software for your heterogeneous clients. If you have clients of the same application architecture (but different kernel architecture) as the server, select their software first. The “status:” field will note which categories have already been selected for this application architecture. For these categories answer **n** to Select this media file [y/n] ?. Answer **y** to the Sys category if you want to be able to build custom kernels for the clients. Then continue on to select software for clients of application architecture *different* from the server.

Note that the form is flexible about the location of the media for each architecture. You can select software for each architecture from a different device (and, for that matter, different media type) if you desire. Note also that if you are loading software from CD-ROM SunInstall will display a screen allowing you to specify which of the software architectures available on the CD-ROM you want to select.

10. As explained above, select software for each client kernel architecture, repeating steps 2 through 9 for each one in turn.

Repeat the software selection procedure until software for all application and kernel architectures is accounted for. Then answer **y** to

Are you finished with this form [y/n] ?

and continue on to "Completing the CLIENT Form."

Completing the CLIENT Form

From the SunInstall Main Menu complete the CLIENT Form as follows:

1. Select assign client information.

SunInstall will display the CLIENT Form.

```
CLIENT FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Architecture Type : _[sun4.sunos.4.1.1]  _[sun3x.sunos.4.1.1]
Client name       :
Choice           :  [create] [delete] [display] [edit]

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]
```

2. The **Architecture Type** field will display the name of the SunOS 4.1.1 release and the kernel architecture types for which you have selected software. **Clients can only be defined if you have previously selected Kvm software that matches their kernel architecture.** Select the **Architecture Type** for the first client you need to define.
3. The cursor will move into the **Client name** field. Enter the hostname of your first diskless client.
4. As the cursor moves into the **Choice** field select `[create]`. SunInstall will display a form like the this:

```

CLIENT FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Architecture Type : x[sun4.sunos.4.1.1]
Client name       : squid-lips
Choice           : x[create] [delete] [display] [edit]
Root fs : /export/root (sd1d)                6291456      Hog : sd1h 284164096
Swap fs : /export/swap (sd0e)                33554432     Hog : sd0g 256901120

Client Information :
  Internet Address      : 195.5.2._
  Ethernet Address     : 8:0:20:1:00:00
  NIS Type              : [none] x[client]
  Domain name          : em_city.oz.com
  Swap size (e.g. 8B, 8K, 8M) : 16M
  Path to Root         : /export/root/squid-lips
  Path to Swap         : /export/swap/squid-lips
  Path to Executables  : /usr
  Path to Kernel Executables : /usr/kvm
  Path to Home         : /home/diphthong
  Terminal type        : sun

Ok to use these values [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```



The `Root fs` and `Swap fs` lines provide partition size and associated free hog information similar to that displayed by the `SOFTWARE Form`. The partitions monitored here will vary depending on the partitions defined by the `Path to Root` and `Path to Swap` fields.

5. Each line of *Client Information* should be checked and, perhaps, edited. An explanation of each line follows:
 - `Internet Address`
The network portion of the client's internet address has already been filled in for you. Just append the correct host number to complete the address, for example; `195.5.2._` might become `195.5.2.20`.
 - `Ethernet Address`
Backspace over and fill in the correct Ethernet address for this client.
 - `NIS Type`
Diskless workstations can be NIS clients, or not use NIS at all. `SunInstall` will pick the reasonable default depending on whether or not you are configuring the server for NIS (in the `HOST Form`).
 - `Domain name`
The same as for the server, if NIS is being used.
 - `Swap size (e.g. 8B, 8K, 8M)`

The size of the swap file that will be assigned to this client. A reasonable default is provided. Refer back to your Client Form Worksheet to see if you've planned something different.

If you choose to change the **Swap size** you can specify the new size in bytes (B), kilobytes (K) or megabytes (M). (As you change the swap file size you may see the sizes of the `/export/swap` partition and its associated free-hog partition automatically adjust.)

- Path to Root

This is the directory on the server that will form the client's root (`/`) directory. The default is `/export/root/clientname`.

- Path to Swap

This is the file on the server that the client will use for swap space. The default is `/export/swap/clientname`.

- Path to Executables

The server's directory that the client will mount as its `/usr`. Should not need to be changed.

- Path to Kernel Executables

The server's directory that the client will mount as its `/usr/kvm`. Should not need to be changed.

- Path to Home

Where users' home directories will reside.

- Terminal type

The console terminal type of the client. Will need to be changed only if the client does not have a Sun bit mapped monitor.

6. When you are satisfied with the client information that you have entered, move the cursor down to `Ok` to use these values `[y/n] ?` and enter **y**.
7. The CLIENT Form will display again, this time with the name of the newly defined client noted.


```

CLIENT FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Architecture Type : x[sun4.sunos.4.1.1]
Client name       : squid-lips
Choice            : x[create] [delete] [display] [edit]

sun4.sunos.4.1.1 Clients:

squid-lips

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```

If you have more clients to define enter **n**. You can then create another client the same way you did the first. You also have the option (in the **Choice** field) to delete, display or edit clients that you've already defined.

- Continue to cycle through the CLIENT Form creating clients until you've taken care of all those that your server is intended to support. Finally, enter **y** in response to the Are you finished with this form [y/n] ? prompt.



If you will be adding more diskless clients to your server in the near future you may find it convenient to define those workstations now in order to “pre-allocate” space in the appropriate partitions. Even if you use hostnames like *dummy1* and *dummy2* and the default Ethernet address when defining these clients it will still be relatively easy to complete their configuration when the new workstations become available.

Rechecking Partition Sizes



The Main Menu should now be displayed, with the cursor next to the item:

```
start the installation
```

Before you select **start the installation** follow these steps to check and adjust the current partition sizes.

- Press **Control-B** to move the cursor back through the menu items.
- Select assign disk information.

The DISK Form is displayed once more.

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    [sd0]

```

3. Select each disk in turn.

The **Disk Label** field contains a new item, `data file`. This item displays the disk label from the installation database, where all of the information you've entered so far is stored.

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    x[sd0]

Disk Label: [default] [use existing] [modify existing] [data file]
Free Hog Disk Partition : [d] [e] [f] [g] x[h]
Display Unit      : x[Mbytes] [Kbytes] [blocks] [cylinders]

```

- ### 4. Select `data file` to display the new partition sizes. Since you last viewed the form, several partitions have likely changed in size:
- The `/usr` partition may be larger.
 - The `/export` partition may be larger.
 - The `/export/swap` partition may be larger.
 - The free-hog partition should be smaller.

SunInstall took space from the free-hog partition to expand the `/usr` partition when you selected software. The `/usr` partition is now just the size needed to accommodate the software you selected.

If partition sizes have not changed (perhaps `/usr` was the free-hog) skip to step 6. Otherwise, adjust the partition size as described in the step 5.

5. Finish sizing your partitions:

- `/usr`
Refer to your Partition Planning Worksheet to find the amount of space you have decided to allow above and beyond that required by the operating system files (space for other files and free space for expansion). Add that space to the current size of `/usr` and edit the `SIZE` field accordingly.

- /export
Check the size of the /export partition. Add an appropriate amount of space if you expect to be adding more clients to the server soon. You may also need to add space to hold application software if you have clients of a different application architecture from the server's.
 - /export/swap
Check the size of the /export/swap partition. Add space for additional clients, if planned.
6. Finally, press **Return** enough times to reach the prompt line:

```
Ok to use this partition table [y/n] ?
```

and enter **y**.
 7. SunInstall will display:

```
Are you finished with this form [y/n] ?
```

If you have more disk drives to check answer **n** and repeat steps 3 through 6 for each drive. When all disks have been checked enter **y** to redisplay the Main Menu.

Letting SunInstall Run

The Main Menu should now be displayed. Move the cursor to:

```
start the installation
```

Type **x** to begin the installation.

Your screen will reflect the progress of the installation as SunInstall labels the disk, creates the specified filesystems, and loads software from the Release 4.1.1 media. Depending on the software categories you chose earlier, you may be asked to load additional media, as shown in the following example:

```
System Installation Begins:
Label disk(s):
    sd0
Create/check filesystems:
Creating new filesystem for / on sd0a
newfs /dev/rsd0a >> /etc/install/suninstall.log 2> &1
. . .
Extracting sunos.4.1.1.sun4 'root' media file ...
Extracting sunos.4.1.1.sun4 'usr' media file ...
Extracting sunos.4.1.1.sun4 'Kvm' media file ...
Extracting sunos.4.1.1.sun4 'Install' media file ...
Extracting sunos.4.1.1.sun4 'Networking' media file ...
Please mount sun4.sunos.4.1.1 release media #2
Press <return> to continue
```

If There's a Problem

If SunInstall should, for some reason, fail or have to be aborted during its run, it will save the data files that were created as you filled in the forms. You can remedy the problem and then re-invoke SunInstall, going directly to "start the installation." SunInstall may prompt:

```
Some software has already been loaded.
Are you sure you want to restart the installation (y/n) ?
```

Answering "y" will have SunInstall restart its run using the data you have already entered.

When SunInstall Completes

What happens after SunInstall extracts the last software category depends on how you filled in the `Reboot after completed` field on the `HOST Form`.

- If you selected **y**, your system boots automatically. Booting messages appear, followed by a `login` prompt. Refer to Section 4.6, "Deciding What Still Needs to Be Done" for further instructions.
- If you selected **n**, the `#` prompt reappears. Your system is still running the `miniroot`.

Installing a Small Kernel

Pre-configured small kernels are available for the following configurations:

- Sun-3/50 and Sun-3/60 with up to 2 SCSI disks, 1 SCSI tape
- Sun-3/80 with up to 4 SCSI disks, 2 SCSI tapes
- Sun-4/110 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 330 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 1, 1+ and 2 with up to 4 SCSI disks, 1 Floppy Disk, 2 SCSI tapes
- All other Desktop SPARCsystems

If you want to install an appropriate pre-configured kernel do so by executing:

```
# install_small_kernel
```

The utility is self-explanatory and will ask you for confirmation before making any changes to the system. It is capable of installing small kernels for your diskless clients as well as for your server.

Configuring an NIS master or slave

NIS masters and slaves should be configured before they are booted in multi-user mode. See Chapter 16 of the *System and Network Administration* manual for details.

Booting Up Your Workstation

To boot your new operating system from the `#` prompt do the following:

```
# sync; sync; reboot
```

4.6. Deciding What Still Needs to Be Done

Several basic system administration tasks should be completed following the installation of your system.

Logging In and Setting the root Password

As supplied the SunOS operating system does not have a password protecting the superuser (root) login. Login as “**root**” and then use the `passwd(1)` command to set the password of your choice.

Configuring for Multiple swap Partitions

If you have defined multiple swap partitions, you must add a line to the `/etc/fstab` file for each additional swap area. For example, you define `sd1b` as a swap partition by adding the following line in the `/etc/fstab` file:

```
/dev/sd1b swap swap rw 0 0
```

Then enter:

```
# swapon -a
```

(From now on `swapon` will be executed automatically each time the system is booted.)

Configuring for tmpfs

If you have decided to use the `tmpfs` virtual file system for the `/tmp` directory do the following:

- Add this line to the file `/etc/fstab`:

```
swap /tmp tmp rw 0 0
```

- Enter:

```
# mount /tmp
```

- In the file `/etc/rc.local` find the line:

```
#mount /tmp
```

and remove the sharp sign (#):

```
mount /tmp
```

From now on, the `/tmp` directory will be mounted automatically each time the system is booted.

- When you build and install a custom kernel include the following line in the kernel configuration file:

```
options TMPFS # tmp (anonymous memory) file system
```

(The tmpfs facility is included in the `GENERIC` kernel.)

Building and Installing a Custom Kernel

For best workstation performance you should make and install a custom operating system *kernel*. The kernel is a program which is loaded into memory when your workstation is booted and which then controls all aspects of system operation. The default kernel is called the *GENERIC* kernel. This kernel includes the software necessary to access all of Sun's peripheral hardware. While this is useful during installation it also means that the kernel includes much more software, and is therefore much larger, than is required for any specific system. This excessive size means an inefficient kernel which uses up memory that can be put to better use and provide improved performance.

Complete instructions for creating and installing a custom kernel for your workstation are given in Chapter 9 of the *System and Network Administration Manual*, Reconfiguring the System Kernel.



If you chose to install a `GENERIC_SMALL` kernel at the conclusion of running SunInstall that kernel will provide improved performance as compared to the `GENERIC` kernel. You may still, however, see some further improvement by creating a kernel matched to your specific configuration.

Setting Up User Accounts

Refer to the manuals *System and Network Administration*, *Getting Started with SunOS: Beginner's Guide*, and *Setting Up Your SunOS Environment: Beginner's Guide* for assistance.

Customizing Your Environment

Refer to Chapter 8 of *System and Network Administration Manual*, Administering Workstations, Section 8.1. Here you will find the information you need for setting up user home directories, enabling electronic mail, etc.

Backing Up Your New System

Once you have customized your system to suit your needs it should be *backed up*. This means recording the information contained on your disks onto a different media, usually tape, for safekeeping. Chapter 6, Section 6.1 of *System and Network Administration* contains the information you will need.

Booting Up Your Clients

Once the server is up and running you can begin to boot your client workstations over the net. Refer to *System and Network Administration* for complete information on administering your network.

4.7. Multi-Release Support

This section describes how to configure a server to support clients running under a different operating system release than the server. This feature is available for servers running SunOS 4.1 or a later release. Sun recommends that you use multiple releases on a server only as a transitional measure and that eventually you upgrade all of your servers as well as clients to the most recent release.

If you have sufficient space free in `/export/exec`, you can add SunOS 4.1.1 as a new release for clients with the `add_services` utility. Refer to the *System and Network Administration* manual, Chapter 8 ("Using the `add_services` utility") for a detailed description. Note that the `add_services` utility will prompt you to confirm the release you are installing after you have specified the media information.

After you have loaded SunOS 4.1.1 onto the server, you can then create new clients of this additional release by using the `add_client` utility. Refer to the *System and Network Administration* manual, Chapter 8 ("Using the `add_client` utility") for a detailed description. Be sure to select the correct release for the client from the *Architecture Type* menu in the client form.



Installing a Dataless Workstation

Chapter 5 details the steps required to complete the installation of a Dataless Workstation using the Custom Installation method.

There are four general tasks to be completed:

- **Planning Your Installation**
Final planning, including determining the layout of your system disk.
- **Performing Preliminary Software Procedures**
Formatting and labeling your disk (if necessary) and loading the software necessary to execute SunInstall.
- **Running SunInstall**
Executing the SunInstall software installation program to actually install the operating system software on your workstation.
- **Deciding What Still Needs to be Done**
Primary system administration procedures which you should carry out as soon as your system is installed.

5.1. Planning Your Installation — Server Designation

A dataless workstation, by definition, requires that executables and a user home area be made available to it by a server. The server chosen **must** have executables suitable for the kernel architecture of the dataless client. The executables will be present if the server has the same kernel architecture as the client. The executables will also be present if the server is already supporting diskless or dataless clients of the same kernel architecture as the one you are installing.

If your chosen server does *not* have the correct executables for your workstation, they can be installed using the `add_services(8)` utility.

5.2. Planning Your Installation — Disk Partitioning

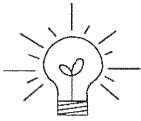
Much of the planning required before you begin the actual installation of your workstation was completed as you worked through Chapter 1. At this point you should already have completed the Preliminary Information and Host Form Worksheets. This section will help you complete the final Worksheets: Partition Planning and Disk Form.



Go to Appendix F and pull out one copy of the Partition Planning Worksheet. Also get a copy of the Disk Form Worksheet for each disk drive attached to your workstation. Refer to and fill in the Worksheets as you work through this section.

Disk drives used with Sun workstations are divided into as many as eight sections called *partitions* (labeled a through h). Each disk partition looks to the operating system and the user as though it were a separate disk drive, and each may be used for a specific purpose. An individual partition may be used in its *raw* state, most often as swap and paging space for the SunOS virtual memory system. Most partitions, however, will be structured as *filesystems* and used to store UNIX files.

Individual filesystems are designated to store various broad classes of files including operating system software, user data files, and perhaps such things as database files for application software. This section will help you to decide what partitions you should define for your disk, how to use each partition, and what size each partition should be.



If you are unfamiliar with computer disk drives and such terms as *partition*, *cylinder*, *sector*, and *head*, please refer to Appendix E, “Disk Structure and Disk Space Terminology.”

The SunInstall program provides a default disk layout for dataless workstations that you can use “as is” or modify as needed.

If your system was previously installed as a dataless workstation, you may wish to base disk partitions on the existing disk layout.

Disk Layout — Default Partitions

Table 5-1 shows the default layout for dataless configurations.

Table 5-1 *Default Partitions for Dataless Workstations (Release 4.1.1)*

Partition	Assignment
a:	/
b:	(swap)
c:	(whole disk)
d:	—
e:	—
f:	—
g:	—
h:	—

The default size (as shipped from the factory) of the root (/) and swap partitions varies depending on the type and capacity of the disk. Table 5-2 shows the default sizes.*

* Disk drives used with dataless workstations are typically of fairly small capacity; usually less than 200 megabytes.

Table 5-2 *Default root and swap Partition Sizes*

Disk Type	Disk Size	Root Size	Swap Size
sd	<130 MB	8 MB	16 MB
sd	>130 <300 MB	8 MB	32 MB
sd	>300 MB	16 MB	32 MB
xd, xy and id	<600 MB	8 MB	16 MB
xd, xy and id	>600 MB	16 MB	32 MB

The root (/) Filesystem

Every SunOS *system disk* must have its a partition defined as the root (/) filesystem. The root filesystem consists of /, the root directory, and subdirectories such as /etc, /dev, /tmp, and /var.

The default root partition size should be usable for nearly all installations. About 3.5 MB of this space will be used by operating system files. The remainder is available for use by 'scratch' files created in the /tmp directory, and temporary log and spool files created in the /var directory.

The swap Partition

This area of the disk (normally the b partition of the system disk) is reserved to implement the virtual memory feature of SunOS. In practice, since a dataless workstation has, by definition, only a root and a swap partition all of the space not used by the root can be assigned to swap. Check the following issues, however, to be sure that you will have sufficient swap space.

□ Workstations with color monitors

A minimum of 24 MB of swap space is recommended if your workstation has a color monitor.

□ Workstations with large main memories

Your swap space **must** be larger than the size of the memory installed in your workstation. For example, if your workstation has 32 MB of main memory, designate at least 34 MB for your swap area.

□ Application programs

Some application programs require large amounts of swap space. As an example, LISP applications can require 40 MB or more of swap.

The `c` Partition

Every disk drive used with the SunOS operating system must, by convention, have a `c` partition defined. This partition is used by the operating system to reference the entire disk. It is defined automatically by Sun's `format(8S)` and `suninstall(8)` programs and should not be altered.

5.3. Preliminary Software Procedures

Now it's time to begin using the software tools provided for installing your workstation.

Selecting the Correct Media

First you'll need to select the correct installation media (tape or CD-ROM) with which to install your workstation. The label on the media should specify the same kernel architecture as you have noted for your workstation on Preliminary Information Worksheet. If your installation medium consists of multiple tapes, select the first one (labeled `1 of N`, where N is the total number of tapes).

Mount the selected tape or CD-ROM in the drive you will be installing from.

Should You Format Your Disk?

You *format* a disk by using the utility program `format(8S)` to write control information used by the disk drive hardware onto a disk. Disk drives provided by Sun are formatted and labeled at the factory. Desktop SPARCstation systems are shipped with SunOS preinstalled.

For preinstalled disks, it is recommended that you check the disk in a nondestructive way to verify that any head movement that may have occurred during shipment has not affected the performance of your disk.

To check the disk, using the `format` command, follow these steps:

1. Select "Run Format" from the `install` script.
2. Choose `analyze` from the `format` menu.
3. Choose `read` from the `analyze` menu.

The `read` option tries to read every block on the disk, but does not destroy any information.

For new disks without preinstalled software, it is recommended that you reformat them. To format your disk(s), select "Run Format" in the MINIRoot install script. See Appendix A of this manual for instructions on running the `format` command. You can also run `format` manually from MINIRoot.

Resizing the root and swap Partitions

If you have elected to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see the Partition Planning Worksheet) you must run the `format` program before running SunInstall. Refer to Appendix A for the necessary instructions.

If you do not plan to alter the size of root or decrease the size of swap, continue with "Loading and Booting the Miniroot," below. (You can use the SunInstall program to make all other adjustments to partition sizes.)

Loading and Booting the Miniroot



SunInstall will be executed from a minimal version of the operating system called the *miniroot*. The miniroot is designed to be copied into the swap (b) partition of the system disk, thereby leaving the remaining partitions available for loading of the full operating system.

The miniroot copied to the swap area is temporary; as soon as the workstation is booted from the installed operating system it will be over-written by normal paging and swapping activity. If you need to use it again, it will have to be copied into the swap area again.

Individual miniroot load and boot procedures are given here for those systems which will be installed from an attached tape or CD-ROM drive (local installation). Procedures for loading the miniroot from a tape drive attached to another system on the network (remote installation) are given in Appendix B — “Loading and Booting the Miniroot from a Remote Tape.” If you are loading the miniroot from a remote CD-ROM, refer to Appendix C — “Loading and Booting the Miniroot from a Remote CD-ROM.”

In any case, once the miniroot is booted, continue with “Running SunInstall,” Section 5.5 below.

Local Procedure from Tape

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt.* If the workstation is not displaying the PROM monitor prompt, hold down the `[L1/STOP]` key and press the `[A]` key and it should appear.†

Make sure that the first release tape is mounted on the system tape drive.

Refer to the Preliminary Information Worksheet to find your *tape* device designation (`xt`, `mt`, or `st`).

Replace the *tape* variable, enter the following command at the PROM monitor prompt:

For Sun3, 3x, or 4:

```
>b tape()
```

For Sun4c systems prior to SPARCstation 2:

```
ok boot tape()
      or
> b tape()
```

For Sun4c systems beginning with SPARCstation 2:

* Newer boot PROMS, particularly in Desktop SPARCsystems, may display the `ok` prompt. Others will display the `>` prompt.

† If your workstation uses a non-Sun terminal as console use its `[BREAK]` key to get the PROM monitor prompt.

```
ok boot tape
    or
> b tape
```

Now proceed to Section 5.4, "Continuing the Miniroot Install," below.

Local Procedure from CD-ROM

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt. * If the workstation is not displaying the PROM monitor prompt, hold down the `[LI/STOP]` key and press the `[A]` key and it should appear.

To boot the miniroot from CD-ROM, enter the following command at the PROM monitor prompt:

For Sun4 systems:

```
> b sd(0,30,1)
```

For Sun4c systems prior to the SPARCstation 2:

```
> b sd(0,6,2)
    or
ok boot sd(0,6,2)
```

For Sun4c systems beginning with the SPARCstation 2:

```
ok boot cdrom
    or
> b cdrom
```

5.4. Continuing the Miniroot Install

After you successfully begin installing the miniroot, your system should display the following messages:

```
What would you like to do?
 1 - install SunOS mini-root
 2 - exit to single user shell
Enter a 1 or 2:
```

* Newer boot PROMS, particularly Desktop SPARCsystems, may display the `ok` prompt. Others will display the `>` prompt.

Follow these steps to continue the installation:

1. Enter **1** to indicate that you want to continue the installation.

If your system has only one disk, the miniroot is copied to that disk. If your system has more than one disk, you are asked to specify a disk number as illustrated in the following display:

```
Beginning system installation - probing for disks.
Which disk do you want to be your miniroot system disk?
 1 - sd0:  disk description
 2 - sd1:  disk description
 3 - exit to single user shell
Enter a 1, 2, or 3:
```

Enter **1** to select the system disk.

2. Before the miniroot is copied to the specified disk, you are given an opportunity to format and relabel the disk.

```
selected disk unit "sd0".
Do you want to format and/or label disk "sd0"?
 1 - yes, run format
 2 - no, continue with loading miniroot
 3 - no, exit to single user shell
Enter a 1, 2, or 3:
```



You do not need to run `format` unless you believe that something is wrong with the disk, or you have chosen to resize the root or decrease the swap partition, or it is a new unlabeled disk from a third-party vendor.

3. Enter **2** to continue.

Messages such as those that follow are displayed:

```
checking writability of /dev/rsd0b
0+1 records in
1+0 records out
Extracting miniroot ...
```

Additional, media-specific messages are displayed. For tape installation, this process may take several minutes to complete. When the process is complete, the following message is displayed:

```
Mini-root installation complete.

What would you like to do?
  1 - reboot using the just-installed miniroot
  2 - exit into single user shell
Enter a 1 or 2:
```

4. Enter **1** to boot the miniroot.

Additional messages are displayed as the system boots.

```
syncing file systems... done
rebooting...
Booting from: sd(0,0,1)
root on sd0b fstype 4.2
Boot: vmunix
Size: 811008+114720+60112 bytes
SunOS Release 4.1.1(MINIROOT) #4: Tue Feb 13 01:10:16 PDT
Copyright (c) 1990 by Sun Microsystems, Inc.
.
.
.
WARNING: CLOCK GAINED 14 DAYS -- CHECK AND RESET THE DATE!
root on sd0b fstype 4.2
swap on sd0b fstype spec size 04070K
dump on sd0b fstype spec size 14056K
#
```

The process is complete when the root prompt (#) is displayed.



Now you are ready to invoke the SunInstall program, and continue with Section 5.5, "Running SunInstall," below.

5.5. Running SunInstall

SunInstall is an interactive, menu-driven program that operates in the following way:

1. You invoke the program and use its preliminary menus to set the system clock and to specify your console display device (Sun workstation or other terminal).
2. Next, you fill out a series of forms each describing a different aspect of the installation.
3. Then, upon confirmation from you, SunInstall begins the actual installation of your system, loading operating system software onto your disk(s).



If you are using a terminal (not a Sun bit mapped display) as system console and have not yet determined the `/etc/termcap` name for the terminal, now is the time to do it. See F.1.1 “Preliminary Information Worksheet” for complete instructions.

Starting the SunInstall Program

Invoke the SunInstall program from the miniroot as follows:

```
# suninstall
```

You are ready to use the program when this screen is displayed:

```

                                Welcome to SunInstall

Remember: Always back up your disks before beginning an installation.

SunInstall provides two installation methods:

1. Quick installation:

This option provides an automatic installation with a choice
  of standard installations, and a minimum number of questions asked.

2. Custom installation:

Choose this method if you want more freedom to configure your
  system. You must use this option if you are installing your
  system as a server.

Your choice (or Q to quit) >>

```

Entering Initial Information

The following steps will provide SunInstall information about your system’s console terminal, the time zone you are in, and the current date and time.

These steps employ a simple convention.

- *enter*
denotes keyboard input with an ending `(Return)` (the ensuing action takes place when you press the `(Return)` key).
 - *type*
denotes keyboard input without a `(Return)` following. (The ensuing action takes place as soon as you type a character.)
1. Enter **2** in response to the SunInstall Welcome screen, selecting a custom installation.

SunInstall automatically checks for your terminal type. If you are using a Sun bit-mapped display, SunInstall does not ask for your terminal type and skips to the next step.

If you are not using a Sun bit-mapped display, SunInstall prompts you for your terminal type, as shown in Step 2.

```
Select your terminal type:
  1) Televideo 925
  2) Wyse Model 50
  3) Sun Workstation
  4) Other
```

```
>>
```

2. Enter a number from 1 to 3 to specify your terminal type from those listed, or 4 if your terminal is of some other type.

If you choose 4 (Other) SunInstall asks you to enter the name of your terminal as it appears in the `/etc/termcap` file. Refer to the Preliminary Information Worksheet for this information.

After you enter your terminal type SunInstall will ask for your local time zone name:

```
Enter the local time zone name (enter ? for help):
```

3. Although you can enter time zone information from the keyboard, it's easiest to use the on-line help facility:

Enter ? to display the TIMEZONE menu.

TIMEZONE MENU

[?=help]

Select one of the following categories to display
a screen of time zone names for that region

_ United States
Canada
Mexico
South America
Europe
Asia
Australia and New Zealand
Greenwich Mean Time

Are you finished with this menu [y/n] ?

[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

4. Move the cursor to the appropriate region name (by typing `Return`) and then type `x` to display a corresponding menu of time zones.

The UNITED STATES menu is shown here.

```

UNITED STATES MENU                                     [?=help]
-----
  TIME ZONE NAME                                     AREA
  _ US/Eastern                                       Eastern time zone, USA
    US/Central                                       Central time zone, USA
    US/Mountain                                       Mountain time zone, USA
    US/Pacific                                       Pacific time zone, USA
    US/Pacific-New                                   Pacific time zone, USA
                                                    with proposed change to Daylight
                                                    Savings Time near election time
    US/Alaska                                       Alaska time zone, USA
    US/East-Indiana                                  Eastern time zone, USA
                                                    no Daylight Savings Time
    US/Hawaii                                       Hawaii

Are you finished with this menu [y/n] ?
[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

```

5. Move the cursor to the appropriate time zone name and type `x`.

SunInstall prompts:

```

Are you finished with this menu [y/n] ?

```

6. Enter `y` to exit this menu and redisplay the TIMEZONE menu.
7. Enter `y` again to exit the TIMEZONE menu.

SunInstall now asks you to confirm the current date and time, as in the following example:

```
Is this the correct date/time: Thu Feb 22 17:10:15 PDT 1990
[y/n] >>
```

8. Enter **y** if the displayed information is correct. Otherwise, enter **n** and press the Return key. The Set Time screen appears. The format for the Set Time screen display depends on which time zone you selected. Press Delete, Control-U or the Backspace key to erase the sample response. Then enter the correct date and time using the format that is displayed for your time zone, and press the Return key.

As an example, on the third day of June, 1990 at three o'clock in the afternoon you could enter:

```
>> 03/06/90 03:00 pm
```

After you press the Return key, SunInstall would respond:

```
Is this the correct date/time: Sun Jun 3 15:00:12 PDT 1990
[y/n] >>
```

Enter **y** if the displayed information is correct and **n** if you want to try again. (Note that SunInstall displays in twenty-four hour time, thus three o'clock in the afternoon is displayed as 15:00.)

SunInstall sets the system clock and displays the Main Menu.

MAIN MENU

[?=help]

Sun Microsystems System Installation Tool

(+ means the data file(s) exist(s))

_ assign host information

exit SunInstall

[RET/SPACE=next choice] [x/X=select choice] [^B/^P=backward] [^F/^N=forward]

Using the Main Menu

The SunInstall Main Menu allows you to use the following control keys:

SPACE
RETURN move forward, by item, as far as the prompt line

Control-F
Control-N move forward through the menu items

Control-B
Control-P move backward through the menu items

(The cursor-movement keys are noted on the message line at the bottom of the screen.)

Control-L repaint the screen should it become garbled

The choices on the Main Menu allow you to:

display a form

Move the cursor to the corresponding form name, and type **x** or **X**.

exit SunInstall

Move the cursor to `exit SunInstall`, and type **x** or **X**.

display general information about the menu use

Type `?` at any time to display an *On-Line Help Screen*; see the figure below for an example. Press **Return** to redisplay the Main Menu when you are through viewing the help text.

start the installation

When you have completed the last required form, the Main Menu displays:

```
start the installation
```

Type **x** or **X** to begin the installation of your system.

Figure 5-1 *On-Line Help Screen*

ON-LINE HELP FOR MENUS	
KEYS	PURPOSE
CONTROL B	move to previous item
CONTROL P	move to previous item
CONTROL F	move to next item
CONTROL N	move to next item
<RETURN>	move to next item
<SPACE>	move to next item
x or X	select an item
CONTROL L	repaint screen
CONTROL C	abort

Press <return> to continue ...

Completing the HOST Form

From the SunInstall Main Menu, complete the HOST Form as follows:

1. Select assign host information.
2. Complete the form, referring to your Host Form Worksheet and using the following example as a guide.


```

HOST FORM                [?=help] [DEL=erase one char] [RET=end of input data]
-----
Workstation Information :
  Name : beaujolais
  Type : [standalone] [server] x [dataless]
  Server name : sonoma
  Server Internet Address : 195.5.2.3
  Path of the executables on server : /export/exec/sun4
  Path of the kernel executables on server : /export/exec/kvm/sun4

Network Information :
  Ethernet Interface : [none] x[le0]

  Internet Address   : 195.5.2.15
  NIS Type           : [none] [master] [slave] x[client]
  Domain name       : em_city.oz.com

Misc Information :
  Reboot after completed : [y] x[n]

Are you finished with this form [y/n] ?
[x/X=select choice] [space=next choice] [^B/^P=backward] [^F/^N=forward]

```



This example form is the first of many to appear in this procedure. Each uses the same conventions.

- System-specific items are italicized.
- User entries are boldfaced.

Thus, the example Ethernet interface (*le0*) is system-specific information SunInstall displayed, while the example hostname (**beaujolais**) and IP address (**195.5.2.15**) are system-specific information the user entered.

When you have completed the last screen field, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

3. Enter **y** to exit the form.

The message updating databases ... is briefly displayed, followed by the Main Menu.

Completing the DISK Form

From the SunInstall Main Menu complete the DISK Form as follows:

1. Select assign disk information.

SunInstall polls the disk drives and lists their device numbers in the Attached Disk Devices field. The form will look like this for most systems with one SCSI disk:

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    [sd0]

```

2. Select the system disk.

SunInstall then expands the DISK Form:

```

DISK FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Attached Disk Devices :
    x[sd0]

Disk Label: [default] [use existing] [modify existing]
Free Hog Disk Partition : [d] [e] [f] [g] x[h]
Display Unit      : x[Mbytes] [Kbytes] [blocks] [cylinders]

```

Steps 3 through 5 explain how to complete the new fields.

3. In the Disk Label field, choose a starting disk label. The choices are:

- default
Displays the standard partitions for your system configuration. This is the correct choice for new installations and most installations of existing systems as well.
- use existing
Displays the partitions defined on the disk but does not allow them to be changed. If you are reinstalling a previously installed system, and you don't want to modify the existing disk partitions, select this option. Note that you must enter the MOUNT PT fields by hand.
- modify existing
Displays the existing partitions on the selected disk and allows them to be changed. Again, the MOUNT PT fields must be entered by hand.

When installing a dataless workstation default is the best choice.

4. SunInstall will choose the partition normally associated with users' home directories (g or h) as the default for the *Free-Hog Disk Partition*.



If you have a small disk (under 130 MB), partition `g` will be marked as the free-hog partition. The example forms in this procedure assume that you are installing SunOS Release 4.1.1 on such a disk.



The *Free-Hog*

The SunInstall program will help you prepare a disk layout that it will use later to define physical disk partitions. As you refine the layout, the program automatically sees that the total amount of disk space in use by the defined partitions equals the total space available on the disk. SunInstall does so by automatically adjusting the size of one partition on each disk: the *free-hog* partition.

As the other partitions are increased or decreased in size the free-hog is decreased or increased to maintain the correct total. It is common to designate the partition that will hold the users' personal directories (usually `/home`) as the free-hog. This results in the users having as much disk space as possible for doing their work commensurate with the specific disk space needs of the operating system.

The term *free-hog* only refers to the special role the partition plays while you're using the SunInstall program. **There is no free-hog partition on an installed system; the concept is meaningless apart from the SunInstall program.** Also note that since the size of the free-hog is relative to that of the other partitions it is not possible to directly change the size of the free-hog. (That is, you cannot type in the `SIZE` field for the free-hog on the `DISK` Form).

5. In the **Display Unit** field, specify how you want partition sizes displayed in the `SIZE` column. When defining partitions for a dataless workstation display in *cylinders* is most convenient. The example forms below will display partition sizes in cylinders. (Refer to "Disk Structure" in Appendix E — "Disk Structure and Disk Space Terminology" for general information about blocks and cylinders.)

When you make your choice, SunInstall displays a partition table that reflects the selected label. If you selected `default` at step 3, the `MOUNT PT` and `PRESERVE*` columns will be filled in. (The columns will otherwise be empty.) Following is a default partition table for a standalone system.

* Since a dataless workstation has, by definition, no user data on its local disk *no* filesystem should be set to

PARTITION	START_CYL	BLOCKS	SIZE†	MOUNT PT	PRESERVE (Y/N)
a	0	16170	77	/	n
b	77	28140	134		
c	0	204540	974		
d	0	0	0		
e	0	0	0		
f	0	0	0		
g	211	160230	763		
h	0	0	0		

The root (/) Partition

The size displayed for your root partition (the `a` partition of your system disk) will reflect the current size of the partition on the disk. If you used `format` to adjust the size of the root this is a good opportunity to check your work, verifying that the partition is the size you intended. **Remember: you cannot change the size of the `a` partition on the system disk within SunInstall.**

The swap Partition

The size displayed for your swap partition (the `b` partition of your system disk) will also reflect the current size of the partition on the disk.

- Since our goal is to give all of the space not assigned to the root (/) to the swap partition, subtract the `SIZE` (in cylinders) of the root partition from the `SIZE` of the entire disk (the `c` partition.) For the example given above:
 $974 - 77 = 897$.

Press `Return` until the cursor is next to the swap partition's `SIZE` field, back-space over the current size, and enter the new size just calculated. Note that SunInstall automatically decreases the size of the designated free-hog partition to zero (0.)

PARTITION	START_CYL	BLOCKS	SIZE	MOUNT PT	PRESERVE (Y/N)
a	0	16170	77	/	n
b	77	188370	897		
c	0	204540	974		
d	0	0	0		
e	0	0	0		
f	0	0	0		
g	0	0	0		
h	0	0	0		

PRESERVE(Y/N) `y`.

† Remember that for the dataless workstation we have chosen to display `SIZE` in *cylinders* rather than in the more common *megabytes*.

When you complete the table, SunInstall prompts

O.K. to use this partition table [y/n] ?

7. Enter **y** to use the displayed table or **n** if you wish to change it.

When you accept the table, SunInstall prompts

Are you finished with this form [y/n]?

8. Enter **y** since you are defining only one disk.

Completing the SOFTWARE Form

From the SunInstall Main Menu, complete the SOFTWARE Form as follows:

1. Select assign software information from the Main Menu.

SunInstall displays the SOFTWARE form.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  [add new release]  [edit existing release]
```

2. Select add new release.

SunInstall requests the device name and location of the device on which the Release 4.1.1 media resides.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
Media Device   : [st0] [st1] [st2] [st_]* [xt0] [mt0] [fd0] [sr0]
Media location : [local] [remote]
```

The following prompt appears:

* Selecting [st_] will allow you to specify the st device number manually. This feature allows selection of SCSI devices 3-7 when necessary.

Please insert the release media that you are going to install
Press <Return> to continue

3. Complete the **Media Information** fields, using the following examples as a guide.

Example for quarter-inch Tape in Local Drive:

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
Media Device   : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
Media Location : x[local] [remote]
```

Example for half-inch Tape in Remote Drive:



When reading from a media device attached to a remote system make sure that the hostname of the system being installed is included in the `/.rhosts` file of the remote system.

Note that including the hostname of the system being installed in the `/.rhosts` file allows superuser (root) access to the remote system from your workstation. For increased security, be sure to remove the hostname from the `/.rhosts` file once you have completed the installation.

```
SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release]  [edit existing release]

Media Information:
Media Device       : [st0] [st1] [st2] [st_] x[xt0] [mt0] [fd0] [sr0]
Media location    : [local] x[remote]
Media Host        : persephone
Media Host's Internet Address : 195.5.2.16
```

Having gathered the information needed to access the Release 4.1.1 media, SunInstall prompts:

```
Ok to use these values to read the table of contents [y/n] ?
```

4. Enter **y** if the values are correct or **n** if you need to change any of them.

When you elect to use the displayed information, SunInstall expands the form as shown below.

```

SOFTWARE FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Software Architecture Operations:
  x[add new release] [edit existing release]

Media Information:
  Media Device   : x[st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location : x[local] [remote]

Choice:  [all] [default] [required] [own choice]
Executables path: /usr
Kernel executables path: /usr/kvm

```

5. Specify *required* by typing **SPACE** to move the cursor and then typing **x**.
6. Press **Return** in the following fields to use the standard paths to executable files.

```

Executables path:
Kernel executables path:

```

SunInstall prompts:

```
Ok to use these values to select Software Categories [y/n] ?
```

7. Enter **y** to use the displayed values and begin software selection.
SunInstall will automatically select the “root” software category, and nothing else. (Root is all that is needed on a dataless workstation.)
8. Enter **y** to use the configuration.

When you elect to use the configuration, SunInstall prompts:

```
Are you finished with this form [y/n] ?
```

9. Enter **y** to exit the form and redisplay the Main Menu.

Letting SunInstall Run

The Main Menu should now be displayed. Move the cursor to:

```
start the installation
```

Type **x** to begin the installation.

Your screen will reflect the progress of the installation as SunInstall labels the disk, creates the specified filesystems, and loads software from the Release 4.1.1 media. Depending on the software categories you chose earlier, you may be asked to load additional media, as shown in the following example:


```

System Installation Begins:
Label disk(s):
    sd0
Create/check filesystems:
Creating new filesystem for / on sd0a
newfs /dev/rsd0a >> /etc/install/suninstall.log 2> &1
. . .
Extracting sunos.4.1.1.sun4c 'root' media file ...

```

If There's a Problem

If SunInstall should, for some reason, fail or have to be aborted during its run, it will save the data files that were created as you filled in the forms. You can remedy the problem and then re-invoke SunInstall, going directly to “start the installation.” SunInstall may prompt:

```

Some software has already been loaded.
Are you sure you want to restart the installation (y/n) ?

```

Answering “y” will have SunInstall restart its run using the data you have already entered.

When SunInstall Completes

What happens after SunInstall extracts the root software category depends on how you filled in the `Reboot after completed` field on the HOST Form.

- If you selected **y**, your system boots automatically. Booting messages appear, followed by a `login` prompt. Refer to Section 5.6, “Deciding What Still Needs To Be Done” for further instructions.
- If you selected **n**, the `#` prompt reappears. Your system is still running the `miniroot`.

Booting Up Your Workstation

To boot your new operating system from the `#` prompt do the following:

```
# sync; sync; reboot
```

5.6. Deciding What Still Needs To Be Done

Several basic system administration tasks should be completed following the installation of your system.

Logging In and Setting the root Password

As supplied the SunOS operating system does not have a password protecting the superuser (`root`) login. Login as “**root**” and then use the `passwd(1)` command to set the password of your choice.

Installing a Small Kernel

Pre-configured small kernels are available for the following configurations:

- Sun-3/50 and Sun-3/60 with up to 2 SCSI disks, 1 SCSI tape
- Sun-3/80 with up to 4 SCSI disks, 2 SCSI tapes
- Sun-4/110 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 330 with up to 4 SCSI disks, 2 SCSI tapes
- SPARCstation 1, 1+ and 2 with up to 4 SCSI disks, 1 Floppy Disk, 2 SCSI tapes
- All other Desktop SPARCsystems

If you want to install an appropriate pre-configured kernel do so by executing:

```
# install_small_kernel
```

The utility is self-explanatory and will ask you for confirmation before making any changes to the system.

Building and Installing a Custom Kernel

For best workstation performance you should make and install a custom operating system *kernel*. The kernel is a program which is loaded into memory when your workstation is booted and which then controls all aspects of system operation. The default kernel is called the *GENERIC* kernel. This kernel includes the software necessary to access all of Sun's peripheral hardware. While this is useful during installation it also means that the kernel includes much more software, and is therefore much larger, than is required for any specific system. This excessive size means an inefficient kernel which uses up memory that can be put to better use and provide improved performance.

Complete instructions for creating and installing a custom kernel for your workstation are given in Chapter 9 of the *System and Network Administration Manual*, Reconfiguring the System Kernel.



If you chose to install a **GENERIC_SMALL** kernel at the conclusion of running SunInstall that kernel will provide improved performance as compared to the **GENERIC** kernel. You may still, however, see some further improvement by creating a kernel matched to your specific configuration.

Setting Up Your Personal Account

Refer to the manuals *Getting Started with SunOS: Beginner's Guide* and *Setting Up Your SunOS Environment: Beginner's Guide* for assistance.

For Desktop SPARCsystems, refer to your Owner's Set for information on setting up your personal account.

Customizing Your Environment

Refer to Chapter 8 of *System and Network Administration Manual*, Administering Workstations, Section 8.1. Here you will find the information you need for setting up user home directories, enabling electronic mail, etc.

Using *format* to Reformat Your System Disk and Change Partition Sizes

This appendix describes how to invoke and use the `format(8S)` program to

- format a disk.
- label a disk with partition information



To format your system disk, or to increase the `root` partition or decrease the `swap` partition, you must use `format` from the `MUNIX` miniroot install menu. To format any other disk, or to re-size partitions `d` through `h` on the system disk, you can use `format` from the miniroot install menu or manually invoke it from the miniroot.



Before proceeding further, you should consider carefully whether either type of activity is necessary:

- **Formatting a disk** is a time-consuming procedure that erases all data from the disk. If your disk has data on it, you should not reformat it unless you have definite reason to believe that problems you are having are a result of the disk itself.
- **Partitioning a disk** with the `format` program requires considerable care. Examine your disk requirements carefully to make sure you need either to change the size of your root partition or decrease your swap partition. (Depending on your system's role as standalone, server, or dataless, see the first section in Chapter 2, 3, 4, or 5 for a discussion of disk partitioning.) Note that you should use the `SunInstall` program, **not** `format(8S)` to *increase* the size of the swap partition or change the size of any other partition, except for the root partition.

A.1. Formatting and Relabeling Your Disk

When you manually invoke the `format` program, a list of available disks is displayed. The first disk is number 0, the second number 1, and so on, for each active disk. In the following example, `format` found one `xy` disk (`xy0`). When you invoke `format` with the `MUNIX` miniroot install script, the disk is selected for you.

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

AVAILABLE DISK SELECTIONS:
  0. xy0 at xyc0 slave 0
    xy0: <Fujitsu-M2333 cyl 821 alt 2 hd 10 sec 67>
Specify disk (enter its number):
```

Note: Sample display; contents may vary, depending on user input and the system used.

You should now see a similar display on your screen, with a prompt asking for a disk number.

1. Enter the number of the disk you wish to format.

The Format Menu is displayed:

```
Specify disk (enter its number): 0

Format Menu:
  disk      - select a disk
  type      - select (define) a disk type
  partition - select (define) a partition table
  current   - describe the current disk
  format    - format the disk
  repair    - repair a defective sector
  show      - show a disk address
  label     - label the disk
  analyze   - surface analysis
  defect    - defect list management
  backup    - search for backup labels
  quit

format>
```

2. At the format> prompt, enter **type**.

If the disk type cannot be derived, the screen displays a selection of disk types:

```
format> type
  0. Fujitsu-2351 Eagle
  1. Fujitsu-M2333
  2. Fujitsu-2361 Eagle
  3. CMD EMD 9720
  4. Other
```

3. Enter the number corresponding to your disk.

The specified disk is selected:

```
Specify disk type (enter its number): 1
selecting xd0 <Fujitsu-M2333>
```

4. Enter **format**:

```
format> format
```

A message reminds you that formatting a disk can be a lengthy procedure, and asks if you want to continue:

```
format> format
Ready to format. Formatting cannot be interrupted
and takes a long while. Continue?
```

5. Enter **y** to initiate formatting.

When formatting is completed, the screen displays a sequence of messages and returns to the `format>` prompt:

```
format> format
Ready to format. Formatting cannot be interrupted
and takes a long while. Continue? y
Beginning format. The current time is
      Wed Feb 21 16:58:05 1990

Formatting...done

Verifying media...
      pass 0 - pattern = 0xc6dec6de
      pass 1 - pattern = 0x6db6db6d
Total of 0 defective blocks repaired.
format>
```

Note: Sample display; contents may vary, depending on user input and the system used.

You should now relabel your disk.

6. Enter **label** at the `format>` prompt.

The display asks if you want to proceed with the labeling:

```
format> label
Ready to label disk, continue?
```

7. Enter **y**.

```
format> label
Ready to label disk, continue? y
```

When the screen redisplay the `format>` prompt, labeling is completed. Your disk is now formatted and labeled. If you want to go on to resize the root partition or reduce the swap partition, proceed to Step 3 in the next section. If you are finished with `format`, enter `q`:

```
format> q
```

If you invoked `format` from the `MUNIX` miniroot install script, the script now continues. If you ran `format` manually, you may now refer to the applicable chapter to run `Suninstall`.

A.2. How to Change the Root Partition or Decrease the Swap Partition of Your System Disk

The following procedure is used only for changing the size of the root partition (partition `a`) or reducing the size of the swap partition (partition `b`). All other partitioning is carried out with the `SunInstall` program.

To change the size of a partition, you will need to enter a starting cylinder for the partition and specify the partition's size, in 512-byte blocks. If you are not familiar with disk structure and the terminology used in setting up partitions, refer to Appendix E, `Disk Structure and Disk Space Terminology`.

To use the `partition` option of the `format` program:

1. Invoke `format`, as described in Section A above. (If you have just finished reformatting your system disk and the `format>` prompt is on your screen, skip Step 1 and proceed directly to Step 3.)

When you invoke `format`, a list of available disks is displayed. The first disk is number 0, the second number 1, and so on, for each active disk. In the following example, `format` found one disk, `sd0`.

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

AVAILABLE DISK SELECTIONS:
  0. sd0 at sw0 slave 0
     sd0: <Micropolis 1558 cyl 1218 alt 2 hd 15 sec 35>
Specify disk (enter its number):
```

Note: Sample display; contents may vary, depending on user input and the system used.

You should now see a similar display on your screen, with a prompt asking for a disk number.

2. Enter the number of your system disk.

The system verifies selection of the disk and displays the Format Menu:

```
Specify disk (enter its number): 0
selecting sd0: <Micropolis 1558>
[disk formatted, defect list found]

Format Menu:
  disk      - select a disk
  type      - select (define) a disk type
  partition - select (define) a partition table
  current   - describe the current disk
  format    - format the disk
  repair    - repair a defective sector
  show      - show a disk address
  label     - label the disk
  analyze   - surface analysis
  defect    - defect list management
  backup    - search for backup labels
  quit

format>
```

Note: Sample display; contents may vary, depending on user input and the system used.

3. At the `format>` prompt, enter `partition`.

The Partition Menu is displayed:

```
PARTITION MENU:
  a      - change 'a' partition
  b      - change 'b' partition
  c      - change 'c' partition
  d      - change 'd' partition
  e      - change 'e' partition
  f      - change 'f' partition
  g      - change 'g' partition
  h      - change 'h' partition
  select - select a predefined table
  name   - name the current table
  print  - display the current table
  label  - write partition map and label to the disk
  quit

partition>
```

4. Enter **a** to change the root partition, or enter **b** to decrease the swap partition. You can only work on one partition at a time. The examples in this and the following steps show a sequence of repartitionings based on changing the size of the root partition.

```
partition> a
```

The screen will now look similar to this:

```
partition> a
      partition a - starting cyl      0, # blocks      32025 (61/0/0)
Enter new starting cyl [0]:
```

Note: Sample display; contents may vary, depending on user input and the system used.

5. Enter the appropriate starting cylinder (cylinder 0 for partition a).

The screen prompts for the size of the partition in blocks.

```
Enter new starting cyl [0]: <Return>
Enter new # blocks [32025, 61/0/0]:
```

Note: Sample display; contents may vary, depending on user input and the system used.

6. Enter the size in 512-byte blocks.*

The following screen shows entries for allocating 16MB to the a partition. After partition size is entered, the partition> prompt is displayed.

```
Enter new # blocks [32025, 61/0/0]: 32768
partition>
```

Note: Sample display; contents may vary, depending on user input and the system used.

Partition a is now sized to contain exactly 16MB. However, the space it occupies on disk will not fill an exact number of cylinders. Although this is not necessary, it is a highly desirable convenience. The next steps resize the a partition to fill out the last cylinder it occupies.

7. Enter a at the partition> prompt.

The screen displays the block size previously entered and the cylinders/tracks/blocks occupied. In the example, the partition takes up between 62 and 63 cylinders.

* To convert megabytes to blocks, multiply the number of megabytes by 2048. (One megabyte equals 1048576 bytes. This, divided by 512 bytes, equals 2048.) A partition of exactly 16MB contains 16 X 2048 = 32,768 blocks.


```
partition> a

      partition a - starting cyl      0, # blocks      32768 (62/6/8)

Enter new starting cyl [0]:
```

Note: Sample display; contents may vary, depending on user input and the system used.

8. Press **<Return>**.

The screen prompts you to enter the new partition size.

```
partition> a

      partition a - starting cyl      0, # blocks      32768 (62/6/8)

Enter new starting cyl [0]: <Return>
Enter new # blocks [32768, 62/6/8]:
```

Note: Sample display; contents may vary, depending on user input and the system used.

9. Enter the new partition size in cylinders/tracks/blocks, instead of as a fixed number of blocks. Round up to the next whole cylinder.

After receiving the new partition size, the system returns you to the `partition>` prompt.

```
Enter new starting cyl [0]: <Return>
Enter new # blocks [32768, 62/6/8]: 63/0/0
partition>
```

Note: Sample display; contents may vary, depending on user input and the system used.

The `a` partition now occupies 63 cylinders, from cylinder 0 through cylinder 62.

If you change the size of the `a` partition, you also need to change the size of the `b` partition so that `b` starts where `a` ends. The next steps illustrate both decreasing the size of the `b` partition and adjusting it to immediately follow the `a` partition.

10. Enter `b` at the `partition>` prompt to change the size of partition `b`.

The screen displays the current size and location of partition `b`, and prompts for the new starting cylinder:

```
partition> b

      partition b - starting cyl      61, # blocks      59850 (114/0/0)

Enter new starting cyl [61]:
```

Note: Sample display; contents may vary, depending on user input and the system used.

In the example, partition `b` currently starts at cylinder 61. This means that if it is not changed, it will overlap the boundaries defined for partition `a`, which extends through cylinder 62.

11. Enter **63** as the new starting cylinder.

The screen prompts for the partition size in blocks.

```
Enter new starting cyl [61]: 63
Enter new # blocks [59850, 114/0/0]:
```

Note: Sample display; contents may vary, depending on user input and the system used.

12. Enter the block size for partition `b`.

The `partition>` prompt is redisplayed.

```
Enter new # blocks [59850, 114/0/0]: 49152
partition>
```

Note: Sample display; contents may vary, depending on user input and the system used.

In the example, partition `b`, the swap partition, has been decreased to 24MB (24 X 2048 = 49152).

Once again, after entering a partition size in number of blocks, the partition should be adjusted to consist of whole cylinders.

13. Enter **b** at the `partition>`, followed by **Return** at the new starting cylinder prompt.

The display now shows the current partition size in number of blocks and cylinders/tracks/blocks and prompts for the new size.

```
Enter new # blocks [49152, 93/9/12]:
```

Note: Sample display; contents may vary, depending on user input and the system used.

14. Enter the new partition size in cylinders/tracks/blocks. Round up to the next whole cylinder.

The `prompt>` is displayed.

```
Enter new # blocks [49152, 93/9/12]: 94/0/0
partition>
```

Note: Sample display; contents may vary, depending on user input and the system used.

Check the results of your repartitioning to see that your partitions are sized in whole cylinders.

15. Enter **print** at the `partition>`.

```
partition> print
Current partition table (unnamed):
  partition a - starting cyl      0, # blocks      33075 (63/0/0)
  partition b - starting cyl     63, # blocks      49350 (94/0/0)
  partition c - starting cyl      0, # blocks     639450 (1218/0/0)
  partition d - starting cyl      0, # blocks           0 (0/0/0)
  partition e - starting cyl      0, # blocks           0 (0/0/0)
  partition f - starting cyl      0, # blocks           0 (0/0/0)
  partition g - starting cyl     175, # blocks     235725 (449/0/0)
  partition h - starting cyl     624, # blocks     311850 (594/0/0)
```

Note: Sample display; contents may vary, depending on user input and the system used.



16. After altering the size and position of the `b` partition, you must adjust the `g` partition to compensate, making sure that no overlap or gap occurs. Calculate the new starting cylinder for the `g` by adding the number of cylinders in the `b` partition to the starting cylinder number (for example, $94 + 63 = 157$). Calculate the new size of the `g` partition by subtracting the new starting cylinder number (for example, 157) from the total number of cylinders available on the disk; this total number is the same as the size shown for the `c` partition. (In our example, $1,218 - 157 = 1061$.)
17. Adjust the size of the `g` partition by entering `g` at the partition prompt and then entering the starting cylinder and number of cylinders calculated in the preceding step. Remember to enter the number of cylinders in cylinder format: `c/0/0`.

```
partition> g
  partition g - starting cyl 175, # blocks 235725 (449/0/0)

Enter new starting cyl [61]: 157
Enter new # blocks [235725, 449/0/0]: 1061/0/0
partition>
```

Note: Sample display; contents may vary, depending on user input and the system used.

18. Any partitions other than `a`, `b`, `c`, and `g` should be deleted (Other partitions are most easily created when when you run *Suninstall*). For example:

```
partition> h
  partition h - starting cyl 624, # blocks 311850 (594/0/0)

Enter new starting cyl [624]: 0
Enter new # blocks [311850, 594/0/0]: 0
```

Note: Sample display; contents may vary, depending on user input and the system used.

19. You can check your work by entering a `print` command:

```
partition> print
Current partition table (unnamed):
partition a - starting cyl      0, # blocks    33075 (63/0/0)
partition b - starting cyl     63, # blocks    49350 (94/0/0)
partition c - starting cyl      0, # blocks   639450 (1218/0/0)
partition d - starting cyl      0, # blocks      0 (0/0/0)
partition e - starting cyl      0, # blocks      0 (0/0/0)
partition f - starting cyl      0, # blocks      0 (0/0/0)
partition g - starting cyl    157, # blocks   557025 (1061/0/0)
partition h - starting cyl      0, # blocks      0 (0/0/0)
```

Note: Sample display; contents may vary, depending on user input and the system used.

20. Label the disk by entering `label` at the `partition>` prompt. You will be queried to confirm, and then the `partition>` prompt is re-displayed.

21. Enter `q` to exit from the `partition` program.

The `Format Menu` and the `format>` prompt are displayed.

22. To exit from the `format` program, enter `q` at the `format>` prompt.

If you invoked `format` from the `MUNIX` miniroot install script, the script will now continue. If you ran `format` manually, you can now refer to the applicable chapter to run `Suninstall`.

Loading and Booting the Miniroot from a Remote Tape

If your system does not have local tape or CD-ROM capabilities, you will need to boot the miniroot from a remote server using either tape or CD-ROM. This appendix covers booting the miniroot from remote tape. Appendix C describes the procedures for booting the miniroot from a remote CD-ROM. **Do not start the booting procedure described below until you have completed Section 1.10, "Pre-Installation Checklist."**

This appendix uses the terms *target* and *mediahost* as they were defined in the main text: The system without local tape or CD-ROM capabilities that is booting the miniroot from a remote source is the *target* system; the remote system with local media capabilities that is being used to boot the miniroot is the *mediahost*.

Booting the miniroot from remote tape requires:

- copying the miniroot to the mediahost
- booting the target system as a temporary diskless client of the mediahost
- copying the miniroot to the target system's disk
- booting the miniroot

B.1. Copying the Miniroot from Tape to Mediahost

The mediahost you use for remote booting must be a server running SunOS 4.1.1 (If the *target* system is a SPARCstation 2, then you must have SunOS 4.1.1 available on the *mediahost*). You must have root user-privileges on the server. The server must meet the following space requirements:

- 17 MB in /export/swap
- 5 MB in /export/root
- 7 MB in /export/exec (for the miniroot)

You cannot use a symbolic link to an area with more space to meet these requirements.

To copy the miniroot to the mediahost:

1. Log onto the mediahost, and become superuser.
2. Change directories to /usr/etc/install.

Sites Using NIS (Network Information Service)

3. If your site uses NIS (Network Information Service), make the target system a client of the mediahost as follows:

```
# add_client -a k-arch client
```

- *k-arch* stands for the kernel architecture of the target system
- *client* is the name of the target system



Make sure the new-client entry that is added to the boot parameter database of the mediahost (`/etc/bootparams`) is reflected in the master NIS bootparams database.

Proceed to step 4.

Sites Not Using NIS (Network Information Service)

3. If your site does not use NIS, make the target system a client of the mediahost as follows:

```
# add_client -a k-arch -y none client
```

- *k-arch* stands for the kernel architecture of the target system
- *client* is the hostname of the target system

4. Copy the miniroot from tape to the mediahost's `/export/exec/kvm/k-arch.sunos.release` directory as shown below.

```
# mt -f /dev/nrdevnum rew
# mt -f /dev/nrdevnum fsf minirootfileno
# dd if=/dev/rdevnum bs=block\
    of=/export/exec/kvm/k-arch.sunos.release/miniroot
```

- *devnum* represents the mediahost's tape device number, as given in Table 1-2, "Media Devices."
- *k-arch* stands for the kernel architecture of the target system
- *minirootfileno* is 4 for Sun3, Sun3x and Sun4 systems and is 2 for the Sun4c
- *block* is the blocksize of the tape device. This is either 200, for 1/4-inch tape, or 20, for 1/2-inch tape.
- *release* stands for the release level of the target system

Example

For a target system with Sun4c kernel architecture and a mediahost using tape device `st0`, you would enter:

```
# mt -f /dev/nrst0 rew
# mt -f /dev/nrst0 fsf 3
# dd if=/dev/rst0 bs=200b of=/export/exec/kvm/sun4c.sunos.4.1.1/miniroot
```

B.2. Booting the Target System from the Mediahost

To boot the target system from the miniroot that has been copied to the mediahost:

1. If your workstation is not displaying the PROM monitor prompt (>, or on some Sun-4c systems, ok), simultaneously press the L1-Stop key and **a**.
2. Enter the command for booting the miniroot over the network:

For Sun3, 3x, or 4:

```
>b enet() -a
```

For Sun4c systems prior to SPARCstation 2:

```
ok boot enet() -a
   or
> b enet() -a
```

– *enet* stands for the abbreviation for your Ethernet controller, either *le* (newer systems) or *ie* (for a few older systems). If you enter the wrong abbreviation, an error message is displayed, and you can re-enter the correct abbreviation.

For Sun4c systems beginning with SPARCstation 2:

```
ok boot net -a
   or
> b net -a
```

For example:

```
> b le() -a
```

The first in a series of prompts is now displayed:

```
> b le() -a

EEPROM boot device...le(0,16,0)le0 -a
Using IP Address 195.5.2.10 = 81900E8D
booting from tftp server @ 195.5.2.22
root filesystem type ( 4.2 nfs ):
```

3. Respond to the prompt

root filesystem type (4.2 nfs):

and the series of prompts that follow it as shown in the following display:

```
root filesystem type ( 4.2 nfs ): nfs
root name: (press Return)
Boot:vmunix
root filesystem type ( spec 4.2 nfs ):nfs
root name: (press Return)
swap filesystem type ( spec nfs ):nfs
swap name: (press Return)
login:
```

4. Log in as `root`, change directories to `dev`, and use `MAKEDEV` to create a device entry for your system disk. The following example shows the system disk as `sd0`; other system disks are possible.

```
# cd /dev
# MAKEDEV sd0
```

5. Copy the miniroot to the swap partition (partition `b`) of your system disk as follows:

```
# dd if=/usr/kvm/miniroot bs=63k of=/dev/rdevnumb
```

– *devnum* is the device number of your system disk.

B.3. Booting the Target System from the Miniroot

Now the miniroot that was loaded onto the disk of the target system must be booted. For Desktop SPARC systems (sun4c), refer to step 9. For all other systems, refer to step 6.

6. Halt the target system:

```
# /etc/halt
```


The PROM monitor prompt (>) is now displayed.

- At the PROM monitor prompt, enter the following command to boot the miniroot from your system disk.

```
>b e-net() -asw
```

– *e-net* stands for the abbreviation for your Ethernet controller, either *le* (newer systems) or *ie* (for a few older systems)

For example:

```
> b le() -asw
```

The first in a series of prompts is displayed:

```
> b le() -asw
```

```
EEPROM boot device...le(0,16,0)le0 -asw
Using IP Address 195.5.2.10 = 81900E8D
booting from tftp server @ 195.5.2.22
root filesystem type ( 4.2 nfs ):
```

- Respond to the prompt

```
root filesystem type ( 4.2 nfs ):
```

and the prompts that follow it as shown in the following display, substituting the device number of your disk for *sd0*, if it is different.

```
root filesystem type ( 4.2 nfs ): 4.2
root device ( xy%d[a-h] sd%d[a-h] xd%d[a-h] ): sd0b
root on sd0b fstype 4.2
Boot: vmunix
root filesystem type ( spec 4.2 nfs ): 4.2
root device ( sd%d[a-h] ): sd0b
swap filesystem type (spec 4.2 nfs): spec
swap device ( sd%d[a-h] ): sd0b
Swapping on root device, OK? y
#
```

Now refer to step 10.

- For Desktop SPARCsystems (sun4c), enter the following command, substituting the device number of your disk for *sd0*, if it is different. Note carefully the position of the quotes, especially the single back quotes.

```
# reboot "`usr/kvm/unixname2bootname sd0b` -sw"
SunOS Release 4.1.1 (MINIROOT) ...
.
.
.
#
```

10. Booting the miniroot is completed when the root prompt (#) is displayed.



You can now proceed with Section 2.4, 3.5, 4.5, or 5.5, "Running SunInstall" as appropriate to your system configuration.

Loading and Booting the Miniroot from a Remote CD-ROM

C.1. Booting the Miniroot from a Remote CD-ROM

If your system does not have local tape or CD-ROM capabilities, you will need to boot the miniroot from a remote system using either tape or CD-ROM*. Booting from remote tape is covered in Appendix B. This section covers booting the miniroot from a CD-ROM attached to a remote system. **Do not start the booting procedure described below until you have completed Section 1.10, "Pre-Installation Checklist."**

This appendix uses the terms *target* and *mediahost* as they were defined in the main text: The system without local tape or CD-ROM that is booting the miniroot from a remote source is the *target* system; the remote system with local media capabilities that is used to boot the miniroot is the *mediahost*.

Booting the miniroot from remote CD-ROM requires:

- copying the miniroot to the mediahost
- booting the target system as a temporary diskless client of the mediahost
- copying the miniroot to the target system's disk
- booting the miniroot

C.2. Copying the Miniroot from CD-ROM to the Mediahost

The mediahost you use for remote booting must be a server running SunOS 4.1.1 (If the *target* system is a SPARCstation 2, then you must have SunOS 4.1.1 available on the mediahost). You must have root user-privileges on the server. The server must meet the following space requirements:

- 17 MB in /export/swap
- 5 MB in /export/root
- 7 MB in /export/exec (for the miniroot)

You cannot use a symbolic link to an area with more space to meet these requirements.

To copy the miniroot to the mediahost:

1. Log onto the mediahost, make yourself superuser, and change directories to /usr/etc/install:

* local CD-ROM is available only on Sun-4 and Sun-4c systems.

```
% su
Password:
# cd /usr/etc/install
```

– Enter the *root* password at Password:

Sites Using NIS (Network Information Service)

2. If your site uses NIS (Network Information Service), make the target system a client of the mediahost as follows:*

```
# add_client -a k-arch client
```

- *k-arch* stands for the kernel architecture of the target system, to be entered as shown, with a “.” at the end of entries for systems with Sun3 or Sun4 kernel architecture:
Sun4., Sun3., Sun4c, Sun3x
- *client* is the name of the target system

Example

For a Sun3x target system named *xyz*, you would enter:

```
# add_client -a sun3x xyz
```



When you make the target system a client of the mediahost, it is entered in the mediahost's boot parameter database (/etc/bootparams). Make sure that an entry for the target system is also added to the master NIS bootparams database.

Proceed to step 3.

Sites Not Using NIS (Network Information Service)

2. If your site does not use NIS, make the target system a client of the mediahost as follows:*

```
# add_client -a k-arch -y none client
```

- *k-arch* stands for the kernel architecture of the target system, to be entered as shown, with a “.” at the end of entries for systems with Sun4 kernel architecture:

* Before carrying out the following steps, it is suggested that you review the `add_client` command in *System and Network Administration* and consider consulting with a System Administrator, especially if you are using NIS.

Sun4., Sun3., Sun4c, Sun3x
 – *client* is the name of the target system

Example

For a Sun4 target system named *xyz*, you would enter:

```
# add_client -a sun4. -y none xyz
```

3. Copy the miniroot from CD to the mediahost's `/export/exec/kvm/k-arch.sunos.release` directory, as shown below— **note the use of underscores rather than periods as separators in CD-ROM entries.**

```
# mount -rt hsfs /dev/sr0 /usr/etc/install/tar
# cd /usr/etc/install/tar/export/exec/kvm/k-arch_sunos_release
# cp /miniroot_k-arch /export/exec/kvm/k-arch.sunos.release/miniroot
```

– *k-arch* stands for the kernel architecture of the target system
 – *release* stands for the release level of the target system

Example

For a Sun-4c target system, you would enter the following:

```
# mount -rt hsfs /dev/sr0 /usr/etc/install/tar
# cd /usr/etc/install/tar/export/exec/kvm/sun4c_sunos_4_1
# cp miniroot_sun4c /export/exec/kvm/sun4c.sunos.4.1.1/miniroot
```

Copying the miniroot takes several seconds. When the # returns, the miniroot is loaded on the host and the remaining procedures are carried out on the target system.

C.3. Booting the Target System from the Mediahost

To boot the target system from the mediahost:

1. If your workstation is not displaying the PROM monitor prompt (`>`, or on some Sun-4c systems, `ok`), simultaneously press the L1-Stop key and **a**. Note that instead of typing `b` at the `ok` prompt, you must type `boot`.
2. Enter the command for booting the miniroot over the network:

For Sun3, 3x, or 4:

```
>b enet() -a
```

For Sun4c systems prior to SPARCstation 2:

```
ok boot enet() -a
   or
> b enet() -a
```

– *enet* stands for the abbreviation for your Ethernet controller, either *le* (newer systems) or *ie* (for a few older systems). If you enter the wrong abbreviation, an error message is displayed, and you can re-enter the correct abbreviation.

For Sun4c systems beginning with SPARCstation 2:

```
ok boot net -a
   or
> b net -a
```

Example

For a mediahost that has an *le* Ethernet controller and is the only boot server on the network, you would enter:

```
> b le() -a
```

The command for booting over the network is followed by a number of booting messages which lead to the first of a series of prompts:

```
> b le() -a

EEPROM boot device...le(0,0,0)le0 -a
Using IP Address 195.5.2.62 = 81900E8D
booting from tftp server @ 195.5.2.22
...
root filesystem type ( 4.2 nfs ):
```

Note: Sample display; contents may vary, depending on user input and the system used.

3. Respond to the prompts that follow as shown:

```

root filesystem type ( 4.2 nfs ): nfs
...
root name:<Return>
...
Boot:<Return>
...
root filesystem type ( spec 4.2 nfs ):nfs
...
root name:<Return>
...
swap filesystem type ( spec nfs ):nfs
swap name:<Return>
...
login:

```

Note: Sample display; contents may vary, depending on user input and the system used.

4. Log in as `root`, change directories to `dev`, and use `MAKEDEV` to create a device entry for your system disk.

Example

Using `sd0` as your system disk, you would enter:

```

login:root
# cd /dev
# MAKEDEV sd0

```

After a series of messages, you are returned to the `#` prompt.

5. Copy the miniroot to the swap partition (partition `b`) of your system disk as follows:

```

# dd if=/usr/kvm/miniroot bs=63k of=/dev/rdevnumb

```

- Note that `bs=63k` is a fixed value, to be entered as shown
- `devnum` is the device number of your system disk, such as `rsd0b`

After a series of messages, the `#` prompt is returned.

C.4. Booting the Target System from the Miniroot

Now the miniroot that was loaded onto the disk of the target system must be booted. For Desktop SPARC systems (sun4c), refer to step 9. Otherwise, refer to step 6.

6. Halt the target system as shown:

```

# /etc/halt

```

After a series of messages, the PROM monitor prompt (> or ok) is displayed.

- At the PROM monitor prompt, enter the following command to boot the miniroot from your system disk.

```
>b e-net()-asw
```

– *e-net* stands for the abbreviation for your Ethernet controller. Enter the abbreviation, *le* or *ie*, used at step 2.

For example:

```
> b le() -asw
```

After a number of booting messages, the first of a series of prompts is displayed:

```
> b le() -asw

EEPROM boot device...le(0,0,0)le0 -asw
Using IP Address 195.5.2.62 = 81900E8D
booting from tftp server @ 195.5.2.22
...
root filesystem type ( 4.2 nfs ):
```

Note: Sample display; contents may vary, depending on user input and the system used.

- Respond to the prompts that follow as shown, substituting the device number of your disk for *sd0*, if it is different:

```
root filesystem type ( 4.2 nfs ): 4.2
root device ( xy%d[a-h] sd%d[a-h] xd%d[a-h] ): sd0b
root on sd0b fstype 4.2
Boot: vmunix
...
root filesystem type ( spec 4.2 nfs ): 4.2
root device ( sd%d[a-h] ): sd0b
...
swap filesystem type (spec 4.2 nfs): spec
swap device ( sd%d[a-h] ): sd0b
Swapping on root device, OK? y
...
#
```

Now refer to step 10.

9. For Desktop SPARC systems (sun4c), enter the following command, substituting the device number of your disk for `sd0`, if it is different. Note carefully the position of the quotes, especially the single back quotes.

```
# reboot "`/usr/kvm/unixname2bootname sd0b` -sw"  
SunOS Release 4.1.1 (MINIROOT) ...  
.  
.  
.  
#
```

- 10 Booting the miniroot is completed when the root prompt (`#`) is displayed.



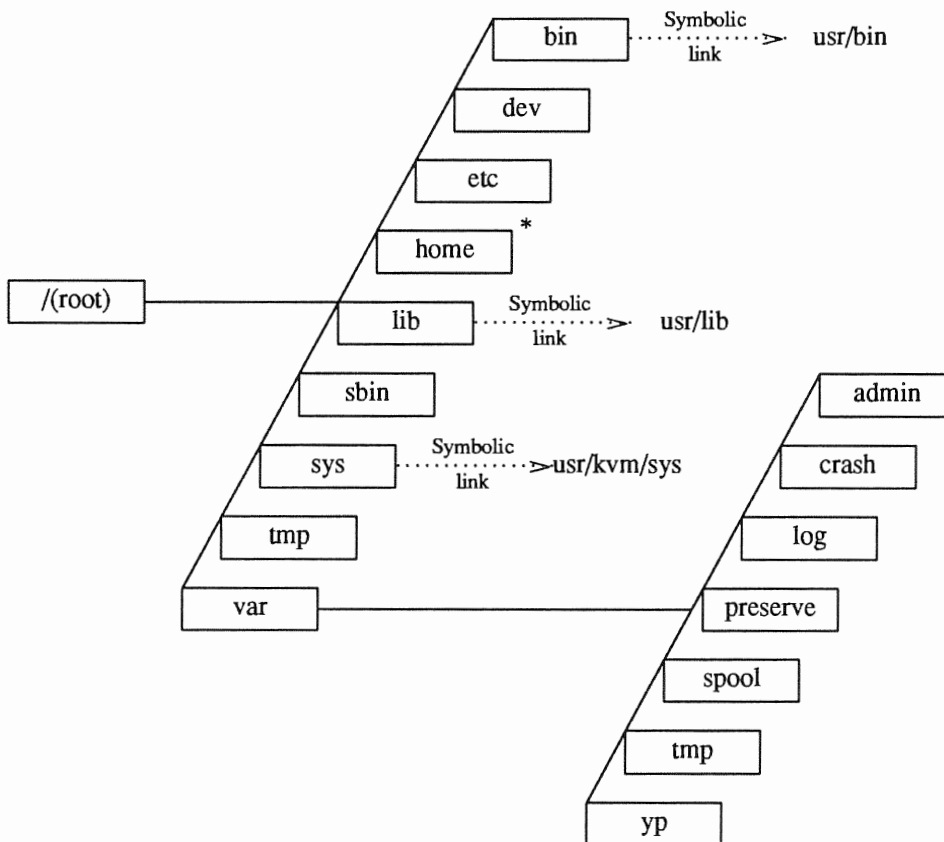
Your system is now running under the miniroot. You can proceed with Section 2.4, 3.5, 4.5, or 5.5, “Running SunInstall” as appropriate to your system configuration.

The SunOS Filesystem

D.1. The root Filesystem

The root filesystem (/) contains files and directories concerned with system and device operation. For example, `vmunix`, the SunOS kernel, is a file in `/(root)`. Figure D-1 shows directories in the root filesystem for Release 4.1.1.

Figure D-1 *Directories in the Root Filesystem*



* On smaller disks (under 130MB), `/home` is a symbolic link to `/usr/export/home`.

The following table describes some of the important directories in the root filesystem.

<code>/dev</code>	Contains device files and the <code>MAKEDEV</code> shell script. <code>MAKEDEV</code> is used to add devices to an installed system.
<code>/etc</code>	Contains data files and subdirectories used in system administration.
<code>/tmp</code>	Contains temporary files, such as those created by the C compiler. The contents of all files in <code>/tmp</code> are automatically cleared whenever you boot the system.
<code>/var</code>	Contains some temporary files and files that vary in size. Spooling programs create files in subdirectories of <code>/var/spool</code> , such as <code>/var/spool/mail</code> for incoming mail, and <code>/var/spool/lpd</code> for queued print jobs.

Prior to Release 4.0, the directory `/bin` contained UNIX executables. It is now a symbolic link to `/usr/bin` (see Section D.2, “The `/usr` Filesystem”).

Changes to the Root Filesystem Since Release 4.0

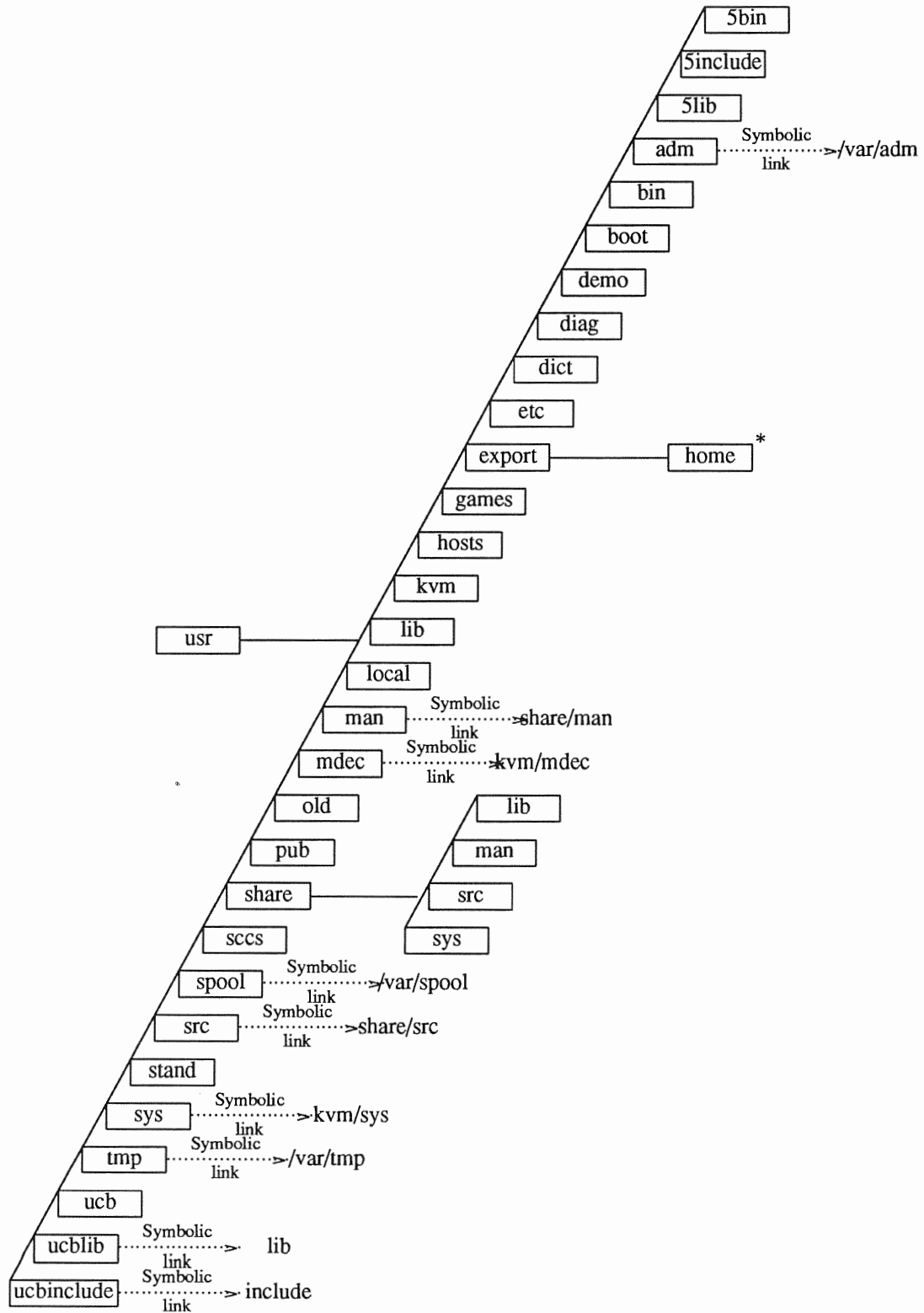
In order to consolidate kernel-architecture-dependent software, the `/sys` directory, formerly a symbolic link to `/usr/share/sys`, is now a symbolic link to `/usr/kvm/sys`, which contains files for building and reconfiguring a kernel.

D.2. The `/usr` Filesystem

The `/usr` filesystem contains executable commands, system programs, and library routines. Figure D-2, on the following page, shows the `/usr` filesystem for Release 4.1.1. Some of the important directories in `/usr` are described below.

<code>/usr/bin</code>	Contains basic SunOS commands, such as <code>ls</code> , <code>cat</code> , <code>chmod</code> , and others.
<code>/usr/etc</code>	Contains commands used for system administration and maintenance.
<code>/usr/lib</code>	Contains miscellaneous utilities, system libraries, macro packages, line-printer filters, and more.
<code>/usr/local</code>	Empty on a newly installed system; can be used to store third-party software added after installation.
<code>/usr/kvm</code>	Contains kernel-architecture-dependent software.
<code>/usr/share</code>	Contains software that is independent of system architecture. The <code>man</code> pages, for example, are located in <code>/usr/share</code> .

Figure D-2 Release 4.1.1 /usr Filesystem



* On larger disks (over 130MB), /usr/export/home is a symbolic link to /home.

Changes to the /usr Filesystem Since Release 4.0

Kernel-architecture-dependent software is now consolidated in /usr/kvm. The following are now symbolic links to subdirectories of /usr/kvm:

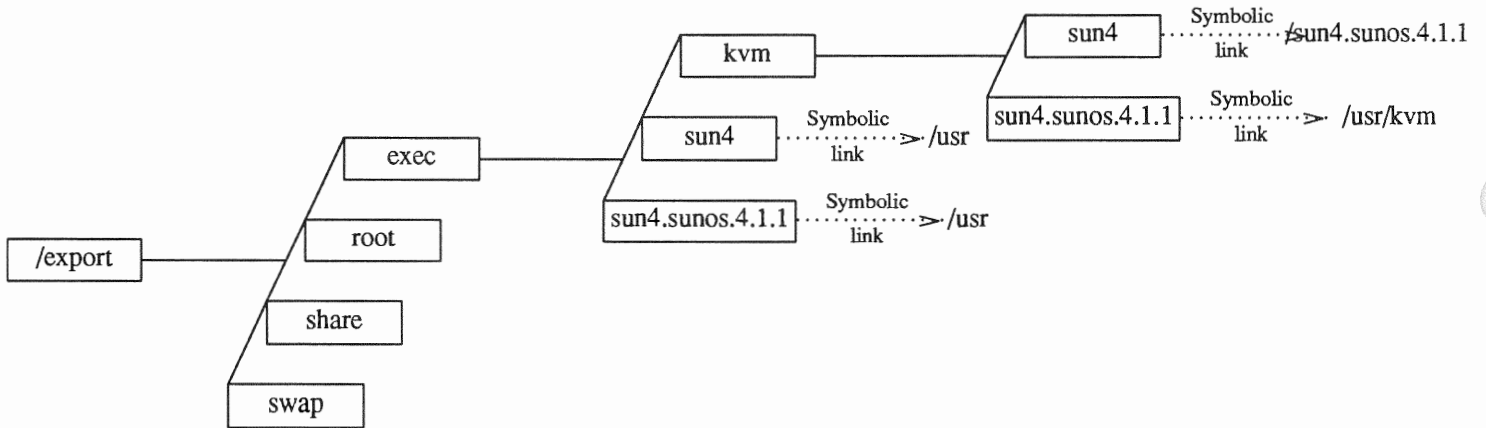
- /usr/boot
- /usr/stand
- /usr/mdec

In addition, /usr/share/sys is now a symbolic link to /usr/kvm/sys, which contains files for building and reconfiguring a kernel.

D.3. The /export Filesystem

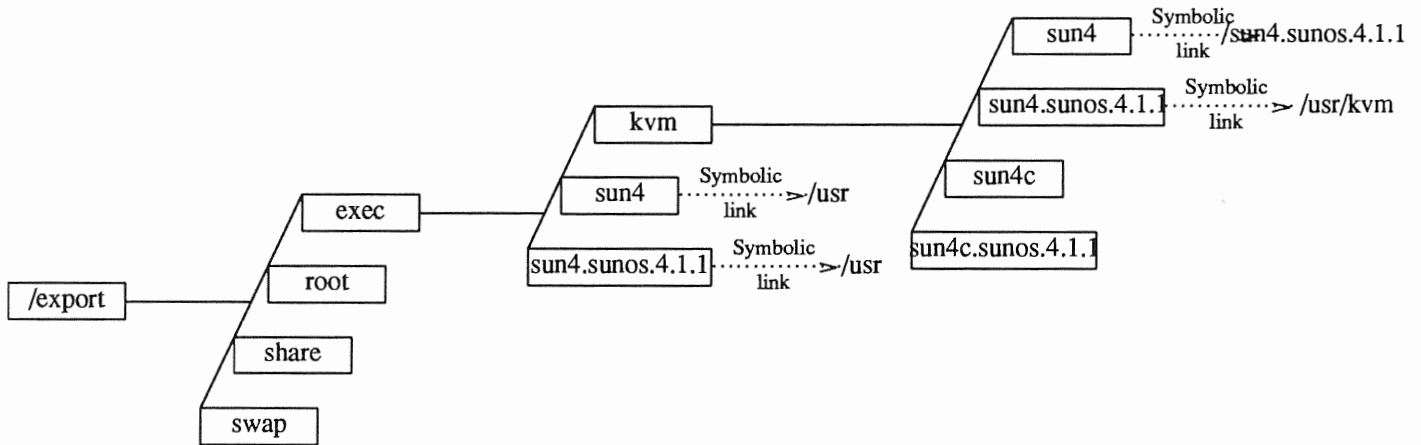
On a server that runs Release 4.1.1, the /export filesystem contains directories that the server exports to clients. Figure D-3 shows the /export filesystem of a homogeneous server. In the example, both server and clients have sun4.sun4 system architectures.

Figure D-3 /export Filesystem of a Homogeneous Server



The /export filesystem of a heterogeneous server is shown in Figure D-4. In the example, a sun4.sun4c client has been added to the sun4.sun4 server of the previous figure.

Figure D-4 /export Filesystem of a Heterogeneous Server



Some of the important directories in the /export filesystem are described below.

- /export/root Contains client root directories.
- /export/swap Contains client swap areas.
- /export/share Contains software that is independent of system architecture. The client mounts the server's /export/share as its /usr/share.
- /export/exec/a-arch.rel Contains executables that run on all systems sharing the same application architecture. The client mounts the server's /export/exec/a-arch.rel as its /usr.
- /export/exec/kvm/k-arch.rel Contains executables that only run on systems sharing the same kernel architecture. The client mounts /export/exec/kvm/k-arch.rel as its /usr/kvm.

**The export Filesystem:
Changes Since Release 4.0**

The /export filesystem is new since Release 4.1. It contains /export/exec, which previously was a separate filesystem, and /export/root, which contains client root directories.

Disk Structure and Disk Space Terminology

E.1. Disk Partitions

The SunOS operating system divides a disk into eight partitions, designated a through h. Depending on your system's network role, all or only some of these partitions will be needed. On your system disk, most of the partitions are intended for individual directory trees, but two are reserved for other purposes:

- Partition b is designated as the swap partition. It provides *virtual* memory space for processes and information that the operating system temporarily stores on disk when there is not enough room in main memory.
- Partition c covers the entire disk. It allows the operating system to carry out functions that affect the disk as a whole.

In this manual, the full directory tree contained within a single partition has been referred to as a *filesystem*. Examples of filesystems are the / (root) and /usr directory trees illustrated in Appendix D, *The SunOS Filesystem*.

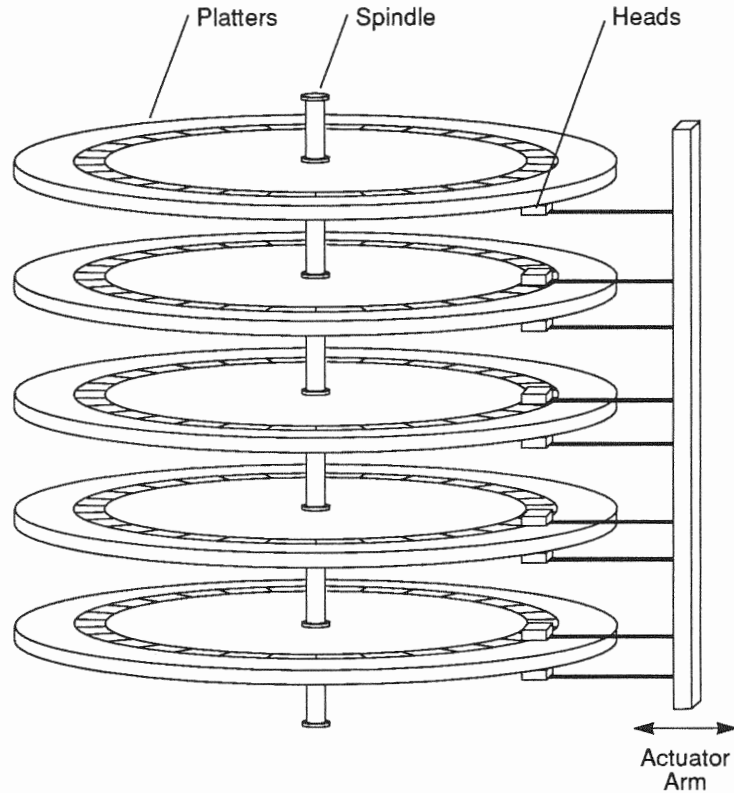
/ (root) resides in partition a, /usr makes up partition g. The term *directory* has been used to refer to the directories within a filesystem.

When you install the SunOS operating system, each partition your system is going to use must be allocated disk space in terms of *tracks*, *cylinders*, and *sectors*, or *blocks*. The following section describes the way disks are physically structured and explains these terms.

E.2. Disk Structure and Terminology

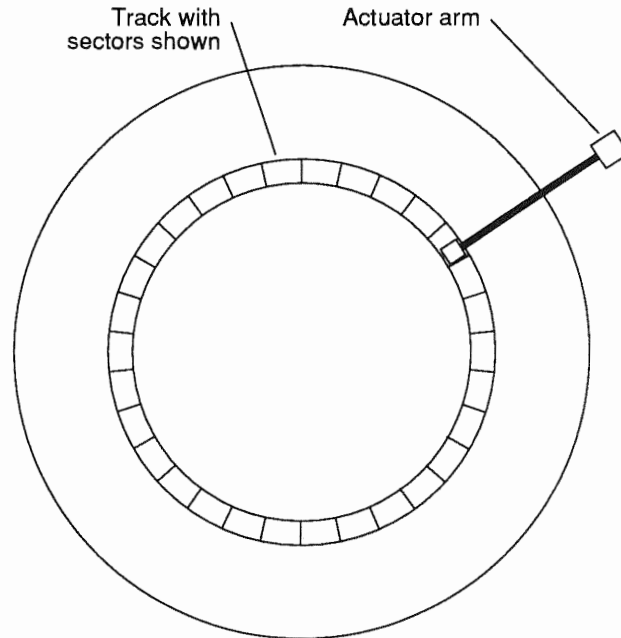
Data on a hard disk is stored on flat, magnetically coated platters. The platters are mounted on a spindle, as shown in Figure E-1. While the disk spins rapidly, read/write heads on an actuator arm move in tandem, toward the disk's center and back, reading and writing data.

Figure E-1 Disk Structure—Platters, Spindle, and Read/Write Heads

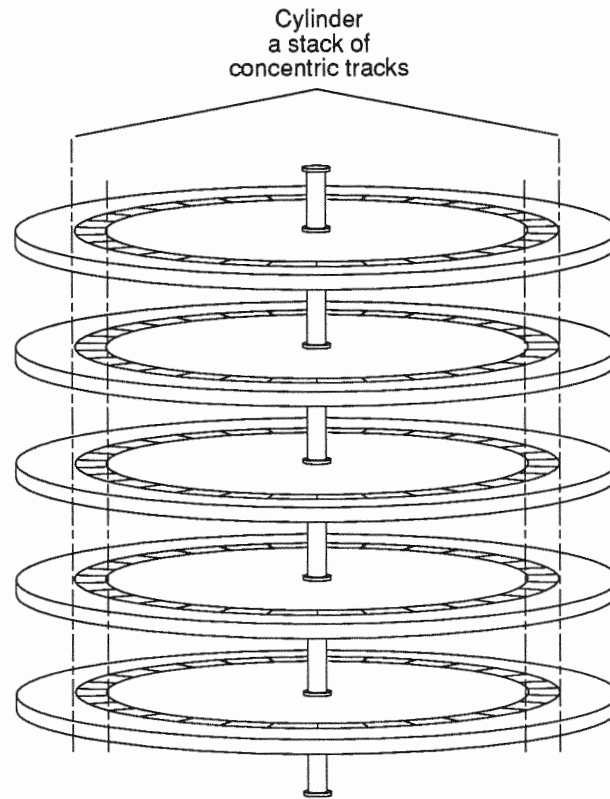


The top and bottom surfaces of most platters (bottom only, for the top platter; top only, for the bottom platter) are divided into circular *tracks*. There may be several thousand tracks on a single platter. Tracks are divided into *sectors*, or *blocks*, each of which contains 512 bytes.* The number of blocks on a track can vary, depending on properties of the platter, but is likely to be in the area of 35 or 40. All the platters making up a given disk will have the same number of tracks and blocks, but different disks may vary in both of these respects. Figure E-2 shows a platter divided into tracks and sectors.

* These are disk *hardware* blocks. Elsewhere, UNIX considers a block to be made up of two sectors and to contain 1,024 bytes.

Figure E-2 *Disk Platter with Tracks and Sectors*

The tracks on each platter are numbered, starting with the outermost track as number zero and moving inward. All the tracks of a given number, across all platters, make up a *cylinder*. For example, cylinder number five is made up of track number five on all the platters belonging to a disk. This is illustrated in Figure E-3.

Figure E-3 *Disk Platter with Tracks Making Up a Cylinder*

Once the actuator arm is positioned with its read/write heads at a given cylinder, all of the blocks contained in the cylinder can be read without having to move the arm again.

Disk Label

Every disk provided by Sun is preformatted and labeled. The label contains a partition table showing the starting cylinder for each disk partition and the number of blocks it contains. When a disk is repartitioned or partition sizes are changed, the partition table is updated. An example of a partition table is given in Figure E-4.

Figure E-4 *Partition Table*

```
Current partition table:

partition a - starting cyl    0, #blocks    16048 (59/0/0)
partition b - starting cyl   59, #blocks   33456 (123/0/0)
partition c - starting cyl    0, #blocks  276896 (1018/0/0)
partition d - starting cyl    0, #blocks     0 (0/0/0)
partition e - starting cyl    0, #blocks     0 (0/0/0)
partition f - starting cyl    0, #blocks     0 (0/0/0)
partition g - starting cyl  182, #blocks  227392 (836/0/0)
partition h - starting cyl    0, #blocks     0 (0/0/0)
```

The partition table shows the starting cylinder of each partition, partition size in 512-byte blocks, and in parentheses, partition size in cylinders/tracks/sectors. For example, in Figure E-4, partition *b*, the swap partition, starts at cylinder 59, and contains 33,456 blocks. At 512 bytes per block, this is equivalent to 16.3MB. The information in parentheses tells us that the swap partition occupies exactly 123 cylinders.

Installation Worksheets

This Appendix consists of Worksheets for use while planning your installation.

Section F.1, "Annotated Worksheets" provides a sample of each worksheet type with explanatory notes. Use these notes for reference and clarification as you complete Worksheets for your installation.

Section F.2, "Example Worksheets" consists of four sets of completed Worksheets; one set for each system configuration. A scenario describes each installation. These example Worksheets will provide insight into the practical aspects of planning an installation as well as clarifying the use of the Worksheets.

Section F.3, "Scratch Worksheets" contains several 'scratch' copies of each Worksheet. Remove the ones you need for your installation from the manual for ease of use. For some installations you will need more than one copy of some Worksheets. You may need to make photocopies if there are not enough worksheets provided to implement your configuration.

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F.1. Annotated Worksheets

The Worksheets are:

- **Preliminary Information Worksheet**

This Worksheet helps you gather information about the hardware which comprises your workstation, and miscellaneous other information about your installation.

- **Host Form Worksheet**

This Worksheet helps you gather the information necessary to complete the SunInstall HOST Form.

- **Partition Planning Worksheet**

This Worksheet assists you in planning how you will lay out partitions on your disk drive(s) and how you will size each of the partitions.

- **Disk Form Worksheet**

This Worksheet specifies the partition layout for an individual disk drive. You will need one Worksheet for each disk drive attached to your system.

- **Software Form Worksheet**

This Worksheet lets you record which optional operating system software categories you will install on your system. *Standalone* workstations and those to be installed as *homogeneous servers* will need to use one copy of this Worksheet. *Heterogeneous servers* will need one copy for each application architecture to be supported by the server. *Dataless* workstations will not use this Worksheet at all.

- **Client Form Worksheet**

Client Form Worksheets are used only when installing *server* systems. They help you record information concerning the *clients* which the server will support. You will need one Worksheet for each planned client.

Preliminary Information Worksheet

1. Your Sun Workstation Model. Example: Sun-4/330.
2. Your workstation architecture as an *a-arch.k-arch* pair. Example: **sun4.sun4**.
3. Media device type. Example: **st** for SCSI tape. See Table 1-2.
4. Media device number. Zero (0) unless there are multiple SCSI devices.
5. Media device name, the concatenation of type and number. Example: **mt0**.
6. System disk name. Example: **xd0**. See Table 1-3.
7. Other disk device names. Examples: **xd1**, **xd2**, and **xd3**. If you are unsure of the correct names, watch the messages displayed as the miniroot (or MUNIX) loads and boots. The display:

```
xd1: <Fujitsu-M2372K cyl 743 alt 2 hd 27 sec 67>
```

for example, indicates disk drive **xd1**.

8. Console device. Most Sun workstations have a bit-mapped graphics display, which is console type "sun". If you are using a bit-mapped console, SunInstall automatically sets the console type for you.

Some systems may be equipped with a non-graphics terminal. SunInstall provides menu-item choices for two common types: The Wyse Model 50 and the Televideo 925.

If your terminal is another type determine its name in the `termcap(5)` terminal capability data base. Wait until you have loaded and booted the miniroot, immediately before executing SunInstall, then execute:

```
# grep -i "terminal_type" /etc/termcap
```

where *terminal_type* is all or part of the name of your terminal. As an example, if you have a Tektronix 4014 type terminal:

```
# egrep -i "Tektronix 4014" /etc/termcap
Xc|tek4014|4014|tektronix 4014:\
Xe|tek4014-sm|4014-sm|tektronix 4014 in small font:\
```

The names are separated by vertical bars (|). You can use any one of `Xc`, `tek4014`, or `4014`. (If your first try doesn't succeed, try searching for portions of the terminal type. Searching for "Tektronix" would have found seventeen entries to examine; searching for "4014" would have found five.)

9. Local timezone. Once SunInstall is running you can use the timezone help screen (organized by region) to select the correct name for your timezone.

Preliminary Information Worksheet

Name: _____

Hardware Information:

Workstation Model: _____¹

Workstation Architecture: _____ . _____²

Media Device Type: _____³ and Number: _____⁴

Media Device Name: _____⁵

System Disk Name: _____⁶

Other Disk Devices (if any):⁷

Name: _____ Name: _____

Name: _____ Name: _____

Name: _____ Name: _____

System Console Device: _____⁸

Miscellaneous Information:

Local Timezone: _____⁹

Host Form Worksheet

1. Name. The *hostname* that you have chosen for your workstation. It must be unique in your network. The hostname can be a maximum of 64 characters long, must start with a lowercase letter and can contain any combination of lowercase letters, numbers, underscores (`_`), hyphens (`-`), and periods (`.`).

Hostnames of personal workstations are often chosen to reflect some special interest of the owner, often with a touch of whimsy. A few examples: *windsurf*, *snowskier*, *stargazer*, *anyspeed*, *mousetrap*, *poohbear*, *thelinks*, and *nowhere*.
2. The installation configuration you have chosen.
3. Internet Address. The address must be unique on your network, and preferably unique in the world. Your system administrator should assign you your internet address. For more information refer to Chapter 13 of *System and Network Administration*.
4. NIS type. If your workstation will not use Sun's Network Information Service (formerly known as "yellow pages" or "YP") check "none." If you will use NIS, check whether you will be an NIS *master*, *slave*, or *client*.
5. NIS Domain name. This entry is only required if your workstation will use NIS. Your system administrator should supply the Domain name. If you need more information refer to Chapter 16 of *System and Network Administration*.
6. Choose the action that will be taken immediately after SunInstall completes the installation of your workstation. Answering "y" instructs the system to reboot itself as soon as the installation is complete. If you answer "n" (the default) the # prompt will re-appear when SunInstall exits, allowing you to reboot manually.
7. *Dataless only*: The hostname of the server that will provide `/usr`, `/usr/kvm`, and `/home` filesystems.
8. *Dataless only*: The Internet address of the server.
9. *Dataless only*: The directory (on the server) in which application architecture executables for the client will be found. The default will be correct in nearly all cases.
10. *Dataless only*: The directory (on the server) in which kernel architecture executables for the client will be found. The default will be correct in nearly all cases.

Host Form Worksheet

Workstation Information:

Name : _____¹

Type : [standalone] [server] [dataless]²

Network Information:

Internet Address : _____ . _____ . _____ . _____³

NIS Type : [none] [master] [slave] [client]⁴

Domain name : _____⁵

Miscellaneous Information:

Reboot after completed : [y] [n]⁶

Dataless Configuration Information:

Server name : _____⁷

Server Internet Address : _____ . _____ . _____ . _____⁸

Path of the executables on server: /export/exec/app_arch⁹

Path of the kernel executables on server: /export/exec/kvm/kernel_arch¹⁰

Partition Planning Worksheet

This Worksheet will assist you with planning your overall disk partitioning strategy prior to filling out Disk Form Worksheets for each individual disk drive.

Do the following:

1. Check off the partitions and filesystems that you've decided to create on your disk(s). (Note that `/`, `swap`, and `/usr` are already checked off for you: they are required partitions for every installation.)
2. Fill in the filesystem mount point names for custom partitions. (`/usr/frame`, for example.)
3. Fill in Positions for each partition, that is, where the partition will reside. Example: If the system disk name is `xd0`, the `/` (root) partition position will be `xd0a`. (Available partition letters are `a`, `b`, `d`, `e`, `f`, `g`, and `h`.)
4. By placing an asterisk (*) in the "Size" column, identify which partition on each disk drive will be given all of the space not specifically assigned to the other partitions on that drive. Example: If a single system disk will be configured with `/` (root) on `xy0a`, `swap` on `xy0b`, `/usr` on `xy0g`, and `/home` on `xy0h` we will specify sizes for the `/`, `swap`, and `/usr` partitions, and then give the `/home` partition all the space that is left.
5. In the "Size" columns for the `/usr` partition fill in the space requirements you've determined for Sun unbundled software, software from other vendors, Local Software, and Free Space. Sum these on the "Total over and above" line. This is the amount of space you will add to the `/usr` partition over and above what's required for SunOS software. The space required for SunOS software will be computed automatically by SunInstall.
6. If you have an `/export` partition, fill in its "Size" columns much as you did for the `/usr` partition. Note the following:
 - Allow space for Sun unbundled, Other vendor, and Local software *only* if it is for clients of a *different* application architecture from the server. (Clients of the same application architecture will use the software already accounted for in `/usr`.)
 - Allow Free Space for the `/` (root) filesystems of any clients which are planned for the near future but which will not be configured for during the installation.
 - As with `/usr`, SunInstall will automatically account for the space needed for SunOS software, and will also keep track of the space needed for `/` filesystems for clients that you define during the installation.
7. If you have an `/export/swap` partition, note only "above and beyond" space, that is, space for planned clients that you are not defining during the installation.
8. Fill in the sizes you have chosen for your remaining defined partitions.

Partition Planning Worksheet

	Partition/Filesystem	Size	Position
–Required–			
<input checked="" type="checkbox"/>	/ (root)		
<input checked="" type="checkbox"/>	swap		
<input checked="" type="checkbox"/>	/usr*	-----	
	Sun unbundled		-----
	other vendors	+	-----
	Local software	+	-----
	Free Space	+	-----
	Total over and above	=	-----
–Common–			
<input type="checkbox"/>	/home		
–Optional–			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
–Servers–			
<input type="checkbox"/>	/export	-----	
	Sun unbundled†		-----
	other vendors†	+	-----
	Local software†	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
–Custom–			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

* /usr is required for all configurations *except dataless*.

† Only for software to support clients of an *application architecture* different from the server's.

Disk Form Worksheet

Disk Form Worksheets bring together the information you'll want at hand while completing the SunInstall DISK form. Fill out one Worksheet for each disk drive attached to your system. Refer to your completed Partition Planning Worksheet for SIZE and MOUNT PT information.

A few notes:

1. As noted on your Partition Planning Worksheet, one partition on each disk drive should have its SIZE noted as "*". This partition will simply "hog" all of the space not explicitly assigned to the other partitions on the disk. It will be sized automatically by SunInstall.
2. Some partitions on your Partition Planning Worksheet (notably /usr) may be designated for "over and above" sizing (indicated by "+N" in the Size column). Transfer the size information to the SIZE column of the Disk Form Worksheet with a "+" as well. You will add this space to the partition *after* SunInstall has automatically determined the space needed to accommodate SunOS software.
3. MOUNT PT designations for filesystems must always begin with a "/". Examples: /usr, /export/swap, /usr/frame.
4. MOUNT PT column entries for swap partitions are for planning purposes only. When running SunInstall and completing the DISK form the MOUNT PT column for swap partitions **must be left blank**.
5. In nearly all cases the PRESERVE(Y/N) column for each partition should be set to "n". This is **required** for partitions which contain SunOS software: /, /usr, /var, /export, and /export/swap. Setting PRESERVE to "n" instructs SunInstall to execute `newfs(8)` on the partition, creating a new, empty filesystem in it.

User data already existing in other partitions can be saved by setting PRESERVE to "y", thus *preventing* SunInstall from executing `newfs(8)` on the partition. Note the following, however:

- If the STARTING CYLINDER of the partition has been changed, it **cannot** be preserved.
- If the SIZE of the partition has been changed, it **cannot** be preserved.



Be certain that you have a valid backup of any partition that you elect to preserve. Consider the consequences of *losing* that information should the filesystem, for any reason, not be preserved.

Disk Form Worksheet

Disk Drive: _____

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			

Software Form Worksheet

The Software Form Worksheet is used to record which software categories you have chosen to install on your system. Check off each category you want to load. (The required categories are already marked for you.) Note any prerequisite categories associated with your chosen categories and check them off as well. (The Manual pages, for example, will not be usable unless the Text category is also selected.)

One Software Form Worksheet should be filled out for a Standalone Workstation or Homogeneous Server. Dataless Workstations don't need to select optional software, they have access to the software loaded on their servers.

For a Heterogeneous Server more than one Worksheet may be necessary:

- Prepare a single Worksheet to cover the software needs of the server itself and of any clients of the same *application* architecture as the server.
- If the server supports clients of its own *application* architecture but a different *kernel* architecture decide whether you want to load the Sys category for the other *kernel* architecture. (The *kvm* category is required, all other categories are shared with the server.)
- If the server supports clients of an *application* architecture other than its own, prepare a Worksheet to cover the software needs of those clients.
- Lastly, if there will be clients of more than one *kernel* architecture of the non-server *application* architecture, decide whether or not to load the Sys category for each. (Again, the *kvm* category is **required** for every *kernel* architecture.)

Software Form Worksheet

a-arch.k-arch: _____ . _____

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	—
<input checked="" type="checkbox"/>	usr	—
<input checked="" type="checkbox"/>	Kvm	—
<input checked="" type="checkbox"/>	Install	—
<input checked="" type="checkbox"/>	Networking*	—
<input type="checkbox"/>	Debugging	SunView_Users
<input type="checkbox"/>	RFS	TLI, Sys
<input type="checkbox"/>	Sys	—
<input type="checkbox"/>	System_V	—
<input type="checkbox"/>	TLI	—
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input type="checkbox"/>	SunView_Users	—
<input type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Games	SunView_Users
<input type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	—
<input type="checkbox"/>	Shlib_Custom	—
<input type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Text	—
<input type="checkbox"/>	User_Diag	SunView_Users
<input type="checkbox"/>	uucp	—
<input type="checkbox"/>	Versatec	—

* Only required if the system is connected to a network.

Client Form Worksheet

A Client Form Worksheet should be completed for each client to be supported by a server. Despite its apparent complexity, most of the fields on the CLIENT Form will have defaults supplied by SunInstall. Few installations will require changes to these defaults. A few fields, however, must be filled in by the installer. Those fields are printed in bold type on the Client Form Worksheet to identify them for you.

1. The client's hostname. This name is subject to the same rules as the server's hostname. (See Section 1.5, "Gathering Preliminary Information — **Software.**")
2. The client's application and kernel architectures (*a_arch.k_arch*). See Table 1-1 — *Sun System Architectures*.
3. */export/root/* is the default filesystem (on the server) to hold client root files. This field is not directly changeable. Rather, it will change if *Path to Root* (item 10) is edited.
4. */export/swap/* is the default filesystem (on the server) to hold client swap files. This field is not directly changeable. Rather, it will change if *Path to Swap* (item 11) is edited.
5. The client's Internet address. SunInstall will fill in the first three fields (the *network* number) to match that of the server. You must assign a unique *host* number (the last field) for each client.
6. The Ethernet address of the client *must* be correctly entered. To determine a workstation's Ethernet address, examine the banner displayed immediately after the system is powered on. (Each workstation has a unique and permanent Ethernet address defined by its hardware.)
7. The NIS type will be chosen by SunInstall to match the server. If the server's HOST Form specifies it to be an NFS client, master, or slave, its diskless clients will be defined as NIS clients.
8. The client's NIS domainname will, by default, match the server's, if any.
9. Swap file sizes for diskless clients should be chosen just as they are for Standalone workstations. See "The swap partition" in Section 2.1, "Planning Your Installation — Disk Partitioning. SunInstall supplies a default swap file size, change it if necessary.
10. "Path to Root" specifies the directory on the server that the client will mount as its root directory. The default will be correct in nearly all cases. (The most likely exception would be for definition of multiple filesystems to hold root directories on a large server.)
11. "Path to Swap" specifies the file on the server that the client will mount as its swap file. Like "Path to Root", the default is almost always correct.
12. "Path to Executables" will be set by SunInstall. It is the server directory from which the client will mount its application architecture specific executables.
13. "Path to Kernel Executables" will also be set by SunInstall. It is the server directory from which the client will mount its kernel architecture specific executables.
14. The server directory which the client will mount as */home*. The default is normally correct, you may want to change it if you define more than one */home* partition on the server. For example, */home2/server_name*.
15. The terminal type "sun" is most common (a Sun bit-mapped monitor). Change this if the client uses some other type of terminal. Use a name given in the */etc/termcap* file, as described in item 9 of the Preliminary Information Worksheet notes earlier in this section.

Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

Root fs: */export/root*³

Swap fs: */export/swap*⁴

Client Information :

Internet Address: *net . net . net .* _____⁵

Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

NIS Type: [none] [client]⁷

Domain name: *server_domainname*⁸

Swap size (e.g. 8B, 8K, 8M): _____**M**⁹

Path to Root: */export/root/client_name*¹⁰

Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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F.2. Example Worksheets

This section presents a sample scenario for each installation configuration: Standalone, Homogeneous Server, Heterogeneous Server, and Dataless. Background information for each scenario is presented, followed by facsimiles of Worksheets completed to support the installation process.

Examining the completed Worksheets will help you understand the correct use of the Worksheets, provide ideas for implementing some common installation configurations, and generally clarify installation planning.

Completed Worksheets: Standalone Workstation

Scenario: aslan

aslan is a Sun-4/330 (also known as a SPARCstation 330) which will be installed as a networked standalone workstation. The system has 24 Mbytes of main memory, and a GX (cgsix) graphics accelerator supporting a bit mapped color monitor.

Peripheral equipment includes a 327 Mbyte internal SCSI disk drive and a 150 Mbyte Quarter Inch Cartridge (QIC-150) tape drive.

Preliminary Information Worksheet

Standalone Scenario:
aslan

Name: aslan

Hardware Information:

Workstation Model: SUN-4/330

Workstation Architecture: SUN4 . SUN4²

Media Device Type: ST³ and Number: Ø⁴

Media Device Name: STØ⁵

System Disk Name: sd6⁶

Other Disk Devices (if any):⁷

Name: _____ Name: _____

Name: _____ Name: _____

Name: _____ Name: _____

System Console Device: SUN⁸

Miscellaneous Information:

Local Timezone: PACIFIC⁹

Standalone Scenario:
aslan

Host Form Worksheet

Workstation Information:

Name : aslan ¹

Type : [standalone] [server] [dataless] ²

Network Information:

Internet Address : 192 . 9 . 11 . 6 ³

NIS Type : [none] [master] [slave] [client] ⁴

Domain name : sw-support ⁵

Miscellaneous Information:

Reboot after completed : [y] [n] ⁶

Dataless Configuration Information:

Server name : _____ ⁷

Server Internet Address : _____ . _____ . _____ . _____ ⁸

Path of the executables on server: /export/exec/app_arch ⁹

Path of the kernel executables on server: /export/exec/kvm/kernel_arch ¹⁰

Partition Planning Worksheet

Standalone Scenario:
aslan

	Partition/Filesystem	Size	Position
-Required-			
<input checked="" type="checkbox"/>	/ (root)	16	sd6a
<input checked="" type="checkbox"/>	swap	32	sd6b
<input checked="" type="checkbox"/>	/usr*	-----	sd6g
	Sun unbundled	∅	-----
	other vendors	+ ∅	-----
	Local software	+ ∅	-----
	Free Space	+ 1∅	-----
	Total over and above	= 15	-----
-Common-			
<input checked="" type="checkbox"/>	/home	*	sd6h
-Optional-			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
-Servers-			
<input type="checkbox"/>	/export	-----	
	Sun unbundled†		-----
	other vendors†	+	-----
	Local software†	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
-Custom-			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

* /usr is required for all configurations *except dataless*.

† Only for software to support clients of an *application architecture* different from the server's.



Disk Form Worksheet

Standalone Scenario:
aslan

Disk Drive: sd6

(MB)

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	32	(SWAP)	
c	327	-----	-----
d			
e			
f			
g	15	/usr	N
h	*	/home	

Software Form Worksheet

Standalone Scenario:
aslan

a-arch.k-arch: SUN4 . SUN4

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	-
<input checked="" type="checkbox"/>	usr	-
<input checked="" type="checkbox"/>	Kvm	-
<input checked="" type="checkbox"/>	Install	-
<input checked="" type="checkbox"/>	Networking*	-
<input checked="" type="checkbox"/>	Debugging	SunView_Users
<input type="checkbox"/>	RFS	TLI, Sys
<input checked="" type="checkbox"/>	Sys	-
<input checked="" type="checkbox"/>	System_V	-
<input type="checkbox"/>	TLI	-
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input checked="" type="checkbox"/>	SunView_Users	-
<input checked="" type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Games	SunView_Users
<input type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	-
<input type="checkbox"/>	Shlib_Custom	-
<input checked="" type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input checked="" type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Text	-
<input type="checkbox"/>	User_Diag	SunView_Users
<input type="checkbox"/>	uucp	-
<input type="checkbox"/>	Versatec	-

* Only required if the system is connected to a network.

Completed Worksheets: Homogeneous Server

Scenario: proton

proton is a Sun-3/470 which will be installed as a homogeneous server. The system has 24 Mbytes of main memory, and a monochrome bit mapped monitor.

Peripheral equipment includes two 656 Mbyte SMD disk drives on an `xd` controller, and a 150 Mbyte Quarter Inch Cartridge (QIC-150) tape drive.

Two diskless clients will be defined, and space in `/export` and `/export/swap` will be reserved for two more clients.

Proton will act as a print server (*SunTranscript* unbundled software) and will have computer assisted publishing (“DocPubs”) and relational database (“DataBase”) software installed.

Preliminary Information Worksheet

Homogeneous Scenario:
proton

Name: proton

Hardware Information:

Workstation Model: sun-3/470 ¹

Workstation Architecture: SUN 3 . sun3x ²

Media Device Type: st ³ and Number: ∅ ⁴

Media Device Name: st∅ ⁵

System Disk Name: Xd∅ ⁶

Other Disk Devices (if any): ⁷

Name: Xd1 Name: _____

Name: _____ Name: _____

Name: _____ Name: _____

System Console Device: SUN ⁸

Miscellaneous Information:

Local Timezone: EASTERN US ⁹

Homogeneous Scenario:
proton

Host Form Worksheet

Workstation Information:

Name : proton ¹

Type : [standalone] [server] [dataless] ²

Network Information:

Internet Address : 192 . 9 . 11 . 3 ³

NIS Type : [none] [master] [slave] [client] ⁴

Domain name : sw-support ⁵

Miscellaneous Information:

Reboot after completed : [y] [n] ⁶

Dataless Configuration Information:

Server name : _____ ⁷

Server Internet Address : _____ . _____ . _____ . _____ ⁸

Path of the executables on server: /export/exec/app_arch ⁹

Path of the kernel executables on server: /export/exec/kvm/kernel_arch ¹⁰

Partition Planning Worksheet

Homogeneous Scenario:
proton

Doc Aubs 45
DATA BASE 45
90

	Partition/Filesystem	Size	Position
-Required-			
<input checked="" type="checkbox"/>	/(root)	16	xd0a
<input checked="" type="checkbox"/>	swap	32	xd0b
<input checked="" type="checkbox"/>	/usr*	-----	xd0g
	Sun unbundled <i>TRANSCRIPT</i>	10	-----
	other vendors	+ 90	-----
	Local software	+ 10	-----
	Free Space	+ 30	-----
	Total over and above	= 140	-----
-Common-			
<input checked="" type="checkbox"/>	/home	*	xd1h
-Optional-			
<input type="checkbox"/>	/tmp		
<input checked="" type="checkbox"/>	/var <i>print spooling</i>	20	xd1a
<input checked="" type="checkbox"/>	second swap	32	xd1b
-Servers-			
<input type="checkbox"/>	/export	-----	xd1d
	Sun unbundled [†]	∅	-----
	other vendors [†]	+ ∅	-----
	Local software [†]	+ ∅	-----
	Free Space <i>(for 2 clients)</i>	+ 15	-----
	Total over and above	= 15	-----
<input checked="" type="checkbox"/>	/export/swap <i>(for 2 clients)</i>	+ 60	xd0e
-Custom-			
<input checked="" type="checkbox"/>	<i>/database</i>		xd1f
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

* /usr is required for all configurations *except dataless*.

† Only for software to support clients of an *application architecture* different from the server's.



Disk Form Worksheet

Homogeneous Scenario:
protonDisk Drive: xd0

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	32	(SWAP)	
c	656	-----	-----
d			
e	460	/export/SWAP	N
f			
g	*	/usr	N
h			

Disk Form Worksheet

Homogeneous Scenario:
proton

Disk Drive: xd1

PARTITION	SIZE	MOUNT PT	PRESERVE
a	20	/var	N
b	32	(swap)	
c	656	-----	-----
d	+15	/export	N
e			
f	200	/data base	N
g			
h	*	/home	N

Software Form Worksheet

Homogeneous Scenario:
proton

a-arch.k-arch: sun3 . sun3X

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	—
<input checked="" type="checkbox"/>	usr	—
<input checked="" type="checkbox"/>	Kvm	—
<input checked="" type="checkbox"/>	Install	—
<input checked="" type="checkbox"/>	Networking*	—
<input checked="" type="checkbox"/>	Debugging	SunView_Users
<input type="checkbox"/>	RFS	TLI, Sys
<input checked="" type="checkbox"/>	Sys	—
<input checked="" type="checkbox"/>	System_V	—
<input type="checkbox"/>	TLI	—
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input checked="" type="checkbox"/>	SunView_Users	—
<input checked="" type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Games	SunView_Users
<input checked="" type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input checked="" type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	—
<input checked="" type="checkbox"/>	Shlib_Custom	—
<input checked="" type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input checked="" type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Text	—
<input type="checkbox"/>	User_Diag	SunView_Users
<input type="checkbox"/>	uucp	—
<input type="checkbox"/>	Versatec	—

* Only required if the system is connected to a network.

Client Form Worksheet

Homogeneous Scenario:
proton

Client name: neutron ¹

Architecture Type: SUN3 . SUN3X ²

Root fs: /export/root ³

Swap fs: /export/swap ⁴

Client Information :

Internet Address: net . net . net . 37 ⁵

Ethernet Address: 8 : 0 : 20 : 1 : 6a : EA ⁶

NIS Type: [none] [client] ⁷

Domain name: server_domainname ⁸

Swap size (e.g. 8B, 8K, 8M): 16 M ⁹

Path to Root: /export/root/client_name ¹⁰

Path to Swap: /export/swap/client_name ¹¹

Path to Executables: /usr ¹²

Path to Kernel Executables: /usr/kvm ¹³

Path to Home: /home/server_name ¹⁴

Terminal type: sun ¹⁵

3/80
monochrome

Homogeneous Scenario:
proton

Client Form Worksheet

Client name: electron ¹

Architecture Type: sun3 . sun3x ²

Root fs: /export/root ³

Swap fs: /export/swap ⁴

Client Information :

Internet Address: net . net . net . 40 ⁵

Ethernet Address: 8 : 0 : 20 : 6 : 6c : 20 ⁶

NIS Type: [none] [client] ⁷

Domain name: server_domainname ⁸

Swap size (e.g. 8B, 8K, 8M): 24 M ⁹

Path to Root: /export/root/client_name ¹⁰

Path to Swap: /export/swap/client_name ¹¹

Path to Executables: /usr ¹²

Path to Kernel Executables: /usr/kvm ¹³

Path to Home: /home/server_name ¹⁴

Terminal type: sun ¹⁵

3/80
CO/OV

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Completed Worksheets: Heterogeneous Server

Scenario: estoril

estoril is a Sun-4/280 which will be installed as a heterogeneous server. The system has 96 Mbytes of main memory, and a Wyse 50 console terminal.

Peripheral equipment includes three 892 Mbyte SMD disk drives on an `xd` controller, and an `xt` Half Inch open reel tape drive.

Four diskless clients will be defined, and space in `/export` and `/export/swap` will be reserved for two more clients.

Estoril will act as a print server (*SunTranscript* unbundled software) and will have SunPHIGS graphics, Sun Communications, computer assisted publishing (“DocPubs”) and relational database (“DataBase”) software installed. Estoril will be an NIS master.

Preliminary Information Worksheet

Heterogeneous Scenario:
estoril

Name: estoril

Hardware Information:

Workstation Model: 4/280 ¹

Workstation Architecture: sun4 . sun4 ²

Media Device Type: Xt ³ and Number: ∅ ⁴

Media Device Name: Xt∅ ⁵

System Disk Name: xd∅ ⁶

Other Disk Devices (if any): ⁷

Name: xd1 Name: xd2

Name: _____ Name: _____

Name: _____ Name: _____

System Console Device: wyse 50 ⁸

Miscellaneous Information:

Local Timezone: CET ⁹

Heterogeneous Scenario:
estoril

Host Form Worksheet

Workstation Information:

Name : estoril ¹

Type : [standalone] [server] [dataless] ²

Network Information:

Internet Address : 192 . 3 . 11 . 2 ³

NIS Type : [none] [master] [slave] [client] ⁴

Domain name : ehg-engineering ⁵

Miscellaneous Information:

Reboot after completed : [y] [n] ⁶

Dataless Configuration Information:

Server name : _____ ⁷

Server Internet Address : _____ . _____ . _____ . _____ ⁸

Path of the executables on server: /export/exec/app_arch ⁹

Path of the kernel executables on server: /export/exec/kvm/kernel_arch ¹⁰

Partition Planning Worksheet

Heterogeneous Scenario:
estoril

phigs 15
comm 20
transcript 10

45

	Partition/Filesystem	Size	Position
-Required-			
<input checked="" type="checkbox"/>	/ (root)	16	xd0a
<input checked="" type="checkbox"/>	swap	40	xd0b
<input checked="" type="checkbox"/>	/usr*	-----	xd0g
	Sun unbundled	45	-----
	other vendors	+ 90	-----
	Local software	+ 30	-----
	Free Space	+ 50	-----
	Total over and above	= 215	-----
-Common-			
<input checked="" type="checkbox"/>	/home 1	*	xd0h
-Optional-			
<input checked="" type="checkbox"/>	/tmp	30	xd1a
<input checked="" type="checkbox"/>	/var print, uucp, NIS, mail	50	xd2a
<input checked="" type="checkbox"/>	second swap	40	xd1b
-Servers-			
<input checked="" type="checkbox"/>	/export	-----	xd1d
	Sun unbundled† transcript	10	-----
	other vendors† database, 45 docpubs 45	+ 90	-----
	Local software†	+ 30	-----
	Free Space (w/ 2 clients)	+ 40	-----
	Total over and above	= 170	-----
<input checked="" type="checkbox"/>	/export/swap A (1 client)	+ 40	xd1e
-Custom-			
<input checked="" type="checkbox"/>	third SWAP	40	xd2b
<input checked="" type="checkbox"/>	/home 2	*	xd1h
<input checked="" type="checkbox"/>	/export/swap B	+ 40	xd2e
<input checked="" type="checkbox"/>	/database	*	xd2f
<input type="checkbox"/>			

* /usr is required for all configurations except dataless.

† Only for software to support clients of an application architecture different from the server's.



Disk Form Worksheet

Heterogeneous Scenario:
estoril

Disk Drive: xd0

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	40	(SWAP)	
c	892	-----	-----
d			
e			
f			
g	1215	/usr	N
h	*	/home1	N

Disk Form Worksheet

Heterogeneous Scenario:
estoril

Disk Drive: xd1

PARTITION	SIZE	MOUNT PT	PRESERVE
a	30	/tmp	N
b	40	(SWAP)	
c	892	-----	-----
d	+170	/export	N
e	+40	/export/SWAPA	N
f			
g			
h	*	/home2	N

Heterogeneous Scenario:
estoril

Disk Form Worksheet

Disk Drive: xd 2

PARTITION	SIZE	MOUNT PT	PRESERVE
a	50	/var	N
b	40	(3rd SWAP)	
c	892	-----	-----
d			
e	+40	/export/SWAPB	N
f	*	/DATABASE	N
g			
h			

Software Form Worksheet

Heterogeneous Scenario:
estoril

a-arch.k-arch: SUN4 . SUN4

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	-
<input checked="" type="checkbox"/>	usr	-
<input checked="" type="checkbox"/>	Kvm	-
<input checked="" type="checkbox"/>	Install	-
<input checked="" type="checkbox"/>	Networking*	-
<input checked="" type="checkbox"/>	Debugging	SunView_Users
<input checked="" type="checkbox"/>	RFS	TLI, Sys
<input checked="" type="checkbox"/>	Sys	-
<input checked="" type="checkbox"/>	System_V	-
<input checked="" type="checkbox"/>	TLI	-
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input checked="" type="checkbox"/>	SunView_Users	-
<input checked="" type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Games	SunView_Users
<input checked="" type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input checked="" type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	-
<input checked="" type="checkbox"/>	Shlib_Custom	-
<input checked="" type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input checked="" type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Text	-
<input checked="" type="checkbox"/>	User_Diag	SunView_Users
<input checked="" type="checkbox"/>	uucp	-
<input type="checkbox"/>	Versatec	-

add kvm + sys for sun4, sun4c

* Only required if the system is connected to a network.

Software Form Worksheet

Heterogeneous Scenario:
estoril

a-arch.k-arch: sun3 . sun3

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	—
<input checked="" type="checkbox"/>	usr	—
<input checked="" type="checkbox"/>	Kvm	—
<input checked="" type="checkbox"/>	Install	—
<input checked="" type="checkbox"/>	Networking*	—
<input checked="" type="checkbox"/>	Debugging	SunView_Users
<input checked="" type="checkbox"/>	RFS	TLI, Sys
<input checked="" type="checkbox"/>	Sys	—
<input checked="" type="checkbox"/>	System_V	—
<input checked="" type="checkbox"/>	TLI	—
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input checked="" type="checkbox"/>	SunView_Users	—
<input checked="" type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Games	SunView_Users
<input checked="" type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	—
<input checked="" type="checkbox"/>	Shlib_Custom	—
<input checked="" type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input checked="" type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input checked="" type="checkbox"/>	Text	—
<input type="checkbox"/>	User_Diag	SunView_Users
<input type="checkbox"/>	uucp	—
<input type="checkbox"/>	Versatec	—

* Only required if the system is connected to a network.

Client Form Worksheet

Heterogeneous Scenario:
estoril

Client name: VIENNA ¹

Architecture Type: SUN4.sun4c ²

Root fs: /export/root ³

Swap fs: /export/swap ⁴

Client Information :

Internet Address: net . net . net . 22 ⁵

Ethernet Address: 8 : 0 : 20 : 1 : 6C : 98 ⁶

NIS Type: [none] [client] ⁷

Domain name: server_domainname ⁸

Swap size (e.g. 8B, 8K, 8M): 24 M ⁹

Path to Root: /export/root/client_name ¹⁰

Path to Swap: /export/swap/client_name ¹¹

/export/SWAP/vienna

Path to Executables: /usr ¹²

Path to Kernel Executables: /usr/kvm ¹³

Path to Home: /home/server_name ¹⁴

/home1/estoril

Terminal type: sun ¹⁵

SPARCstation 1+
color

Heterogeneous Scenario:
estoril

Client Form Worksheet

Client name: zurich ¹

Architecture Type: sun4.sun4c ²

Root fs: /export/root ³

Swap fs: /export/swap ⁴

Client Information :

Internet Address: net.net.net.7 ⁵

Ethernet Address: 8:0:20:1:3e:1e ⁶

NIS Type: [none] [client] ⁷

Domain name: server_domainname ⁸

Swap size (e.g. 8B, 8K, 8M): 16 M ⁹

Path to Root: /export/root/client_name ¹⁰

Path to Swap: /export/swap/client_name ¹¹

/export/swapA/zurich

Path to Executables: /usr ¹²

Path to Kernel Executables: /usr/kvm ¹³

Path to Home: /home/server_name ¹⁴

/home1/estoril

Terminal type: sun ¹⁵

SPARCstation 1+
monochrome monitor

Client Form Worksheet

Heterogeneous Scenario:
estoril

Client name: lyon ¹

Architecture Type: sun4. sun4 ²

Root fs: /export/root ³

Swap fs: /export/swap ⁴

Client Information :

Internet Address: net . net . net . 25 ⁵

Ethernet Address: 8 : 0 : 20 : 0 : 18 : AB ⁶

NIS Type: [none] [client] ⁷

Domain name: server_domainname ⁸

Swap size (e.g. 8B, 8K, 8M): 30 M ⁹

Path to Root: /export/root/client_name ¹⁰

Path to Swap: ~~/export/swap/client_name~~ ¹¹

/export/swapB/lyon

Path to Executables: /usr ¹²

Path to Kernel Executables: /usr/kvm ¹³

Path to Home: ~~/home/server_name~~ ¹⁴

/home2/estoril

Terminal type: sun ¹⁵

Heterogeneous Scenario:
estoril

Client Form Worksheet

Client name: bagshot ¹

Architecture Type: SUN3.SUN3 ²

Root fs: /export/root ³

Swap fs: /export/swap ⁴

Client Information :

Internet Address: net.net.net.31 ⁵

Ethernet Address: 8 : 0 : 20 : 1 : 0 : 93 ⁶

NIS Type: [none] [client] ⁷

Domain name: server_domainname ⁸

Swap size (e.g. 8B, 8K, 8M): 12 M ⁹

Path to Root: /export/root/client_name ¹⁰

Path to Swap: /export/swap/client_name ¹¹

Path to Executables: /usr ¹²

Path to Kernel Executables: /usr/kvm ¹³

Path to Home: home/server_name ¹⁴

Terminal type: sun ¹⁵

/export/SWAPB/bagshot

/home/estoril

3/60

monochrome

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Completed Worksheets: Dataless Workstation

Scenario: helsinki

helsinki is a SPARCstation 1+ which will be installed as a dataless workstation. The system has 16 Mbytes of main memory, and a monochrome monitor.

Peripheral equipment includes a 105 Mbyte internal SCSI disk drive. Since the workstation does not have a tape or diskette drive it will be installed using the remote method explained in Appendix B.

Preliminary Information Worksheet

Dataless Scenario:
helsinki

Name: helsinki

Hardware Information:

Workstation Model: SPARCstation 1t ¹ (4/65)

Workstation Architecture: SUN4 . SUN4c ²

Media Device Type: _____ ³ and Number: _____ ⁴

Media Device Name: _____ ⁵

System Disk Name: sd0 ⁶

Other Disk Devices (if any): ⁷

Name: _____ Name: _____

Name: _____ Name: _____

Name: _____ Name: _____

System Console Device: SUN ⁸

Miscellaneous Information:

Local Timezone: CET ⁹

Dataless Scenario:
helsinki

Host Form Worksheet

Workstation Information:

Name : helsinki ¹

Type : [standalone] [server] [dataless] ²

Network Information:

Internet Address : 193 . 3 . 11 . 4 ³

NIS Type : [none] [master] [slave] [client] ⁴

Domain name : ehg.engineering ⁵

Miscellaneous Information:

Reboot after completed : [y] [n] ⁶

Dataless Configuration Information:

Server name : estoril ⁷

Server Internet Address : 192 . 3 . 11 . 2 ⁸

Path of the executables on server: /export/exec/app_arch ⁹

Path of the kernel executables on server: /export/exec/kvm/kernel_arch ¹⁰

Partition Planning Worksheet

Dataless Scenario:
helsinki

	Partition/Filesystem	Size	Position
-Required-			
<input checked="" type="checkbox"/>	/ (root)	16	sd0a
<input checked="" type="checkbox"/>	swap	*	sd0b
<input checked="" type="checkbox"/>	/usr *	-----	
	Sun unbundled		-----
	other vendors	+	-----
	Local software	+	-----
	Free Space	+	-----
	Total over and above	=	-----
-Common-			
<input type="checkbox"/>	/home		
-Optional-			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
-Servers-			
<input type="checkbox"/>	/export	-----	
	Sun unbundled †		-----
	other vendors †	+	-----
	Local software †	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
-Custom-			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

* /usr is required for all configurations *except dataless*.

† Only for software to support clients of an *application architecture* different from the server's.



Disk Form Worksheet

Dataless Scenario:
helsinkiDisk Drive: sd0

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	*	(SWAP)	
c	105	-----	-----
d			
e			
f			
g			
h			

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F.3. Scratch Worksheets

The pages that follow are multiple 'scratch' copies of the Worksheets for your use while planning your installation. Remove the sheets you need from the binder, and fill them as you work your way through the manual.

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Preliminary Information Worksheet

Name: _____

Hardware Information:

Workstation Model: _____ 1

Workstation Architecture: _____ . _____ 2

Media Device Type: _____ 3 and Number: _____ 4

Media Device Name: _____ 5

System Disk Name: _____ 6

Other Disk Devices (if any): 7

Name: _____ Name: _____

Name: _____ Name: _____

Name: _____ Name: _____

System Console Device: _____ 8

Miscellaneous Information:

Local Timezone: _____ 9

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Preliminary Information Worksheet

Name: _____

Hardware Information:

Workstation Model: _____¹

Workstation Architecture: _____ . _____²

Media Device Type: _____³ and Number: _____⁴

Media Device Name: _____⁵

System Disk Name: _____⁶

Other Disk Devices (if any):⁷

Name: _____ Name: _____

Name: _____ Name: _____

Name: _____ Name: _____

System Console Device: _____⁸

Miscellaneous Information:

Local Timezone: _____⁹

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Host Form Worksheet

Workstation Information:

Name : _____¹

Type : [standalone] [server] [dataless]²

Network Information:

Internet Address : _____ . _____ . _____ . _____³

NIS Type : [none] [master] [slave] [client]⁴

Domain name : _____⁵

Miscellaneous Information:

Reboot after completed : [y] [n]⁶

Dataless Configuration Information:

Server name : _____⁷

Server Internet Address : _____ . _____ . _____ . _____⁸

Path of the executables on server: /export/exec/app_arch⁹

Path of the kernel executables on server: /export/exec/kvm/kernel_arch¹⁰

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Host Form Worksheet

Workstation Information:

Name : _____ 1

Type : [standalone] [server] [dataless] 2

Network Information:

Internet Address : _____ . _____ . _____ . _____ 3

NIS Type : [none] [master] [slave] [client] 4

Domain name : _____ 5

Miscellaneous Information:

Reboot after completed : [y] [n] 6

Dataless Configuration Information:

Server name : _____ 7

Server Internet Address : _____ . _____ . _____ . _____ 8

Path of the executables on server: `/export/exec/app_arch` 9

Path of the kernel executables on server: `/export/exec/kvm/kernel_arch` 10

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Partition Planning Worksheet

	Partition/Filesystem	Size	Position
–Required–			
<input checked="" type="checkbox"/>	/ (root)		
<input checked="" type="checkbox"/>	swap		
<input checked="" type="checkbox"/>	/usr*	-----	
	Sun unbundled		-----
	other vendors	+	-----
	Local software	+	-----
	Free Space	+	-----
	Total over and above	=	-----
–Common–			
<input type="checkbox"/>	/home		
–Optional–			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
–Servers–			
<input type="checkbox"/>	/export	-----	
	Sun unbundled†		-----
	other vendors†	+	-----
	Local software†	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
–Custom–			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

* /usr is required for all configurations *except dataless*.

† Only for software to support clients of an *application architecture* different from the server's.

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Partition Planning Worksheet

	Partition/Filesystem	Size	Position
–Required–			
<input checked="" type="checkbox"/>	/ (root)		
<input checked="" type="checkbox"/>	swap		
<input checked="" type="checkbox"/>	/usr*	-----	
	Sun unbundled		-----
	other vendors	+	-----
	Local software	+	-----
	Free Space	+	-----
	Total over and above	=	-----
–Common–			
<input type="checkbox"/>	/home		
–Optional–			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
–Servers–			
<input type="checkbox"/>	/export	-----	
	Sun unbundled†		-----
	other vendors†	+	-----
	Local software†	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
–Custom–			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

* /usr is required for all configurations *except dataless*.† Only for software to support clients of an *application architecture* different from the server's.

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Disk Form Worksheet

Disk Drive: _____

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			

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Disk Form Worksheet

Disk Drive: _____

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			

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Disk Form Worksheet

Disk Drive: _____

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
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h			

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Disk Form Worksheet

Disk Drive: _____

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			

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Software Form Worksheet

a-arch.k-arch: _____ . _____

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	—
<input checked="" type="checkbox"/>	usr	—
<input checked="" type="checkbox"/>	Kvm	—
<input checked="" type="checkbox"/>	Install	—
<input checked="" type="checkbox"/>	Networking*	—
<input type="checkbox"/>	Debugging	SunView_Users
<input type="checkbox"/>	RFS	TLI, Sys
<input type="checkbox"/>	Sys	—
<input type="checkbox"/>	System_V	—
<input type="checkbox"/>	TLI	—
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input type="checkbox"/>	SunView_Users	—
<input type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Games	SunView_Users
<input type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	—
<input type="checkbox"/>	Shlib_Custom	—
<input type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Text	—
<input type="checkbox"/>	User_Diag	SunView_Users
<input type="checkbox"/>	uucp	—
<input type="checkbox"/>	Versatec	—

* Only required if the system is connected to a network.

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Software Form Worksheet

a-arch.k-arch: _____ . _____

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	—
<input checked="" type="checkbox"/>	usr	—
<input checked="" type="checkbox"/>	Kvm	—
<input checked="" type="checkbox"/>	Install	—
<input checked="" type="checkbox"/>	Networking*	—
<input type="checkbox"/>	Debugging	SunView_Users
<input type="checkbox"/>	RFS	TLI, Sys
<input type="checkbox"/>	Sys	—
<input type="checkbox"/>	System_V	—
<input type="checkbox"/>	TLI	—
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input type="checkbox"/>	SunView_Users	—
<input type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Games	SunView_Users
<input type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	—
<input type="checkbox"/>	Shlib_Custom	—
<input type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Text	—
<input type="checkbox"/>	User_Diag	SunView_Users
<input type="checkbox"/>	uucp	—
<input type="checkbox"/>	Versatec	—

* Only required if the system is connected to a network.

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Software Form Worksheet

a-arch.k-arch: _____ . _____

Category	Prerequisites
<input checked="" type="checkbox"/> root	—
<input checked="" type="checkbox"/> usr	—
<input checked="" type="checkbox"/> Kvm	—
<input checked="" type="checkbox"/> Install	—
<input checked="" type="checkbox"/> Networking*	—
<input type="checkbox"/> Debugging	SunView_Users
<input type="checkbox"/> RFS	TLI, Sys
<input type="checkbox"/> Sys	—
<input type="checkbox"/> System_V	—
<input type="checkbox"/> TLI	—
<input type="checkbox"/> OpenWindows_Users	SunView_Users
<input type="checkbox"/> OpenWindows_Fonts	OpenWindows_Users
<input type="checkbox"/> SunView_Users	—
<input type="checkbox"/> Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/> OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/> Games	SunView_Users
<input type="checkbox"/> Graphics	SunView_Users, SunView_Programmers
<input type="checkbox"/> Manual	Text
<input type="checkbox"/> Security	—
<input type="checkbox"/> Shlib_Custom	—
<input type="checkbox"/> SunView_Demo	SunView_Users, SunView_Programmers
<input type="checkbox"/> SunView_Programmers	SunView_Users
<input type="checkbox"/> OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/> Text	—
<input type="checkbox"/> User_Diag	SunView_Users
<input type="checkbox"/> uucp	—
<input type="checkbox"/> Versatec	—

* Only required if the system is connected to a network.

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Software Form Worksheet

a-arch.k-arch: _____ . _____

	Category	Prerequisites
<input checked="" type="checkbox"/>	root	—
<input checked="" type="checkbox"/>	usr	—
<input checked="" type="checkbox"/>	Kvm	—
<input checked="" type="checkbox"/>	Install	—
<input checked="" type="checkbox"/>	Networking*	—
<input type="checkbox"/>	Debugging	SunView_Users
<input type="checkbox"/>	RFS	TLI, Sys
<input type="checkbox"/>	Sys	—
<input type="checkbox"/>	System_V	—
<input type="checkbox"/>	TLI	—
<input type="checkbox"/>	OpenWindows_Users	SunView_Users
<input type="checkbox"/>	OpenWindows_Fonts	OpenWindows_Users
<input type="checkbox"/>	SunView_Users	—
<input type="checkbox"/>	Demo	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
<input type="checkbox"/>	OpenWindows_Demo	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Games	SunView_Users
<input type="checkbox"/>	Graphics	SunView_Users, SunView_Programmers
<input type="checkbox"/>	Manual	Text
<input type="checkbox"/>	Security	—
<input type="checkbox"/>	Shlib_Custom	—
<input type="checkbox"/>	SunView_Demo	SunView_Users, SunView_Programmers
<input type="checkbox"/>	SunView_Programmers	SunView_Users
<input type="checkbox"/>	OpenWindows_Programmers	OpenWindows_Users, OpenWindows_Fonts
<input type="checkbox"/>	Text	—
<input type="checkbox"/>	User_Diag	SunView_Users
<input type="checkbox"/>	uucp	—
<input type="checkbox"/>	Versatec	—

* Only required if the system is connected to a network.

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

Root fs: */export/root*³

Swap fs: */export/swap*⁴

Client Information :

Internet Address: *net . net . net .* _____⁵

Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

NIS Type: [none] [client]⁷

Domain name: *server_domainname*⁸

Swap size (e.g. 8B, 8K, 8M): _____**M**⁹

Path to Root: */export/root/client_name*¹⁰

Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

Root fs: */export/root*³

Swap fs: */export/swap*⁴

Client Information :

Internet Address: *net . net . net .* _____⁵

Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

NIS Type: [none] [client]⁷

Domain name: *server_domainname*⁸

Swap size (e.g. 8B, 8K, 8M): _____**M**⁹

Path to Root: */export/root/client_name*¹⁰

Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

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Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

NIS Type: [none] [client]⁷

Domain name: *server_domainname*⁸

Swap size (e.g. 8B, 8K, 8M): _____**M**⁹

Path to Root: */export/root/client_name*¹⁰

Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

Root fs: */export/root*³

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Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

NIS Type: [none] [client]⁷

Domain name: *server_domainname*⁸

Swap size (e.g. 8B, 8K, 8M): _____ **M**⁹

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Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

Root fs: */export/root*³

Swap fs: */export/swap*⁴

Client Information :

Internet Address: *net . net . net .* _____⁵

Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

NIS Type: [none] [client]⁷

Domain name: *server_domainname*⁸

Swap size (e.g. 8B, 8K, 8M): _____ **M**⁹

Path to Root: */export/root/client_name*¹⁰

Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

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Swap fs: */export/swap*⁴

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Internet Address: *net . net . net .* _____⁵

Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

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Domain name: *server_domainname*⁸

Swap size (e.g. 8B, 8K, 8M): _____ **M**⁹

Path to Root: */export/root/client_name*¹⁰

Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

Root fs: */export/root*³

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Ethernet Address: _____ : _____ : _____ : _____ : _____ : _____⁶

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Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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Client Form Worksheet

Client name: _____¹

Architecture Type: _____ . _____²

Root fs: */export/root*³

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Path to Swap: */export/swap/client_name*¹¹

Path to Executables: */usr*¹²

Path to Kernel Executables: */usr/kvm*¹³

Path to Home: */home/server_name*¹⁴

Terminal type: *sun*¹⁵

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