

# Solaris 1.1.1 System Installation

1.1.1

Solaris<sup>®</sup>



*SunSoft*

A Sun Microsystems, Inc. Business

# Solaris 1.1.1 System Installation

(SunOS4.1.3\_U1 and OpenWindows3.0\_U1)

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U.S.A.

Part No: 801-5127-10  
Revision A, November 1993



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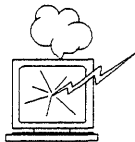
# Introduction

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Chapter 1 includes general information about the manual as a whole, and details the first steps required for all installations.

- It will help you determine if your computer has a hard disk pre-installed with SunOS system software
- 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 Preinstalled*, *Quick Install*, or *Custom Install*. 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.

- 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:
```

- When a box represents 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**

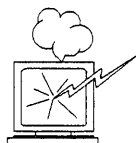
Illuminates information that is nice to know, but not essential to the installation.

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

### Required Documents

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

- *Solaris 1.1.1 Late Breaking News*
- *Solaris 1.1.1 Release Notes*

### Helpful Reference Documents

The following are manuals that you should have available for reference while planning and performing your installation. 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

First you must determine your workstation's or server's configuration. Then determine which method you will use to perform the installation.

#### *Determining Workstation Configuration*

Sun workstations are typically installed in groups connected by a *network*. This connection allows each workstation 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 one of the configurations below that 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.

#### *Dataless Client*

A dataless client has a disk drive 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)
- Simplify system administration (by requiring only the server, not the clients, to be backed up on a regular basis)



---

## *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 a network it is 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 that require those services in order to function. A client of a server is classified as *dataless* or *diskless*, depending on whether or not it has its own local disk.

A server is classified as either *homogeneous* or *heterogeneous*. This classification is determined by the *architectures* of the clients which the server will support.

- 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.

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.

## *The Next Step*

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 (using a *Preinstalled* SunOS or performing a *Quick Install* with SunInstall) 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 Install* and should proceed to Section 1.4, "Gathering Preliminary Information — Hardware." If your workstation has just one disk, read on.



## *SunOS Preinstalled?*

Desktop SPARCstation™ systems are shipped from the factory with SunOS already installed on their internal (or external) disks. 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 4.1.3\_U1 using either the *upgrade* utility (described in Chapter 2 or the Quick Install or Custom Install options of SunInstall. **Be sure that you back up your personal files prior to beginning the installation of Solaris 1.1.1.**

## *Quick Installation?*

If your workstation has a local CD-ROM drive, you have the option of using the *Quick Install* 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” chapter of this manual.

## *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.

## *Applying OpenWindows Patches*

Over 270 bug fixes to OpenWindows 3.0 are available in the patch zone, and can be applied with the `/usr/etc/extract_patch` command after you’ve installed SunOS and OpenWindows. Before starting, you may want to backup OpenWindows, or locate the original distribution CD, since the patched components will overwrite the originals. Make sure your `OPENWINHOME` environment is set before extraction!



```
% su
Password:
# setenv OPENWINHOME OpenWindowsInstallDirectory
# extract_patch
-----
Enter the name of the patch you wish to extract? ow3_u1
```

Note that you need 16 MB of free space in `/usr/tmp` (or in another partition) to install this patch. For instructions on using a remote CD drive, see chapter 4 of *Solaris 1.1.1 Release Notes*.

## 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 E 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.



This SunOS release does not support Sun-3 systems.

*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 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. Systems in the SPARCsystem 600MP series have a *sun-4m* kernel architecture.



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 10	sun4.sun4m
SPARCsystem 600MP series	sun4.sun4m
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 IPX (4/50)	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

### *Determining Sun Peripheral Device Abbreviations*

You will need to know the device name and number of the CD-ROM drive; and device name and partition\_designator for your system disk drive. Refer to the following tables and record the information on the Preliminary Information Worksheet.





Table 1-2 Media Devices

Abbreviation	Media Device No.	Description
cdrom	sr0 (sd for booting)	CD-ROM drive for open boot PROM
sr	sr0 (sd for booting)	CD-ROM drive for other systems

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 SCSI SunCD drive would most often be known as `sr0`.

Table 1-3 Disk Devices

Abbreviation	Disk Device No.	Description
sd	sd0 sd1 sd2 sd3 sd4 sd5 sd6	SCSI disk
xy	xy0 xy1 xy2 xy3	Xylogics 450/451 SMD disk
xd	xd0 through xd15	Xylogics 7053 SMD disk
id	id000 through id0374	IPI disk

Table 1-4 Boot Syntax for Sun System Architecture

Device	Sun-4	SPARCstation 1, 1+, IPC, SLC	SPARCstation 2, ELC, IPX, 10, and 600MP-Series
sr	sd(0,30,1)	sd(0,6,2)	cdrom

You need only determine the device name of your *system disk*; that is, the disk drive that your system will boot from. The system disk will be device `6` for internal SCSI disks in SPARCserver 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 (for example `wyse50` or `tvi925`) on the Preliminary Information Worksheet. Full instructions for determining the `/etc/termcap` name are given in Appendix E, "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 the “Sun’s Network Information Service” section later in this chapter 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 *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, what domain name you must use. 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.



**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 1.11, "Pre-Installation Checklist," below.**

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 category)
- If you plan to use SunView™ or other window-based applications. (SunView\_Users category)
- If you plan to use OpenWindows™ (OpenWindows\_Users and SunView\_Users categories)
- If you need access to programming tools and debuggers (Debugging category)
- 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 categories)



To install all of the software from the SunOS release media requires between 165-175 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.*

### 1.6. Category Classifications

To help you determine your software needs, the following tables classify each software category as one of the following types: Required, Desirable, Common, or Optional.



## *Required*

The required categories *must* be installed for basic system functions.

**Example:** root, usr, Kvm, Install, and Networking

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

## *Desirable*

Desirable categories are essential for many applications.

**Example:** Sys

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

## *Common*

Common categories provide software that is commonly needed.

**Example:** SunView\_Users

The SunView\_Users category enables you to use SunView window-based tools and applications. (It is also a prerequisite for the OpenWindows\_Users common category).

## *Optional*

Optional categories are ones you can consider installing based solely on your specific needs

**Examples:** Manual and Text

These two optional categories provide an on-line version of the *SunOS Reference Manual*. Whether you choose to install these categories that provide 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*

The Software Form Worksheet lists software categories you can install. The following tables describe the software categories and notes their approximate sizes. Read the description of each category and decide whether you wish to load it. On a copy of the Software Form Worksheet, check off each category you choose to install.



If you want to see a list of the categories generated directly from the CD-ROM containing this release of the operating system, refer to the next section.



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

Table 1-5 Required Software Categories with Descriptions

Category	Size in MBytes	Description	Prerequisites
root	5.3	Contents of the root filesystem /, including the SunOS kernel /vmunix	
usr	28.9	Required portions of /usr. Includes standard utilities, system programs, and library routines.	
Kvm	5.2	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	1.1	(Required for all networked systems.) Essential NFS software including programs such as rlogin(1C) and rcp(1C), and tools for network administration.	



Table 1-6 Desired Software Categories with Descriptions

Category	Size in MBytes	Description	Prerequisites
Debugging	2.9	Debugging tools for programmers including <code>dbxtool(1)</code> , a source-level debugger for C, Pascal, and Fortran-77 programs that runs in a windowed environment.	SunView_Users
RFS	0.9	Remote File System, an alternative to NFS in a System-V environment.	TLI, Sys
Sys	6.2	Software for building kernels and kernel configuration files for common configurations.	
System_V	4.0	Selected programs, include files, and libraries for UNIX System-V compatibility and compliance with X/Open Portability Guide standards. (UNIX is a registered trademark of AT&T.)	
TLI	0.1	Transport Layer Interface, a communications protocol used by RFS, an alternative to NFS in a System-V environment.	Sys





Table 1-7 Common Software Categories with Descriptions

Category	Size in MBytes	Description	Prerequisites
SunView_Users	2.7	Provides an environment to run SunView window-based tools, such as mailtool(1), dbxtool(1), sundiag(8), and many others.	
OpenWindows_Users*	33.5	Provides an environment to run OpenWindows window-based tools, such as mailtool(1), filemgr(1), cm(1), and many others.	
OpenWindows_Fonts*	9.5	Provides fonts for OpenWindows_Users.	

\* See Section 1.8 below for descriptions of the new OpenWindows Version 3 software categories.

Table 1-8 Optional Software Categories with Descriptions

Category	Size in MBytes	Description	Prerequisites
Demo	4.1	Miscellaneous demonstration programs (selected source code and binaries).	SunView_Users, SunView_Programmers, OpenWindows_Users, OpenWindows_Programmers
Games	3.1	Computer games, such as adventure(6), boggle(6), chesstool(6), and others.	SunView_Users
Graphics	1.8	Software for programmers who wish to develop graphics-based applications in a SunView environment. (Includes CGI and SunCore.)	SunView_Users, SunView_Programmers



Table 1-8 Optional Software Categories with Descriptions— Continued

Category	Size in MBytes	Description	Prerequisites
Manual	7.5	Source files for the on-line man pages. These can be installed on just one or two servers on your network. Other workstations can then mount the /usr/share directory from a "man page server" to access man pages.)	Text
OpenWindows_Demo*	7.6	Miscellaneous demonstration programs (selected source code and binaries).	OpenWindows_Users
OpenWindows_Programmers*	23.2	Software for programmers who wish to develop window-based applications in an OpenWindows environment.	OpenWindows_Users, OpenWindows_Fonts
Security	0.3	Software to provide enhanced password security and event-specific auditing, as specified for C2-level security. (See <i>System and Network Administration</i> , Chapter 19 – Administering C2 Security.)	
Shlib_Custom	1.4	Software for programmers building their own shared libraries.	
SunView_Demo	0.5	SunView demonstration programs (selected source code and binaries).	SunView_Users, SunView_Programmers
SunView_Programmers	1.8	Software for programmers who wish to develop window-based applications in a SunView environment. <b>Most Sun graphics products require this category.</b>	SunView_Users



Table 1-8 Optional Software Categories with Descriptions— Continued

Category	Size in MBytes	Description	Prerequisites
Text	0.7	Text-processing software, including the <code>nroff(1)</code> and <code>troff(1)</code> formatting programs, standard macro packages, and preprocessors such as <code>eqn(1)</code> and <code>tbl(1)</code> .	
User_Diag	7.7	Diagnostic programs, including <code>sundiag(8)</code> , a window-based tool used to test system devices and peripherals.	SunView_Users
uucp	0.6	Files to support <code>uucp(1C)</code> , for system-to-system, serial-line network communications.	
Versatec	6.0	Spooling support for Versatec V-80 plotters.	

\* See Section 1.8 below for descriptions of the new OpenWindows Version 3 software categories.

## 1.8. OpenWindows Version 3 Software Categories

The software categories for OpenWindows Version 3 do not have exactly the same content as the categories for OpenWindows Version 2. The software packages that comprise OpenWindows Version 3 have been grouped into the following categories, which are described in the next subsections.

- OpenWindows\_Users
- OpenWindows\_Fonts
- OpenWindows\_Demo
- OpenWindows\_Programmers



Note that many unbundled and third-party applications which previously ran under OpenWindows Version 2 with only OpenWindows\_Users installed may not run under OpenWindows Version 3 — because they require the Optional Fonts package.



---

## *OpenWindows\_Users*

The *OpenWindows\_Users* category requires about 35.6MB of disk space and is comprised of the following *packages*:

- The Required Package  
X11/NeWS server, XView, OLIT, TNT, dynamically linked libraries, DeskSet, core set of fonts, basic clients, support programs, and data files
- The Online Manual Pages Package  
OpenWindows man pages sections 1, 5, 6, 7, and 8
- The Online Handbooks Package  
Online handbook and Desktop Intro
- The MIT Release Package  
X11R4 release applications

## *OpenWindows\_Fonts*

The *OpenWindows\_Fonts* category requires about 10MB of disk space and is comprised of the following *package*:

- The Optional Fonts Package  
Fonts required for non-default OpenWindows applications

## *OpenWindows\_Demo*

The *OpenWindows\_Demo* category requires about 8.1MB of disk space and is comprised of the following *packages*:

- The Demo Programs Package  
OpenWindows demonstration applications
- The Demo Images Packages  
Graphic images used by certain demo programs

## *OpenWindows\_Programmers*

The *OpenWindows\_Programmers* category requires about 24MB of disk space and is comprised of the following *packages*:

- The Online Library Interface Manual Pages Package

man pages section 3

- The Include Files Package
- The Lint Libraries Package
- The Static Libraries Package
- The Sample Source Package

## 1.9. Listing Software Categories on a CD-ROM

This section tells how to find out which categories are on the SunOS release CD-ROM and how to use the `list_files` command to display all the files within a category.

### *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_3_u1
```

Replace *k-arch* with 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 a desktop system in the following example:



Figure 1-1 Contents for Sun4c Kernel Architecture (Desktop SPARCsystems)

```
ARCH sun4c
VOLUME -1
Vol File          Name          Size   Type
0  -1             XDRTOC        4096   toc
1  0              root          262144 tar
1 262144          usr           29589504 tar
1 29851648        Kvm           5308416 tar
1 35160064        Install       999424  tar
1 36159488        Networking    1064960 tar
1 37224448        System_V      4104192 tar
1 41328640        Sys           5701632 tar
1 47030272        SunView_Users 2727936 tar
1 49758208        SunView_Demo  524288  tar
1 50282496        Text          729088  tar
1 51011584        Demo          4161536 tar
1 55173120        OpenWindows_Users 34316288 tar
1 89489408        OpenWindows_Demo 7815168  tar
1 97304576        OpenWindows_Fonts 9748480  tar
1 107053056       User_Diag     7872512 tar
1 114925568       Manual        7675904 tar
1 122601472       TLI           49152   tar
1 122650624       RFS           925696  tar
1 123576320       Debugging    2998272 tar
1 126574592       SunView_Programmers 1884160  tar
1 128458752       Shlib_Custom 1409024 tar
1 129867776       Graphics     1826816 tar
1 131694592       uucp         622592  tar
1 132317184       Games        3211264 tar
1 135528448       Versatec     6103040 tar
1 141631488       Security     319488  tar
1 141950976       OpenWindows_Programmers 23756800 tar
-1  -1            Copyright    2560    image
```

## list\_files

Use the `list_files(8)` command to list all the files in a specific category on a CD-ROM or tape. 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, you must follow it with the name of 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 you must follow it with the name of the release whose files are to be listed.

For example, to list files in category "Text" on a CD-ROM in device `sr0`, enter:

```
#cd /usr/etc/install
#list_files sr0 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 `sun4c` kernel architecture; the server can be of any architecture.

```
#cd /usr/etc/install
#list_files sr0 Text -a sun4c
```

## 1.10. Software Selection Guidelines

Some further suggestions to help you choose your optional software.

- Need for these categories depends entirely on your system hardware:

```
OpenWindows_Users
SunView_Users
uucp
Versatec
```

The first two are very desirable if you have a bit mapped display.

- These categories are for accessing 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  
OpenWindows\_Programmers  
Shlib\_Custom  
SunView\_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  
OpenWindows\_Demo  
OpenWindows\_Fonts  
SunView\_Demo  
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.





## 1.11. 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 (you may also print output from commands marked with an \*):**

- \_\_\_ 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
- \_\_\_ mail files (all files in /var/spool/mail)

#### \_\_\_ **Save to tape or diskette a copy of each of:**

- |                                |                     |
|--------------------------------|---------------------|
| ___ /.profile                  | ___ /.cshrc         |
| ___ /.rhosts                   | ___ /etc/fstab      |
| ___ /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 Solaris 1.1.1 release CD-ROM.

- To install a heterogeneous server, for example, you'll need additional media for client architectures not supported by Solaris 1.1.1. (The Solaris 1.1.1 release CD-ROM includes all supported architectures on a single disk.)
- You must reinstall or extract from backups unbundled software and third-party applications after you do a full install of the new SunOS release.

— **Gather all necessary documentation.**

In addition to this manual, have available the *Release Manual* for this SunOS release. Be sure to read the "Open Issues" section of that manual for information about special handling of your hardware and software within this SunOS release.

You also may find the manual for operating your SunCD drive and the *System and Network Administration* manual to be useful.



---

— **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)



**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 4.1.3\_U1.

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

Chapter 2: Upgrading to Solaris 1.1.1

Chapter 3: Installing a Standalone Workstation with Quick Install

Chapter 4: Installing a Standalone Workstation with Custom Install

Chapter 5: Installing a Homogeneous Server

Chapter 6: Installing a Heterogeneous Server

Chapter 7: Installing a Dataless Workstation

# Upgrading to Solaris 1.1.1

---



Solaris 1.1.1 is comprised of SunOS 4.1.3\_U1 and OpenWindows 3.0 (or 3.0\_U1). Use `sunupgrade` to upgrade your SunOS 4.1.x\* system to SunOS 4.1.3\_U1 and OpenWindows 3.0. For example, you can upgrade from SunOS 4.1.3 to SunOS 4.1.3\_U1 only, or from SunOS 4.1.3 and OpenWindows 2.0 to SunOS 4.1.3\_U1 and OpenWindows 3.0. You can upgrade the following types of Sun-4, Sun-4c, or Sun-4m systems with `sunupgrade`:

- Standalone or dataless SPARCsystem
- SPARCserver and diskless SPARC clients

The procedures for the two types of upgrades are similar, but they are described separately, for the sake of clarity. Only SunOS 4.1.x can be upgraded; you must do a full install with `suninstall` if you have a previous version of the operating system.

See Section 2.7 for a list of all optional flags to the `sunupgrade` command.

## 2.1. OpenWindows 3.0\_U1

See the Section “Applying OpenWindows Patches” in the previous chapter for instructions on using `extract_patch` to produce OpenWindows 3.0\_U1.

---

\* SunOS 4.1.x includes SunOS 4.1.1, SunOS 4.1.1 Rev B, SunOS 4.1.2, and SunOS 4.1.3. `sunupgrade` does not support any other SunOS releases.

## 2.2. Summary of Upgrade Process

The details of upgrading to Solaris 1.1.1 are described in “Standalone or Dataless Upgrade” and “Server and Diskless SPARC Client Upgrade” below. The basic process consists of the following steps:

1. Back up your current system(s).
2. Determine that you have enough disk space to complete the upgrade.
3. Mount the Solaris 1.1.1 CD-ROM.
4. [Optional] Run `dummy sunupgrade` to determine that the proper software categories will be upgraded.
5. Run `check_perm` to see which SunOS 4.1.x\* files that are going to be replaced by SunOS 4.1.3\_U1 files have been changed since SunOS 4.1.x was installed.
6. Analyze results of `check_perm` and decide which volatile file list you wish to use. See Section 2.9 for details about `check_perm`.
7. If you are upgrading a server, halt all client machines.

Note: upgrade all dataless clients and halt them before you upgrade the server.

8. Shut down the machine to be upgraded, bringing it down to single-user mode. (If you are going to do the upgrade remotely, first mount the Solaris 1.1.1 CD-ROM from the machine to be upgraded.)
9. [Optional] Run `fsck` on the following file systems: slash (/), /usr, and /export (if it exists).

Fix any file system problems before continuing.

10. Run `sunupgrade`.

If you upgrade the server of dataless clients, upgrade each of the dataless clients *before* you upgrade the server and halt them before you upgrade the server.

11. [Optional] Reboot each upgraded system: server first, then clients.

Because rebooting makes standard editors and other functions available, you may find it easier to customize volatile files and the kernel after you have rebooted; however, your system may not reboot automatically if you have a non-standard booting process. In this case, you may have to customize `rc.local` and/or `rc.boot`, and the kernel configuration file before booting.



12. Customize volatile files (`rc.local`, `format.dat`, etc.), if necessary. Restore or edit any files that need to be restored or edited.
13. Customize and rebuild the kernel(s), if necessary.



When you run `config` to prepare to make a kernel, you designate a `config_file` which describes the kernel to be made; `config`'s output goes into the directory named `../config_file`. Because of differences in time stamps, if the directory `../config_file` already exists when you run `config`, your kernel may not be buildable. In this case, you will have to remove the directory before running `config`.

14. Reboot each system modified in the previous two steps: server first, then clients.

## No Partial Upgrades

You *cannot* do partial upgrades with `sunupgrade`. A partial upgrade is any upgrade that does not include the server and all of its SPARC clients.

## Remote Upgrades

You can run `sunupgrade` directly, from an attached CD-ROM drive, or remotely, from a CD-ROM drive on another machine on the network.



Note that you *cannot* do a remote server upgrade from a client of the server (since the client must be halted before the upgrade is performed).

Suppose you have a machine named "withcdrom" that has a CD-ROM drive and a machine named "nocdrom" that you want to upgrade. Do the following as root:

1. On "withcdrom," insert the CD-ROM into the drive and mount the Solaris 1.1.1 CD-ROM:

```
# mount -rt hsfs /dev/sr0 /mnt
```

If the CD-ROM drive is currently in use, you may have to unmount it and eject the current CD-ROM.

2. On "withcdrom," add the following line to `/etc/exports`:

```
/mnt -ro
```

3. On "withcdrom," export the mounted CD-ROM:

```
# /usr/etc/exportfs /mnt
```

You may have to start `rpc.mountd` manually; see the man page for `mountd(8C)` for details.

4. On "nocdrom," mount the CD-ROM from "withcdrom":

```
# mount -r withcdrom:/mnt /usr/etc/install/tar
```

5. Perform the upgrade on "nocdrom," as described in Section 2.5 or Section 2.6 below.

Do *not* mount the CD-ROM as instructed in Step 4 of the upgrade procedure; you will get an error condition if you attempt it.

6. After the upgrade, unmount the Solaris 1.1.1 CD-ROM, remove the line from `/etc/exports`, and execute the following command:

```
# /usr/etc/exportfs -u /mnt
```

## Disk Space Requirements

For upgrading from SunOS 4.1.x `sunupgrade` requires an additional two megabytes in the root (`/`) partition (for the server and each client or for a standalone system). Upgrading from SunOS 4.1.1 or SunOS 4.1.1 Rev B requires an additional 11 megabytes in the user partition (`/usr`); upgrading from SunOS 4.1.2 requires an additional four megabytes in `/usr`. SunOS 4.1.3\_U1 should not require any more space than SunOS 4.1.3. These are general guidelines, which should be sufficient for all cases.



If `sunupgrade` abnormally terminates during the upgrade procedure (from lack of disk space, for example), the system may be in an inconsistent state, at which point a full installation of SunOS may become necessary. Be sure enough space is available before running `sunupgrade`.

If OpenWindows Version 2 is installed and you wish to install OpenWindows Version 3 during sunupgrade, you will need an additional 31.5 megabytes in \$OPENWINHOME (default location is /usr/openwin).

If you think you do not have enough free space available to perform an upgrade, consider the following:

- If you are upgrading from SunOS 4.1.1 Rev B, approximately 360 kilobytes can be subtracted from the 11-megabyte guideline.
- If usr\_diag is not loaded, 5.5 MB can be subtracted from the 11-megabyte guideline.

Other space-saving ideas to consider, especially if the root partition (/) is short on space, include the following;

- Be sure all core files have been deleted.
- Make sure /tmp is "clean."
- Move any unneeded kernels (/vmunix.old, /vmunix.generic, etc) to a different file system or remove them.
- Use the small (-s) option when running sunupgrade.
- Use the no backup (-nb) option when running sunupgrade (this will save about 1.2 MB of space).

If the user partition (/usr) is short of space, it might be necessary to remove some software categories prior to sunupgrade. For example, if /usr/man or /usr/openwin is located on another machine, it may not be necessary to include it locally. If these software categories are removed, **be sure** to update /etc/install/media\_file.sun4.sun4[c,m].sunos.4.1.[1-3] before running sunupgrade; otherwise, the SunOS 4.1.3\_U1 versions of the software will be loaded.

If /usr/openwin is short of space, but there is enough space on another partition, mv /usr/openwin to that partition and use the -wOPENWINHOME option when running sunupgrade.

### 2.3. Upgrade Workaround for SunOS 4.1.1 and SunOS 4.1.1 Rev B: C2 Security Bug

The SunOS 4.1.2 C2 security bug fixes require that two pseudo-user passwd be added. This can be done by using C2conv in SunOS 4.1.2, or 4.1.3, or 4.1.3\_U1.

However, if you are running C2 in 4.1.1 or SunOS 4.1.1 Rev B and wish to use sunupgrade to upgrade to SunOS 4.1.3\_U1, these passwd entries must be





added before the machine is rebooted with 4.1.3\_U1 or you will not be able to log in. Note that this is a problem *only* when you use sunupgrade; once the upgrade is complete, C2conv will work correctly.

You may either add these passwd entries manually before the system is rebooted with 4.1.3\_U1, or you may run C2unconv before running sunupgrade and C2conv after running sunupgrade and rebooting.

If the file /etc/security/passwd.adjunct exists, then you are running C2 security and you should perform one of the following procedures.

## Method 1

One method for working around the C2 security problem is to edit the passwd entries manually.

1. Edit /etc/passwd and add these entries:

```
AUpwdauthd:##AUpwdauthd:27:10:AUpwdauthd pseudo user::  
AUyppasswdd:##AUyppasswdd:28:10:AUyppasswdd pseudo user::
```

2. Edit /etc/security/passwd.adjunct and add these entries:

```
AUpwdauthd:*:::::  
AUyppasswdd:*:::::
```

## Method 2

A second method for working around the C2 security problem is to run C2unconv before running sunupgrade and C2conv after the upgrade.

1. Run C2unconv in single-user mode, before running sunupgrade:

```
# /usr/etc/C2unconv
```

2. Run C2conv in single-user mode, after running sunupgrade and rebooting the system:

```
# /usr/etc/C2conv
```

3. Remove duplicate entries in `/etc/fstab` and `/etc/exports`.

Duplicate entries from the first time `C2conv` was installed under SunOS 4.1.x should be removed after `C2conv` is run again.

## 2.4. Sun-3 Client Workaround

Sun-3 clients will not be upgraded by `sunupgrade` (Solaris 1.1.1 does not support Sun-3 systems). But your Sun-3 clients can continue to run a previous release of SunOS. If you want Sun-3 clients to continue to access the same man pages and if you want to be able to add more Sun-3 clients, you must do the following for Sun-3 clients of a server being upgraded:

1. Before the upgrade, back up the following two directories:

```
/export/share/sunos.4.1.1  
/export/exec/proto.root.sunos.4.1.1
```

These directories will be renamed with "4.1.3\_U1" as their suffixes during the upgrade. Note that you cannot use `cp` to back up the directories, because they contain linked files; use `tar` or `cpio`.

2. Restore backed-up files after upgrade.

After running `sunupgrade`, restore the backed-up `/export/share/sunos.4.1.1` directory to `/export/share`, and the backed-up `proto.root.sunos.4.1.1` directory to `/export/exec`.

Note that only man pages change in the `/export/share` directory during the upgrade. Note also that the `proto.root.sunos.4.1.1` directory is needed only when you add Sun-3 clients to your system.

## 2.5. Standalone or Dataless Upgrade

Any standalone or dataless SPARC (Sun-4, Sun-4c, or Sun-4m) system running SunOS 4.1.x can be upgraded to SunOS 4.1.3\_U1 by using the `sunupgrade` utility supplied on the Solaris 1.1.1 release CD-ROM.

See the instructions for the C2 security bug in Section 2.3 before performing the upgrade.



## Upgrade Dataless Client Before Server

You must upgrade all dataless clients of a server *before* you upgrade the server. Each of the clients should be halted after they are upgraded. After the upgrade, reboot the server first, then each of the dataless clients.

Note that only the `root` software category is upgraded for a dataless client.

## Upgrade Procedure

Do the following to perform the upgrade:

### 1. Perform a level 0 dump of your system.

NOTE: if you are not satisfied with your system after the upgrade, you can return to the original state of your system by performing a full restore.

### 2. Check for sufficient disk space.

Be sure your root partition (`/`) has at least two (2) free megabytes, and that `/usr` has at least 11 free megabytes (four free megabytes if upgrading from SunOS 4.1.2); this additional space in `/usr` is necessary if you are going to upgrade the full set of software categories. See "Disk Space Requirements" above for ways to save disk space.

If OpenWindows Version 2 is installed and you wish to install OpenWindows Version 3 during `sunupgrade`, you will need an additional 31.5 megabytes in `$OPENWINHOME` (default location is `/usr/openwin`).

The files that might be replaced (depending on what software categories are installed on your system) during the upgrade are listed in the following directory, sorted by category:

```
/usr/etc/install/tar/sunupgrade/incl
```

### 3. Become super-user:

```
% su
[Enter root password]
#
```

### 4. Mount the Solaris 1.1.1 CD-ROM.

Insert the Solaris 1.1.1 CD-ROM into your CD-ROM drive, and mount it on `/usr/etc/install/tar`:



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

See “Remote Upgrades” above for instructions for upgrading remotely, from a machine with a CD-ROM drive.

**5. Change to the directory where sunupgrade is located:**

```
# cd /usr/etc/install/tar/sunupgrade/shell
```

**6. Run check\_perm:**

```
# check_perm -v
```

Basically, `check_perm` lists those SunOS 4.1.1, 4.1.2, or 4.1.3 files that will be replaced by SunOS 4.1.3\_U1 files — *if* you have modified the SunOS 4.1.1, 4.1.2, or 4.1.3 file. These are files which you might want to customize after the upgrade is complete. The output of `check_perm` is two output files:

```
/usr/tmp/volatile_candidates  
/usr/tmp/volatile_file
```

It will take between two and 10 minutes to run `check_perm`, depending on your system configuration. See Section 2.9 in this chapter for details about `check_perm`.

**7. Analyze the results of check\_perm and decide which volatile file list to use.**

You can use the default volatile file list, `/usr/tmp/volatile_file`, as your volatile file list, or you can create your own volatile file list. See Section 2.8 for instructions for creating and using your own volatile file list. By default `sunupgrade` will use the Sun-supplied volatile file list.

**8. [Optional] Run sunupgrade with -dummy option:**

```
% sunupgrade -d
```

Note that you do not have to be the super-user to run the dummy upgrade and you do not have to be in single-user mode. See Section 2.7 for a list of all optional flags to the `sunupgrade` command.

The output of the dummy upgrade will tell you which software categories and volatile files are going to be upgraded. You can include the `-x` flag and your own volatile file list, if you wish.

9. **If you are not satisfied with the software categories that are going to be upgraded, edit the following file before running `sunupgrade`:**

```
/etc/install/media_file.sun4.sun[4,4c,4m].sunos.4.1.[1-3]
```

NOTE: you can only upgrade software categories which are already on your system. Please check that the file shows "mf\_loaded=no" for software categories you do NOT wish to upgrade and "mf\_loaded=yes" for software categories you wish to upgrade.

If you have installed a software category *manually* — using `extract_files(8)` or `tar`, for example — it will not be shown as loaded; change the "no" to "yes" for such software categories, being sure the software category is installed in the standard SunInstall location. If it is not in the standard location, it will not be upgraded.

Also, if you have manually *removed* a software category (`/usr/games` or `/usr/man`, for instance), and you do not wish to have it re-installed, you will have to change the "yes" to "no" in the media file.



If you have OpenWindows Version 2 on your system and you choose to install OpenWindows Version 3 during `sunupgrade`, all files in the directory `$OPENWINHOME` will be removed.

If you already have OpenWindows Version 3 on your system, it will *not* be overwritten during the upgrade.

10. **Become super-user, warn anyone logged in that you are going to halt the system, and shut down the system, bringing it down to single-user mode.**

If there are *no* users logged onto the system:

```
% su
[Enter root password]
# /usr/etc/shutdown now
```

If there are users logged on, use the `shutdown(8)` command to schedule a shutdown in advance. For example, to shutdown in 30 minutes:

```
% su
   [Enter root password]
# /usr/etc/shutdown +30 "Upgrading software to Solaris 1.1.1"
```

11. **[Optional]** Run `fsck` on `/`, `/usr`, and `/export` (if it exists) file systems.

Fix any file system problems before continuing.

12. **Change to the directory where `sunupgrade` is located:**

```
# cd /usr/etc/install/tar/sunupgrade/shell
```

13. **Start `sunupgrade`.**

When you are satisfied with the software categories and files that are going to be upgraded, run `sunupgrade` without the `-dummy` option:

```
# sunupgrade -v
(if you wish to see the list of the upgraded files, and if you want to use the
Sun-supplied volatile file list)
      or
# sunupgrade -x/usr/tmp/volatile_file
(if you do not wish to see the list of the upgraded files and if you wish to use
volatile_file, output from check_perm, for your volatile file list)
```

The upgrade will start. See Section 2.10 at the end of this chapter for an example of an upgrade. See Section 2.7 for a list of all optional flags to the `sunupgrade` command.

14. **Respond to system queries.**

The upgrade will be performed if you respond “yes” or “y” to all queries. Depending on the configuration of your system, which categories you have on your system, and how many clients you have, the upgrade will take about 15 to 30 minutes.

15. **[Optional]** For a standalone system: **reboot the system.**  
For a dataless client system: **halt the system.**

Leave all dataless client systems halted until after the server has been upgraded and rebooted; then reboot each dataless client, customize volatile files and the kernel, if necessary, and reboot again.

Because rebooting makes standard editors and other functions available, you may find it easier to customize volatile files and the kernel after you have rebooted; however, your system may not reboot automatically if you have a non-standard booting process. In this case, you may have to customize `rc.local` and/or `rc.boot`, and the kernel configuration file before booting.

16. **For standalone system: customize volatile files (`rc.local`, `/sys/sun4*/conf/files`, `format.dat`, etc.), if necessary.**

See the file `/usr/tmp/coalesce_list` for a list of the files that might need to be customized; these are "volatile" files that have been backed up with a `.411`, `.412`, or `.413` suffix.



If your system had unbundled products installed that require kernel support or device drivers other than those included in the generic kernel, you must re-apply these changes by coalescing the suggested files and configuring a new kernel.

17. **For standalone system: restore or edit any other files that need to be restored or edited.**
18. **For standalone system: customize and rebuild the system kernel, if necessary.**



When you run `config` to prepare to make a kernel, you designate a *config\_file* which describes the kernel to be made; `config`'s output goes into the directory named `../config_file`. Because of differences in time stamps, if the directory `../config_file` already exists when you run `config`, your kernel may not be buildable. In this case, you will have to remove the directory before running `config`.

19. **For standalone system: reboot the system, if you modified the kernel or volatile files such as `rc.local` after the upgrade.**

## 2.6. Server and Diskless SPARC Client Upgrade

You can upgrade a SPARCserver and *all* diskless SPARC clients running SunOS 4.1.x to SunOS 4.1.3\_U1 with `sunupgrade`. As noted earlier, partial upgrades are not supported: the SPARCserver and all SPARC clients will be upgraded when you run `sunupgrade`.

See the instructions for the C2 security bug in Section 2.3 before performing the upgrade. If you have any Sun-3 clients, see the Sun-3 workaround in Section 2.4, also.



If you are upgrading dataless clients, upgrade them before you upgrade the server.

Do the following to upgrade the server and all diskless clients:

1. **Perform a level 0 dump on your server.**

NOTE: if you are not satisfied with your system after the upgrade, you can return to the original state of your system by performing a full restore.

2. **Check for sufficient disk space.**

Be sure your root partition (/) has at least two (2) free megabytes, and that /usr has at least 11 free megabytes (four free megabytes if upgrading from SunOS 4.1.2); this additional space in /usr is necessary if you are going to upgrade the full set of software categories. See “Disk Space Requirements” above for ways to save disk space.

If OpenWindows Version 2 is installed and you wish to install OpenWindows Version 3 during sunupgrade, you will need an additional 31.5 megabytes in \$OPENWINHOME (default location is /usr/openwin).

The files that might be replaced (depending on what software categories are installed on your system) during the upgrade are listed in the following directory, sorted by software category:

```
/usr/etc/install/tar/sunupgrade/incl
```

3. **Become super-user:**

```
% su
[Enter root password] #
```

4. **Mount the Solaris 1.1.1 CD-ROM.**

Insert the Solaris 1.1.1 CD-ROM into your CD-ROM drive and mount it on /usr/etc/install/tar:

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

See “Remote Upgrades” above for instructions for upgrading remotely, from a machine with a CD-ROM drive.

5. **Change to the directory where sunupgrade is located:**



```
# cd /usr/etc/install/tar/sunupgrade/shell
```

#### 6. Run `check_perm`:

```
# check_perm -v
```

Basically, `check_perm` lists those SunOS 4.1.1 or SunOS 4.1.2 files which will be replaced by SunOS 4.1.3\_U1 files — *if* you have modified the SunOS 4.1.1 or SunOS 4.1.2 file. These are files which you might want to customize after the upgrade is complete. The output of `check_perm` is two output files:

```
/usr/tmp/volatile_candidates  
/usr/tmp/volatile_file
```

It will take between two and 10 minutes to run `check_perm`, depending on your system configuration. See Section 2.9 in this chapter for details about `check_perm`.

#### 7. Analyze the results of `check_perm` and decide which volatile file list to use.

You can use the default volatile file list, `/usr/tmp/volatile_file`, as your volatile file list, or you can create your own volatile file list. See Section 2.8 for instructions for creating and using your own volatile file list. By default `sunupgrade` will use the Sun-supplied volatile file list.

#### 8. [Optional] Run `sunupgrade` with `-dummy` option:

```
% sunupgrade -d [-xmyvolatile_list]
```

Note that you do not have to be the super-user to run the dummy upgrade and you do not have to be in single-user mode. See Section 2.7 for a list of all optional flags to the `sunupgrade` command.

The output of the dummy upgrade will tell you which software categories and volatile files are going to be upgraded. You can include the `-x` flag and your own volatile file list, if you wish.

#### 9. If you are not satisfied with the software categories that are going to be upgraded, edit the following file before running `sunupgrade`:

```
/etc/install/media_file.sun4.sun[4,4c,4m].sunos.4.1.[1-3]
```

NOTE: you can only upgrade software categories which are already on your system. Check that the file shows "mf\_loaded=no" for software categories you do NOT wish to upgrade and "mf\_loaded=yes" for software categories you wish to upgrade.

If you have installed a software category *manually* — using `extract_files(8)` or `tar`, for example — it will not be shown as loaded; change the "no" to "yes" for such software categories, being sure the software category is installed in the standard `SunInstall` location. If it is not in the standard location, it will not be upgraded.

Also, if you have manually *removed* a software category (`/usr/games` or `/usr/man`, for instance), and you do not wish to have it re-installed, you will have to change the "yes" to "no" in the media file.

If you have OpenWindows Version 2 on your system and you choose to install OpenWindows Version 3 during `sunupgrade`, OpenWindows Version 2 will be removed.

If you already have OpenWindows Version 3 on your system, it will *not* be overwritten during the upgrade.

10. **Halt all clients, including diskless, dataless, Sun-3, Sun-4, Sun-4c, Sun-4m.**
11. **Become super-user, warn anyone logged in that you are going to halt the system, and shut down the system, bringing it down to single-user mode.**

If there are *no* users logged onto the system:

```
% su
[Enter root password]
# /usr/etc/shutdown now
```

If there are users logged on, use the `shutdown(8)` command to schedule a shutdown in advance. For example, to shutdown in 30 minutes:

```
% su
[Enter root password]
# /usr/etc/shutdown +30 "Upgrading software to Solaris 1.1.1"
```

12. **[Optional] Run `fsck` on `/`, `/usr`, and `/export` (if it exists) file systems.**  
Fix any file system problems before continuing.

13. Change to the directory where sunupgrade is located:

```
# cd /usr/etc/install/tar/sunupgrade/shell
```

14. Start sunupgrade.

When you are satisfied with the software categories and files that are going to be upgraded, run sunupgrade without the -dummy option:

```
# sunupgrade -v
(if you wish to see the list of the upgraded files, and if you want to use the
Sun-supplied volatile file list)

or

# sunupgrade -x/home/server/mylist
(if you do not wish to see the list of the upgraded files and if you wish to use your own
volatile file list, which is in /home/server and is called mylist, in this case)
```

The upgrade will start. See Section 2.10 at the end of this chapter for an example of an upgrade. See Section 2.7 for a list of all optional flags to the sunupgrade command.

15. Respond to system queries.

The upgrade will be performed if you respond “yes” or “y” to all queries. Depending on the configuration of your system, which categories you have on your system, and how many clients you have, the upgrade will take between 20 minutes and two hours.

16. [Optional] Reboot the system.

Because rebooting makes standard editors and other functions available, you may find it easier to customize volatile files and the kernel after you have rebooted; however, your system may not reboot automatically if you have a non-standard booting process. In this case, you may have to customize rc.local and/or rc.boot, and the kernel configuration file before booting.

17. Customize volatile files (rc.local, /sys/sun4\*/conf/files, format.dat, etc.), if necessary.

See the file /usr/tmp/coalesce\_list for a list of the files that might need to be customized; these are “volatile” files that have been backed up with a .411, .412, or .413 suffix.



If your system had unbundled products installed that require kernel support or device drivers other than those included in the generic kernel, you must re-apply these changes by coalescing the suggested files and configuring a new kernel.

18. **Restore or edit any other files that need to be restored or edited.**
19. **Customize and build the system kernel, if necessary.**



When you run `config` to prepare to make a kernel, you designate a *config\_file* which describes the kernel to be made; `config`'s output goes into the directory named `../config_file`. Because of differences in time stamps, if the directory `../config_file` already exists when you run `config`, your kernel may not be buildable. In this case, you will have to remove the directory before running `config`.

20. **Reboot the system, if you modified the kernel or volatile files such as `rc.local` after the upgrade.**
21. **Boot all clients.**

You may want to customize files and the kernel for dataless clients; if so, boot the clients, customize the files and the kernel, and reboot.

## 2.7. Options to `sunupgrade` Command

The options to `sunupgrade` are listed below. Note that you should not include any space after the `-x` and `-w` flags.

**-d | -dummy**

No actual upgrade will be performed.

**-v | -verbose**

Prints the list of actually untarred files. By default, the replaced files will not be listed; they will be included in `/etc/install/sunupgrade.log`, however.

**-q | -quiet**

No screen output. Log will be recorded anyway.

**-n | -noninteractive**

No questions asked. Assumes always "yes".

**-wOPENWINHOME**

Full path of OpenWindows on the users system. The default is `/usr/openwin`.



**-xVOLATILE\_LIST**

Full path to user's volatile list. By default, Sun's list is used.

**-nb | -nobackup**

If **-nb** or **-nobackup** is specified, the script will not back up `/vmunix` with the name `/vmunix.orig`. By default, the backup is performed, if `/vmunix.orig` does not exist.

**-s | -small**

Install `/vmunix_small` rather than `/vmunix`, which is the default.

For a server upgrade, the three last options (**-xVOLATILE\_LIST**, **-nobackup**, and **-small**) are applicable to the server and all its diskless SPARC clients.

Using the options **-nobackup** and/or **-small** will save some space in the root directory.

## 2.8. Volatile File List

The default volatile file list, `volatile_list`, lists those files that changed between SunOS 4.1.1 or SunOS 4.1.2 and SunOS 4.1.3\_U1, and that are most likely to be customized by a user. The file is found in `/usr/etc/install/tar/sunupgrade`. This file is read, by default, when you run `sunupgrade`. You may designate a different volatile file list by including the full path name to the file after the **-x** flag; see "Using Your Own Volatile File List" below for instructions.

### How to Use `check_perm` Output

Run `check_perm` to get a list of the SunOS 4.1.1 or SunOS 4.1.2 files that are changed in SunOS 4.1.3\_U1 and that you have modified in some way; the output of `check_perm` is the following files:

```
/usr/tmp/volatile_file  
/usr/tmp/volatile_candidates.
```

You can use `/usr/tmp/volatile_file` as your volatile file list by including it after the **-x** flag with `sunupgrade`:

```
# sunupgrade -v -x/usr/tmp/volatile_file
```

If you do not wish to save all of the files in `/usr/tmp/volatile_file` with a `.411` or `.412` tag, you can edit the file before running `sunupgrade`. Or you can create your own volatile file list, as described in Section 2.9 below. Or you



could copy those files to a different location or with a different name so that they are not replaced by sunupgrade.

Note that it is *not* necessary to include files in your own volatile file list *unless* they appear in /usr/tmp/volatile\_file; only those files listed in /usr/tmp/volatile\_file will be replaced during the upgrade.

After you have run sunupgrade, you can edit the new files, using the saved versions of the files to add whatever customization is necessary.

## Using Your Own Volatile File List

By default sunupgrade uses the Sun-supplied volatile file list, /usr/etc/install/tar/sunupgrade/volatile\_list, reading the symbol at the start of the line to determine what to do with the files on the list:

+ = replace 4.1.[1-3] file with 4.1.3\_U1 file, saving a copy of the 4.1.[1-3] file with a .41[1-3] tag

- = retain 4.1.[1-3] file, saving a copy of the 4.1.3\_U1 file with a .413U1 tag\*

\* Note: if the SunOS 4.1.1 or 4.1.2 or 4.1.3 file is the same as the SunOS 4.1.3\_U1 file, no copy of the file is created.

You could use /usr/tmp/volatile\_file, an output of check\_perm, as your volatile file list when running sunupgrade. You could also copy the Sun-supplied list from the CD-ROM and amend it, or you could create a whole new list, using the symbols + or - to tell sunupgrade what to do with the files.

If you use /usr/tmp/volatile\_file or if you create your own list, you may wish to change the symbol by a file. You may also wish to add files to the list before performing the upgrade.

To use a volatile file list you created, include its full path name after the -x flag. To use the file /home/server/username/mylist, for instance, enter the following:

```
# sunupgrade -x/home/server/username/mylist
```

## Default Volatile File List

The Sun-supplied volatile file list is shown below. Note that most files listed are preceded by a plus sign (+), indicating that the file will be replaced and saved with a ".411" or ".412" tag.

```
#  @(#)volatile_list 1.2 91/07/30 SMI
#
#  key:
#  - 4.1.1 file is retained; 4.1.3_U1 file added with .413U1 tag.
#  + 4.1.3_U1 file replaces 4.1.[1-3] file; 4.1.[1-3] file saved with .41[1-3] tag
#  & 4.1.[1-3] file replaced by 4.1.3_U1 file.
#
+ /.cshrc
- /etc/aliases.pag
+ /etc/fstab
+ /etc/format.dat
+ /etc/magic
+ /etc/rc.boot
+ /etc/rc.local
+ /etc/uucp/Systems
+ /var/spool/cron/crontabs/root
+ /usr/kvm/sys/conf.common/files.cmn
+ /usr/kvm/sys/conf.common/param.c
+ /usr/kvm/sys/netinet/in_proto.c
+ /usr/kvm/sys/os/init_sysent.c
+ /usr/kvm/sys/os/vfs_conf.c
+ /usr/kvm/sys/scsi/conf/scsi_confdata.c
+ /usr/kvm/sys/scsi/targets/sd_conf.c
+ /usr/kvm/sys/scsi/targets/st_conf.c
+ /usr/kvm/sys/sun/conf.c
+ /usr/kvm/sys/sun/stubs.c
+ /usr/kvm/sys/sun/swapgeneric.c
+ /usr/kvm/sys/sun4/conf/devices
+ /usr/kvm/sys/sun4/conf/files
+ /usr/kvm/sys/sun4c/conf/devices
+ /usr/kvm/sys/sun4c/conf/files
+ /usr/kvm/sys/sun4c/openprom_xxx.c
+ /usr/kvm/sys/sun4m/conf/devices
+ /usr/kvm/sys/sun4m/conf/files
+ /usr/kvm/sys/sun4m/openprom_xxx.c
+ /usr/kvm/sys/sundev/sc_conf.c
+ /usr/kvm/sys/sunif/ie_conf.c
+ /usr/kvm/sys/sunif/le_conf.c
```



## 2.9. About check\_perm

The utility `check_perm` checks every SunOS 4.1.x file that is changed in SunOS 4.1.3\_U1 and lists those files that you have modified on your SunOS 4.1.x system. Files are checked for changes in permissions, ownership, size, and date created. This comparison should take between two and 10 minutes, depending on your system configuration. Basically, `check_perm` gives you a list of SunOS 4.1.1 or 4.1.2 files that are not *pure* SunOS 4.1.1 or 4.1.2 files.

One output of `check_perm` is `/usr/tmp/volatile_candidates`, which is a list of SunOS files that will be changed on your system after the upgrade, with an indication of the differences between the two files. See the example of a `volatile_candidates` file below for more about this file.

The other output of `check_perm` is `/usr/tmp/volatile_file`, which is a list of the same files, in the format of the default volatile file list (`volatile_list`). See the example of `volatile_file` below for more about this file.

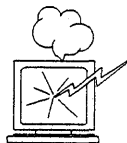
You can either save your files manually, or you can make your own version of the volatile file list and let the `sunupgrade` script do it for you. See Section "2.8" above for more information about the volatile file list and its use.

### *Installed Applications and Patches: How check\_perm Helps*

Run `check_perm` to determine if any system files have been customized for an installed application or for a system patch; these files will show up in `/usr/tmp/volatile_candidates` and `/usr/tmp/volatile_file`, which are described below.



Anything added to the base operating system must be re-applied after an upgrade; this includes unbundled applications. Any patches applied to your system which have not been incorporated into this release (see "SunOS 4.1.3\_U1 Patches" in Chapter 3 of the *Solaris 1.1.1 Release Notes* for a list of patches which were incorporated into Solaris 1.1.1) must be updated to run in the Solaris 1.1 environment before they are re-applied.



Do **not** re-apply a pre-Solaris 1.11 patch to your upgraded system. Check with your local Sun Support for patch updates.



## *Unbundled Applications; Possible Bug*

The following bug report (1079224) describes a possible problem with unbundled applications. Please test for the problem and the workaround, and suggest what else could be done to solve or mitigate the problem.

Synopsis: unbundled products need to be re-installed after sunupgrade.

Description: I had sunlink DNI 7.0 and Sunnet X25 7.0 installed on my SPARCstation 2, which was running SunOS 4.1.1 rev B. I decided to run sunupgrade rather than SunInstall because i did not want to have to re-install these products, and the documentation did not hint at any problems.

I ran sunupgrade ( after check\_perm ) successfully. Upon the first reboot I realised that I needed to do several things to get my unbundled products back:

1. Take the start up lines from rc.\*.411 and move them back into the correct rc file.
2. Build a new kernel with the unbundled product. This failed with many undefined symbols ( all X25 or DNI ) because the file /sys/sun4c/conf/files was a generic 4.1.2 file without the support for DNI and X25 that is added by the unbundled product install scripts.

A copy of files called files.411 is kept, but there are other differences so you cannot just copy files.411 to files. You have to take the correct lines from files.411 to files, and then you can build a kernel.

Workaround: Most Sunlink product have a files.addfP file containing the extra lines for the product, and these can be appended to /sys/sun4c/conf/files. Take care, if there is more than one product, not to add duplicate lines (DNI and X25 both have a sun/kern\_wrapxxx.o, for instance).

Or you can deinstall and then re-install the unbundled product; this defeats the purpose of using sunupgrade instead of SunInstall.

Comments: The documentation mentions that you may need to rebuild a kernel, but it is during this process that all the undefined symbols will appear. While most Sun technical staff will realise that the fault lies with the files file, 95% of the customers will not and will log support calls. The customer base with unbundled products that have kernel .o files is very large.

## What Files Changed in Solaris 1.1.1

All of the files that might be replaced (depending on what software categories are installed on your system) during the upgrade are listed in the following directory, sorted by software category:

```
/usr/etc/install/tar/sunupgrade/incl
```

### Example: `volatile_file` File

The file `/usr/tmp/volatile_file`, produced by running `check_perm`, is a ready-made volatile file list, which can be used by including it after the `-x` flag when running `sunupgrade`. You can edit the `volatile_file` if you do not want to save all the files listed with a `.411` or `.412` tag, or if you want to change the `+` to a `-` or a `&`. Shown below is a sample `volatile_file`; note that all the files listed are in the default volatile file list.

```
# Suggested volatile file list
#
# key:
# - 4.1.1 file is retained; 4.1.3_U1 file added with .413U1 tag.
# + 4.1.3_U1 file replaces 4.1.[1-3] file; 4.1.[1-3] file saved with .41[1-3] tag.
# & 4.1.[1-3] file replaced by 4.1.3_U1 file.
#
+ /etc/aliases.pag
+ /etc/fstab
+ /etc/format.dat
+ /etc/magic
+ /etc/rc.boot
+ /etc/rc.local
```

### Example: `volatile_candidates File`

The file `/usr/tmp/volatile_candidates`, produced by running `check_perm`, lists the file or directory and tells you what differences the compare found, in group, owner, size, or permissions. An example of the file, showing some of the changed files, follows. Note that “local” refers to what is on your disk — a modified SunOS 4.1.1 file — and “media” refers to a *pure* SunOS 4.1.1 file.

```
/etc/chown      # group: local -> 10 media -> 1
/etc/chroot    # group: local -> 10 media -> 1
/etc/fasthalt  # group: local -> 10 media -> 1
/etc/filetype  # size: local -> 2027 media -> 2011
/etc/fstab     # size: local -> 224 media -> 195
/etc/update    # group: local -> 10 media -> 1
/home         # permissions: local -> rwxr-xr-x media -> rwxr-sr-x
/home         # owner: local -> 0 media -> 3
/home         # group: local -> 0 media -> 10
. . .
```

In the example above, the group for the file `/etc/chown` is 10 on your customized SunOS 4.1.1 system (“local”); the group for the file `/etc/chown` is 1 on a *pure* SunOS 4.1.1 system (“media”).

The size of the file `/etc/filetype` is 2027 on your (“local”) system and 2011 on a *pure* SunOS 4.1.1 system (“media”).

## 2.10. Upgrade Example: Server & Diskless Clients

In this example, the server greenteal and the diskless clients, cheese, ezsystem, sparcs1, and suntour are upgraded.

```

sunupgrade: effective options list:
Checking for writability of /usr partition...
----- Starting sunupgrade Mon Feb 10 21:18:26 PST 1992 -----
sunupgrade will perform an upgrade by extracting 4.1.3_U1 files from the
media and overwriting the 4.1.2 files on server greenteal.
sunupgrade will only upgrade software categories which are currently installed.

No OpenWindows versions later than OpenWindows Version 3 will be overwritten.

The list of installed software categories to upgrade will be generated from the
following file(s) on your system :

/etc/install/media_file.sun4.sun{4, 4c, 4m}.sunos.{4.1.1, 4.1.2}

Please check that the file shows "mf_loaded=no" for software categories you
do NOT wish to upgrade and "mf_loaded=yes" for software categories you wish to
upgrade. If you have installed a software category "manually" -- without using
SunInstall -- it will not be shown as loaded; change the "no" to "yes" for
such software categories, being sure the software category is installed in the
normal SunInstall location.

Please check the _readme file in /usr/etc/install/tar/sunupgrade for more
information about the upgrade process.

Continue [yes|no] ? yes
cheese is at 4.1.1 release and is an UPGRADE CANDIDATE
ezsystem is at 4.1.2 release and is an UPGRADE CANDIDATE
sparcs1 is at 4.1.1 release and is an UPGRADE CANDIDATE
suntour is at 4.1.2 release and is an UPGRADE CANDIDATE

Before you answer "yes" to the following question
- make sure that all dataless clients of the server greenteal have been upgraded;
- make sure that all diskless clients of the server greenteal are halted.

All listed above diskless clients will be upgraded. Continue [yes|no] ? yes

Examining table of contents on release media...
-----
The following software categories are currently installed on greenteal :
install    kvm    networking    root    usr
-----

The following software categories are NOT currently installed on greenteal :
debugging  demo    games    graphics    manual    openwindows_demo

```

```

openwindows_fonts  openwindows_programmers  openwindows_users  rfs  security
shlib_custom  sunview_demo  sunview_programmers  sunview_users  sys
system_v  text  tli  user_diag  uucp  versatec
-----
The following software categories will be upgraded on greenteal :
install  kvm  networking  root  usr

Start upgrade on server greenteal  [yes|no] ? yes

UPGRADING CLIENTS
Upgrade kvm and sys files for the sun4
Upgrading software category kvm ...
Software category kvm upgraded.
Some old files from the software category kvm unused in 4.1.3_U1 will be deleted

Upgrade kvm and sys files for the sun4c
Upgrading software category kvm ...
Software category kvm upgraded.
Some old files from the software category kvm unused in 4.1.3_U1 will be deleted

Rename /export/exec/sun4.sunos.4.1.2 to /export/exec/sun4.sunos.4.1.3_U1
Remove /export/exec/sun4.sunos.4.1.1
Rename /export/exec/proto.root.sunos.4.1.1 to /export/exec/proto.root.sunos.4.1.3_U1
Remove /export/exec/proto.root.sunos.4.1.2
Upgrading software category root ...
Software category root upgraded.
Some old files from the software category root unused in 4.1.3_U1 will be deleted

Upgrading client cheese ...
Upgrading software category root ...
Software category root upgraded.
Making device nodes ...
Some old files from the software category root unused in 4.1.3_U1 will be deleted

    Updating fstab
    Updating /tftpboot links
    Updating installation records

Upgrading client ezsystem ...
Upgrading software category root ...
Software category root upgraded.
Making device nodes ...
Some old files from the software category root unused in 4.1.3_U1 will be deleted

    Updating fstab
    Updating /tftpboot links
    Updating installation records

Upgrading client sparcs1 ...
Upgrading software category root ...

```



```
Software category root upgraded.
Making device nodes ...
Some old files from the software category root unused in 4.1.3_U1 will be deleted

    Updating fstab
    Updating /tftpboot links
    Updating installation records

Upgrading client suntour ...
Upgrading software category root ...
Software category root upgraded.
Making device nodes ...
Some old files from the software category root unused in 4.1.3_U1 will be deleted

    Updating fstab
    Updating /tftpboot links
    Updating installation records

Rename /etc/install/client_list.sun4.sun4.sunos.4.1.2 to /etc/install/client_list.sun4.sun4.sunos.4.1.3_U1
Cat and then remove /etc/install/client_list.sun4.sun4.sunos.4.1.1
Rename /etc/install/client_list.sun4.sun4c.sunos.4.1.2 to /etc/install/client_list.sun4.sun4c.sunos.4.1.3_U1
Cat and then remove /etc/install/client_list.sun4.sun4c.sunos.4.1.1

UPGRADING SERVER
Upgrading software category install ...
Software category install upgraded.

Upgrading software category kvm ...
Software category kvm upgraded.
Some old files from the software category kvm unused in 4.1.3_U1 will be deleted

Upgrading software category networking ...
Software category networking upgraded.

Upgrading software category root ...
Software category root upgraded.
Making device nodes ...
Some old files from the software category root unused in 4.1.3_U1 will be deleted

Upgrading software category usr ...
Software category usr upgraded.
Some old files from the software category usr unused in 4.1.3_U1 will be deleted

You may need to coalesce the following files / directories manually:
/etc/aliases.pag
/etc/format.dat
/export/exec/proto.root.sunos.4.1.3_U1/etc/aliases.pag
/export/exec/proto.root.sunos.4.1.3_U1/etc/fstab
/export/exec/proto.root.sunos.4.1.3_U1/etc/format.dat
/export/exec/proto.root.sunos.4.1.3_U1/etc/magic
/export/exec/proto.root.sunos.4.1.3_U1/etc/rc.boot
```

```
/export/exec/proto.root.sunos.4.1.3_U1/etc/rc.local
/export/root/cheese/etc/aliases.pag
/export/root/cheese/etc/fstab
/export/root/cheese/etc/format.dat
/export/root/cheese/etc/fstab
/export/root/cheese/etc/magic
/export/root/cheese/etc/rc.boot
/export/root/cheese/etc/rc.local
/export/root/ezsystem/etc/aliases.pag
/export/root/ezsystem/etc/format.dat
/export/root/ezsystem/etc/fstab
/export/root/sparcs1/etc/aliases.pag
/export/root/sparcs1/etc/fstab
/export/root/sparcs1/etc/format.dat
/export/root/sparcs1/etc/fstab
/export/root/sparcs1/etc/magic
/export/root/sparcs1/etc/rc.boot
/export/root/sparcs1/etc/rc.local
/export/root/suntour/etc/aliases.pag
/export/root/suntour/etc/format.dat
/export/root/suntour/etc/fstab
/export/exec/proto.root.sunos.4.1.3_U1/etc/aliases.pag
/export/exec/proto.root.sunos.4.1.3_U1/etc/fstab
/export/exec/proto.root.sunos.4.1.3_U1/etc/format.dat
/export/exec/proto.root.sunos.4.1.3_U1/etc/magic
/export/exec/proto.root.sunos.4.1.3_U1/etc/rc.boot
/export/exec/proto.root.sunos.4.1.3_U1/etc/rc.local
/export/root/cheese/etc/aliases.pag
/export/root/cheese/etc/fstab
/export/root/cheese/etc/format.dat
/export/root/cheese/etc/magic
/export/root/cheese/etc/rc.boot
/export/root/cheese/etc/rc.local
/export/root/cheese/etc/fstab
/export/root/ezsystem/etc/aliases.pag
/export/root/ezsystem/etc/format.dat
/export/root/ezsystem/etc/fstab
/export/root/sparcs1/etc/aliases.pag
/export/root/sparcs1/etc/fstab
/export/root/sparcs1/etc/format.dat
/export/root/sparcs1/etc/magic
/export/root/sparcs1/etc/rc.boot
/export/root/sparcs1/etc/rc.local
/export/root/sparcs1/etc/fstab
/export/root/suntour/etc/aliases.pag
```



```
/export/root/suntour/etc/format.dat
/export/root/suntour/etc/fstab
/etc/aliases.pag
/etc/format.dat
Fixing release records ...
Fixing /etc/install/arch_info
Fixing /etc/install/arch_list
Fixing /etc/install/sys_info
Fixing /etc/install/soft_info.sun4.sun4.sunos.4.1.3_U1
Fixing /etc/install/soft_info.sun4.sun4.sunos.4.1.3_U1
Fixing /etc/install/media_file.sun4.sun4.sunos.4.1.3_U1
Fixing /etc/install/soft_info.sun4.sun4c.sunos.4.1.3_U1
Fixing /etc/install/soft_info.sun4.sun4c.sunos.4.1.3_U1
Fixing /etc/install/media_file.sun4.sun4c.sunos.4.1.3_U1
Fixing /etc/install/appl_media_file.sun4.sunos.4.1.3_U1
Fixing /etc/exports
Fixing links in /export/exec, /export/exec/kvm, /export/share ...

    Installing kernel and kadb on client cheese
    Upgrade sbin on client cheese
    Copying /sbin commands...

    Installing kernel and kadb on client ezsystem
    Upgrade sbin on client ezsystem
    Copying /sbin commands...

    Installing kernel and kadb on client sparcs1
    Upgrade sbin on client sparcs1
    Copying /sbin commands...

    Installing kernel and kadb on client suntour
    Upgrade sbin on client suntour
    Copying /sbin commands...
Create the /tftpboot/boot.sun4.sunos.4.1.3_U1 for the sun4 clients
Create the /tftpboot/boot.sun4c.sunos.4.1.3_U1 for the sun4c clients

Installing vmunix...
Installing kadb ...
Installing bootblock ...
Primary boot: bootsd
Secondary boot: /boot
Boot device: /dev/rsd2a
Boot size: 0x22670
Boot checksum: 0x8418f94b
Boot block installed
Copying /sbin commands...
Delete unused old files
Log is recorded in the file /etc/install/sunupgrade.log
```



---

```
----- Exiting sunupgrade Mon Feb 10 21:35:22 PST 1992 -----  
List of actually updated volatile files / directories :  
/usr/tmp/coalesce_list  
  
You may halt and reboot greenteal now.
```

# *Installing a Standalone Workstation with Quick Install*

---



## *3.1. Introduction*

The SunInstall program provides a Quick Install option for standalone workstations. All users who are installing a standalone system are encouraged to use the Quick Install option. A standalone system has one or more disks on which it maintains its own root (/) file system, swap space, /usr filesystem, and home directory. A standalone system does not require a server to boot and can function when the network is down. If your system will not be part of a network, you must install it as a standalone system.

If you have a standalone workstation, you may be able to choose to use a preinstalled form of SunOS. You can also use the Custom Install option of SunInstall to install a standalone workstation. That process is described in the next chapter.

Use this chapter to perform the following tasks:

- Install SunOS 4.1.3\_U1 quickly from CD-ROM (compact disc)
- Configure your system
- Prepare your system for reconfiguration
- Return your system to its original preinstalled configuration

This chapter contains the following sections:

- “What is Quick Install?” provides background information about the quick install feature of the suninstall program.
- “Before You Begin” tells you the information you need to know before you begin the installation.



- “Installation Procedure” guides you through a quick installation of SunOS 4.1.3\_U1.
- “Reconfiguration Procedure” describes how to prepare your system for reconfiguration.
- “Returning to a Preinstalled Configuration” tells you how to run the `re-preinstall` program.

### 3.2. What Is Quick Install?

SunInstall offers you a Custom Install and a Quick Install method for installing a Sun workstation as a standalone system. The instructions here are specifically for the Quick Install method.

To perform a Quick Install, you must have a local hard disk and a local CD-ROM drive. You can only configure one Ethernet interface with Quick Install.

You can choose one of four Quick Install options, depending on disk size:

Systems with up to a 104 MB disk can use these Quick Install options:

- `Typical_user` provides all of the programs a typical user needs to run SunView applications. It does not include OpenWindows.
- `Programmer` provides typical user programs plus programmer writing and debugging software. It does not include OpenWindows.
- `Mini_install` installs the most minimal workable system and does not include SunView or OpenWindows.

Systems with a 130 MB disk or larger can use this Quick Install option, or any of the three previous options:

- `Full_install` installs everything on the SunOS installation media, including OpenWindows.

(See the section on “SunOS Installation” for a complete list of the programs in each category.)

If you have a 4.1.3 Desktop SPARCstation, you can restore it to its factory preinstalled state with a SunInstall utility called `re-preinstall`. There are two factory installation configurations: one for disks smaller than 130 MB, and one for disks larger than 130 MB. These configurations are different from the four Quick Install options. The last section in this chapter, “Returning to a Preinstalled Configuration” tells you how to run `re-preinstall`.

### 3.3. Before You Begin

Before you begin a quick installation, your disk must be formatted and labeled. In most cases, your disk will already be formatted and have an assigned label. The format command, which allows you to format and/or label the disk, is described in Appendix A of *Installing the SunOS*. You can choose the format command as part of the miniroot installation described in the next section, “Installation Procedure.”

If you are reinstalling system software, be sure to back up your system before you proceed.



---

**Caution** – Quick Install overwrites the disk files in partitions `a` and `g` for all systems. All data on system disks smaller than 130 MB will be overwritten because all of the data is in partitions `a` and `g`. Many Desktop SPARC systems have disks that are smaller than 130 MB.

---

You may need the following information from your system administrator prior to completing the Quick Install:

- A unique hostname for your workstation
- Your Internet address
- Your NIS domain name, if you want to use the NIS name service. If your system is already running, you can find out your domain name from a command line prompt by typing `domainname` and pressing Return.
- The media device number for the media and local disk you will use for the installation. Tables 3-1 and 3-2 list the standard device abbreviations, numbers, and descriptions.
- The command used to boot from the appropriate media for your system architecture. Table 3-3 lists the corresponding boot command for each type of Sun system architecture.



Table 3-1 Media Devices

Abbreviation	Media Device No.	Description
cdrom	sr0 (sd for booting)	CD-ROM drive for open boot PROM
sr	sr0 (sd for booting)	CD-ROM drive on for other systems

The device name of the CD-ROM is sr for everything except when you install SunOS from the boot PROM. Use the device name sd, as you would for all other SCSI disk devices when you install SunOS from the boot PROM.

Table 3-2 Disk Devices

Abbreviation	Disk Device No.	Description
sd	sd0 sd1 sd2 sd3 sd4 sd5 sd6	SCSI disk
xy	xy0 xy1 xy2 xy3	Xylogics 450/451 SMD disk
xd	xd0 through xd15	Xylogics 7053 SMD disk
id	id000 through id0374	IPI disk

Table 3-3 Boot Syntax for Sun System Architecture

Device	Sun-4	SPARCstation 1, 1+, IPC, SLC	SPARCstation 2, ELC, IPX, 10, and 600MP-Series
st0	st(0,0,0)	st(0,0,0)	tape or tape0* (either command works)
st1	st(0,28,0)	st(0,1,0)	tape1
sr	sd(0,30,1)	sd(0,6,2)	cdrom
xt	xt(0,0,0)	Not supported	Not supported
mt	mt(0,0,0)	Not supported	Not supported

### *Abort Sequences*

You may want to abort the installation to obtain more information before you proceed or to check with your system administrator as you perform the procedures in the next section.



---

**Caution** – Do not type Control-C while disk operations are in progress.

---

Once the miniroot is loaded and the prompt is displayed, you can abort the procedure in the following ways:

- You can abort the installation by typing L1-A to return to the PROM monitor prompt during Steps 1 through 3 of SunOS installation.
- You can type Control-C at any time while the Quick Install forms are displayed to stop the installation and return to the monitor prompt.

### 3.4. Installation Procedure

The Quick Install procedure has three parts:

First, you copy the miniroot from CD-ROM to a formatted disk. Second, you install the release software onto the disk. Finally, when installation is complete and the system reboots, a set of interactive screens are displayed to assist you in configuring the system with a hostname, time zone, and network information (if appropriate), and assigning a superuser password.

If your system is not on a network, interactive screens are displayed to assist you in setting up a user account and assigning it a user password.

**NOTE:** Make sure that only the release CD-ROM is loaded into your drive during installation. If SunInstall finds another tape, floppy, or CD-ROM in a drive, it may try to install from that medium.

To install release 4.1.3\_U1 with Quick Install, follow these steps:

1. Become superuser and halt your machine by typing `/etc/halt` and then pressing Return.

When the system halts, the PROM monitor prompt that is displayed depends on your system architecture. The PROM monitor prompt is always displayed as `>` on non-SPARC Sun-4 systems. The prompt may be displayed as either `>` or `ok` on Desktop SPARC systems (Sun-4c). The `ok` prompt provides you with additional PROM commands. (See the Release Notes for more information.) You can install from either prompt.



Type `n` or `new-mode` and press Return to switch from the `>` prompt to the `ok` prompt. Type `o` or `old-mode` and press Return to switch from the `ok` prompt to the `>` prompt.

## Miniroot Installation

The miniroot is a small version of the operating system that includes the kernel `vmunix`, plus a few essential utilities such as `cat` and `ed`. The miniroot does not include common programs such as `more` or `vi`. You must use `ed`, the SunOS line editor, if you need to use an editor while in the miniroot. An editor is *not* required to install the release software.

1. To boot the miniroot from CD-ROM, enter one of the following commands at the PROM monitor prompt:

- For Sun4 systems:

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

- For Sun4c systems prior to the SPARCstation 2 (such as the SPARCstation 1, IPC, and SLC):

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

- For Sun4m and Sun4c systems beginning with the SPARCstation 2:

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

When the miniroot is ready to be installed, the following menu is displayed:

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

2. Type 1 and press Return to continue the installation.

The miniroot is copied to the disk if your system has only one SCSI disk. If your system has more than one disk, you must specify the disk number after the following message is displayed:

```
Enter a 1 or 2:
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:
```

3. Type the appropriate number to select the disk and press Return.

Quick Install installs the system software on the disk you choose for miniroot.

You can choose to reformat and/or relabel the disk. If you have a new disk, suspect your disk has lost its formatting, or want to change the disk layout by repartitioning it, choose 1 - yes, run format from the list of choices:

```
Enter a 1, 2, or 3:2
selected disk unit "sd1".
Do you want to format and/or label disk "sd1"?
  1 - yes, run format
  2 - no, continue with loading miniroot
  3 - no, exit to single user shell

Enter a 1, 2, or 3:
```

4. Type the appropriate number (1 to format the disk, 2 to continue) and press Return.

If you choose 1 to format the disk, the format menu is displayed. (See Appendix A for information on how to use the format command.)

The miniroot is copied to the disk after the disk is formatted (option 1), or you chose not to format the disk (option 2). The reboot menu is then displayed: Mini-root installation is 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:
```





5. Type **1** and press Return to reboot the miniroot.

The next section describes SunOS installation, step-by-step.

## Running SunInstall

After the miniroot is rebooted, start the installation.



You can get online help for some screen prompts while you are doing a Quick Install. To display the help messages, type "?"

1. Type **suninstall** and press Return at the # prompt to start SunInstall.

A number of screens are displayed, prompting you for information that is needed to complete the installation. The last screen displays the information you entered. You can then make corrections and changes before you proceed with the installation.

The following screen is displayed after you type **suninstall**:

```

                                     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. Type **1** and press Return to select the quick installation method.

SunInstall checks for the type of terminal you are using. If you are using a terminal with a Sun bit-mapped display, SunInstall assigns the terminal type and checks the media devices. This can take from 10 to 60 seconds, and the Preserve Data Partitions screen is displayed, which appears later in this section.



If you are using a terminal that does not use a Sun bit-mapped display, you must designate a terminal type when the following screen is displayed:

```
SysConfA0                SYSTEM CONFIGURATION
                          TERMINAL TYPE
-----
Select a terminal type and press RETURN:

  1) Sun Workstation
  2) Televideo 925
  3) Wyse Model 50
  4) Other

Selection =>
```

SunInstall checks the media devices, which takes from 10 to 60 seconds, and displays the Preserve Data Partitions screen after you enter a terminal type.

You can use the Preserve Data Partitions screen to preserve data in existing partitions b, d, e, f, and h on the disk on which you are installing SunOS:



## PRESERVE DATA PARTITIONS

---

Quick Install gives you the option of saving data partitions that already exist on the installation disk. If additional disks are attached to the system, Quick Install does not affect them.

If you enter 'n', Quick Install will not preserve any partitions on the installation disk. The contents of the disk will be erased before installation begins.

If you enter 'y', Quick Install will install software in the a: and g: partitions, but preserve the other partitions. Only the contents of the a: and g: partitions will be erased before installation begins.

- If your home directory is currently in the g: partition, it will be lost. This commonly applies to small disks (130 MB or less). Back up your home directory so you can restore it from media later.
- If your home directory is currently in the h: partition, it will be preserved. This commonly applies to large disks (over 130 MB).

Do you want to preserve the existing data partitions? [y/n]:

Type **y** and press Return if you want to preserve any existing data in partitions b, d, e, f, and h. You should back up your entire disk, if not already done, before proceeding with the installation.

Type **n** and press Return in the following circumstances:

- You are installing Release 4.1.3\_U1 on a new disk.
- All of the data is in partitions a and g.
- You do not want to preserve the data in partitions b, d, e, f, and h.

If you have not backed up your disk and you want to do so now, type Control-C to exit from Quick Install. Back up your disk and begin the installation procedure again.

1. Type **n** to overwrite the data or **y** to preserve the data in partitions b, d, e, f, and h, as appropriate. Then press Return.

The Standard Installations screen is displayed. It provides you with choices for a typical networked environment; if you have a non-networked

environment, other choices are displayed.

```
INSTALLATION          STANDARD INSTALLATIONS
-----
Select the standard installation that best suits your needs.  Press
<Return> or <Space> to move forward a choice or <Control-B> to move
backward.  Type 'x' to make a selection or '?' to display more
information about a choice.  The menu scrolls up if additional
choices are available.

Select <none of the above> if none of the installations apply.

                                DESCRIPTION
-----
Typical_user  Typical user running SunView applications
Programmer    Programmer writing and debugging software
Full_install  Installs everything on the SunOS installation media
Mini_install  Installs smallest workable system (no SunView)
<none of the above>
```

Choose one of the following types of installation:

- Typical\_user is suited to the user who is not a programmer but wants to run SunView applications, edit files, use mail, and so on.
- Programmer is suited to programmers who want to develop and test programs in a SunView environment.
- Full\_install contains the complete Release 4.1.3\_U1 software.
- Mini\_install is suited to the user who requires basic network functions but does not need to run SunView applications.
- If you want to quit, choose <none of the above>.

An information message is displayed if you choose an installation type that is too large to fit on your system disk. For example, neither Programmer nor Full\_install will fit on a 104 MB system disk. You can either quit or choose another type of installation from the Standard Installations screen.

If you want more information about the programs included in a particular type of installation, press Return or the space bar to highlight the item, and then type ?. The software for each corresponding installation is displayed. A list of this information follows:

**Typical\_user:** root, usr, Kvm, Install, Networking, System\_V, Sys, SunView\_Users, Text, Manual, Debugging



**Programmer:** root, usr, Kvm, Install, Networking, System\_V, Sys, TLI, RFS, Debugging, SunView\_Users, SunView\_Programmers, SunView\_Demo, Text, Graphics, Manual

**Full\_install:** root, usr, Kvm, Install, Networking, System\_V, Sys, TLI, RFS, Debugging, SunView\_Users, OpenWindows\_Users, OpenWindows\_Fonts, SunView\_Programmers, OpenWindows\_Programmers, SunView\_Demo, Shlib\_Custom, Text, User\_Diag, Graphics, uucp, Manual, Demo, OpenWindows\_Demo, Games, Versatec, Security

**Mini\_install:** root, usr, Kvm, Install, Networking

2. Press Return or the space bar to move the cursor down the list of displayed choices. Type **x** to select an installation.

A confirmation screen shows you the choices you made. An example of a confirmation screen follows:

```

                                CONFIRMATION
-----
Preserve data partitions: Yes
Standard Installation: Typical_user
                        (Typical user running SunView applications)

Enter 'n' if you want to change some information.

Start the installation? [y/n]: y
```

3. Choose one of the following options:
  - a. If you want to change any information, type **n** and press Return.
  - b. If the information is correct, press Return and begin the installation.

The software installation proceeds and takes from 20 minutes (for a minimal installation on a fast machine) to about an hour and a half (for a full install on a slow system). Information messages are displayed as the media files are installed.

4. After the software is loaded, you are asked whether you want to reboot the system. Type **y** and press Return.

The system reboots and displays informational messages, including screens with menus that allow you to configure your system as part of the installation process. The configuration screens are described in the next section.

### 3.5. Configuration Screens

The system displays several screens and prompts you to provide information that is used to configure the system so that you can use it. The configuration screens appear whenever you boot a Quick Install, preinstalled, or re-preinstalled system for the first time. If your 4.1.3\_U1 quick installation does not succeed, you may see one or more screens informing you of the process failure.

```
INSTALLATION MESSAGES

The automatic installation procedure did not find all of the
information needed to set up this system on the network.

You may:

1. Review the reasons the automatic installation was not completed.
2. Continue the installation by supplying the needed
   information manually.
3. Stop the installation procedure and halt the system.

If you are installing a non-networked system or are attempting network
installation without using the network information service, select
option 2 to continue the installation.

Enter choice (1, 2, or 3) and press the RETURN key.
```

In Option 1, your system administrator will review the reasons the installation was not completed. One or more screens come up. If, for example, the system could not find the Internet address, the following screen appears:

```
INTERNET ADDRESS NOT FOUND

An Internet address could not be obtained from a server on the network
due to one of the following reasons:

-The Ethernet cable is not connected correctly.
-The rarp daemon is not running on a server in this subnet.
-NIS is not running on the network.
-No NIS servers are functioning.
-There is no entry for this system in the NIS ethers and hosts
databases.
```

Select Option 2 of the Installation Messages screen if you want to configure the system manually. If you choose option 2, the first screen you see informs you of the information you will need for the manual setup.



Be prepared to supply a hostname, user name and id, user password, and superuser password. You will need the Internet address of the system, whether you will be using NIS, and your domain name, all of which may be obtained from your system administrator.

Select Option 3 from the Installation Message screen to stop the installation procedure and halt the system.

## *Manual Configuration*

Do the following if you want to configure the system manually:

1. To begin the manual setup, type 2 and press Return.
2. Enter the information on the Manual Setup screen (shown below).

```
MANUAL SETUP

You can set up this system manually by entering the following
information as prompted:

?   o Terminal type (if this is not a bit-mapped Sun terminal)
?   o Hostname
?   o Time zone
?   o Date and time
?   o Internet address (if installing on a network)
?   o NIS domain name (if using NIS on a network)

If you are installing your system on a network, but you do not have
your Internet address or NIS domain name, contact your system
administrator.

Make sure your system administrator adds this system to the network
databases so that this system can communicate with others on the
network.

Press RETURN to begin the manual setup or
press the ESC key to return to the previous menu.
```

3. Press Return.

If you are using a terminal that does not use a Sun bit-mapped display, the Select Terminal Type screen is displayed:



```
SysConfA0          SYSTEM CONFIGURATION
                   TERMINAL TYPE

Select a terminal type and press RETURN:

    1) Sun Workstation
    2) Televideo 925
    3) Wyse Model 50
    4) Other

Selection =>
```

4. Enter the number for your terminal type and press Return. The Hostname screen is displayed.

If your terminal is a Sun bit-mapped display, the Hostname screen is the first screen that is displayed:

```
SysConfA1  SYSTEM CONFIGURATION
           HOSTNAME

If this system is connected to the network, the hostname must be
unique to the local area network. Confirm this with your system
administrator.

Enter a name to assign to this workstation and press RETURN:

    Hostname =>

[?] = Help
```

5. Type your hostname and press Return.

The Time Zone screen is displayed:



```
SysConfB1  SYSTEM CONFIGURATION
                TIME ZONE
```

```
Press <Return> or <Space> to move forward to your choice and type x.
```

```
x * United States
   * Canada
   * Mexico
   * South America
   * Europe
   * Asia
   * Australia and New Zealand
   * Greenwich Mean Time
```

```
[?] = Help [Control-B] = Previous screen [Control-F] = First Screen
```

Review the time zone instructions displayed on your screen. Select the time zone for your region.

6. Press Return or the space bar to move the cursor to the desired category. Type **x** to choose a country time zone. A submenu of time zones for that category is displayed. Type **?** if you need more information about choosing a time zone.

The following screen shows the time zones that are available for the United States:



```
SysConfC1          SYSTEM CONFIGURATION
                   UNITED STATES

Press <Return> or <Space> to move forward to your choice and type x.

    TIME ZONE NAME      AREA
    US/Eastern          Eastern time zone, USA
    US/Central          Central time zone, USA
    US/Mountain         Mountain time zone, USA
    X US/Pacific        Pacific time zone, USA
    US/Pacific-New     Pacific time zone, USA
                       with proposed changes to Daylight
                       Saving Time near election time
    US/Alaska           Alaska time zone, USA
    US/East-Indiana     Eastern time zone, USA
                       no Daylight Saving Time
    US/Hawaii           Hawaii, USA

[?] = Help    [Control-B] = Previous screen [Control-F] = First Screen
```

7. Press Return or the space bar to move the cursor to the desired category. Type **x** to choose the time zone category and to display the System Time screen.

The System Time screen is displayed, as shown in the following example:

```
SysConfD1          SYSTEM CONFIGURATION
                   SYSTEM TIME

The system time is "Sat Apr 1 01:01:01 1990 PST".
Enter selection and press RETURN:

1) Yes, accept that as current time.
2) No, prompt me to input current time.

Selection =>

[?]=Help [Control-B]=Previous screen [Control-F]=First Screen
```

8. Choose one of the following options:

a. If the time is correct, type **1** and press Return.

b. If the time is incorrect, type 2 and press Return.

The Set Time screen is displayed, as shown in the next example. The format for the Set Time screen that is displayed depends on the time zone you selected.

```
SysConfD2  SYSTEM CONFIGURATION
                        SET TIME

Enter the current date and local time and press RETURN:

Current date (mm/dd/yy = month/day/year) =>

Local time (hh:mm:ss = hours:minutes:seconds) =>

[?] = Help[Control-B] = Previous screen [Control-F] = First Screen
```

Use the format displayed on the Set Time screen to specify the date and time. In this example, the format is mm/dd/yy and hh:mm:ss am/pm. For other time zones, the date and time may be displayed with a different format. Use the format that is displayed for your time zone to enter the correct date and time. Press Return. The System Time screen is displayed again.

c. If the time displayed on the System Time screen is correct, type 1 and press Return.

The Network screen is displayed:

```
SysConfE1  SYSTEM CONFIGURATION
                        NETWORK

Enter selection for whether workstation is attached to A network
and press RETURN:

1) Yes, prompt for additional network questions to configure into network.
   (Verify Ethernet cable is attached to workstation.)

2) No, workstation is NOT attached to a network.

Selection =>

[?] = Help [Control-B] = Previous screen [Control-F]=First Screen
```

9. If you are not connected to a network, type 2 and skip to Step 10. If you are connected to a network, type 1 and press Return.

The Network Address screen is displayed:



SysConfE2

SYSTEM CONFIGURATION  
NETWORK ADDRESS

You must assign a network address to your workstation. Contact your system administrator for the unique network address of your system. Do not use the displayed address (192.9.200.1) if your workstation is being connected to the Internet network. Do not enter an address unless you are sure it is correct.

Enter the network address to be assigned to this workstation and press RETURN:

Network Address (e.g. 192.9.200.1) =>

[?] = Help [Control-B = Previous] screen [Control-F] = First Screen



**Caution** – If your workstation is connected to the Internet network, do not use the sample Internet address on this screen. You must first obtain a valid Internet address from your system administrator.

Type your Network Address and press Return.

The NIS Name Service screen is displayed:

SysConfE3

SYSTEM CONFIGURATION

NIS NAME SERVICE

NIS is the network information service.

Enter the selection that applies and press RETURN:

- 1) Yes, the network uses NIS. Confirm this with your system administrator.
- 2) No, the workstation will not be using NIS.

Selection=>

[?] = Help [Control-B = Previous] screen [Control-F] = First Screen

10. You have the following choices:

- a. If your system does not use NIS (network information service), type 2 and press Return.

The Confirmation Screen is displayed, as shown in Step 9.

- b. If your system is using NIS, type 1 and press Return.

The Domain Name screen is displayed:

```

SysConfE4      SYSTEM CONFIGURATION
                DOMAIN NAME

A domain name uniquely identifies your part of the network. Contact
your system administrator for your domain name.

Enter the domain name and press RETURN:

  Domain name=>

[?] = Help      [Control-B = Previous] screen [Control-F] = First Screen

```

11. Type your domain name and press Return.

The Confirmation screen is displayed, as shown in the following example:

```

SysConfF1      SYSTEM CONFIGURATION
                CONFIRMATION

Hostname       : zapper
Timezone      : US/pacific
Network address : xxx
Domain name    : xxx

  Accept the information as correct (y/n)?

[?] = Help [Control-B] = Previous screen

```

12. Verify that the hostname, time zone, Network address, and NIS domain name information is correct.

If you have a networked system but are not running NIS, only the hostname, time zone, and Network address information is displayed.

- To start over, type **n** and press Return. The Hostname screen is displayed, and you can change it and subsequent screens as they appear.

- To confirm the information, enter **y** and press Return. The Installation screen is displayed, as shown in the following example:

```
SysConfG1          SYSTEM CONFIGURATION
                   INSTALLATION

Hostname           : zapper
Timezone           : US/Pacific
Network address    : xxx
Domain name        : xxx
```

The system briefly displays the configuration information you chose for your machine on the Installation screen, then prompts for a root password.

The Superuser Password screen is displayed:

```
SysConfH1  SYSTEM CONFIGURATION
           SUPERUSER PASSWORD

For security reasons it is important to give a password to
the superuser (root) account.  A password should be six to
eight characters long.  To give a password to the root account,
enter the password below.  The password will not appear on the
screen as you type it.

Enter superuser password and press RETURN, or press RETURN to continue:
[?] = Help

Password=>
```

13. Type a password and press Return.

You should choose a password for your root account at this time. However, if you do not want to assign a password, you can press Return without typing a password.

14. Type the same password a second time at the confirmation prompt and press Return.

If your system uses NIS, SunInstall completes the installation process without asking you to set up a user account, and reboots.

If your system does not use NIS (it is either not networked or is networked but not with NIS), the User Account screen is displayed so you can set up a user account:

```
SysConfI1  SYSTEM CONFIGURATION
                USER ACCOUNT
```

To use the system, a user account must be set up. You can set up the account now or separately after configuration.

The following information is needed prior to setting up the account:

User full name - the common name of the user, e.g. John Doe

User name - the login name of the user, e.g. jdoe

User id - the system numerical id of the user

Do you want to set up a user account (y/n)?

[?] = Help



The user name and password are very important. Use them to log into your system. If you choose not to set up a user account at this time, you must manually create the user account at a later date.

1. If you do not want to set up a user account, type **n** and press Return. The system then reboots. If you want to set up a user account, type **y** and press Return to proceed.

The User Account - Full Name screen is displayed:

```
SysConfI2  SYSTEM CONFIGURATION
                USER ACCOUNT - FULL NAME
```

The User's full name is a more verbose form to be used by some programs like mailers.

Enter the user's full name and press RETURN:

User full name =>

[?] = Help

[Control-B] = Previous screen

2. Type your full name and press Return.

The User Account - User Name screen is displayed:



```
SysConfI3  SYSTEM CONFIGURATION
           USER ACCOUNT - USER NAME
```

The user name (up to 8 lower case letters, no spaces) is the name the user is known by on the system.

Enter the user name and press RETURN:

User name =>

[?] = Help[Control-B] = Previous screen

### 3. Type your user name and press Return.

The User Account - User ID screen is displayed. The User ID must be a unique whole number between 10 and 60000. Always check with your system administrator to be sure you do not duplicate an existing User ID number.

```
SysConfI4  SYSTEM CONFIGURATION
           USER ACCOUNT - USER ID
```

The user id is a number between 10 and 60000 that is unique in the network. The system administrator can help confirm its uniqueness.

Enter the user id number and press RETURN:

User id =>

[?] = Help[Control-B] = Previous screen

### 4. Type your User ID number and press Return.

The User Password screen is displayed:

```
SysConfI5  SYSTEM CONFIGURATION
           USER PASSWORD
```

Passwords are used for security reasons but are not required. You can enter a password now or you can also add one later.

Enter the user password and press RETURN or press RETURN to continue:

Password =>

[?] = Help

### 5. Type your password and press Return.





If you do not want to assign a password to your user account, press Return without typing a password.

6. Type the same password a second time at the confirmation prompt and press Return.

The system finishes the booting process and displays the login prompt.

```
Automatic reboot in progress...
...
nevada login:
```

You can now log into the system with your account name and password. (Refer to the information about logging in and logging out in the *Sun System User's Guide*, if you have a desktop SPARCstation. See *Getting Started with SunOS: Beginner's Guide* if you have another type of machine.)

### 3.6. Reconfiguration Procedure

If you want to change the name of a system, or if you configured it incorrectly, use the `sys-unconfig` program to unconfigure the following settings:

- Hostname
- Time zone
- Network address
- Domain name

Running `sys-unconfig` returns your system to its original state. It does not, however, remove any user accounts that you set up with the User Accounts screens. You must be root to use `sys-unconfig`. You can run `sys-unconfig` on any architecture from a root prompt by typing `/usr/etc/install/sys-unconfig` and pressing Return.

Two confirmation screens are displayed to be sure you really want to unconfigure your system. If you answer `y` to both questions, the system is unconfigured and halted.

The configuration screens are displayed the next time you boot the system. You can then enter new configuration information.

# *Installing a Standalone Workstation with Custom Install*

---



Chapter 4 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.

## *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 following worksheets:

- Preliminary Information Worksheet

- Host Form Worksheet
- Software Form Worksheet

This section will help you complete the remaining worksheets:

- Partition Planning Worksheet
- Disk Form Worksheet

(The Client Form Worksheet is not used for installing a standalone workstation.)



Go to Appendix E 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<sup>†</sup> 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 D, "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.

---

<sup>†</sup> UNIX is a registered trademark of AT&T.

## Disk Layout — Default Partitions

The number of default partitions depends upon the capacity of your system disk. Table 4-1 shows the default layouts for standalone configurations.

Table 4-1 Default Partitions for Standalone Systems (Release 4.1.3\_U1)

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 4-2 shows the default sizes.

Table 4-2 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

---

**Note** – On SPARCsystem 600MP machines, swap size is 64 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. If your workstation has 64 MB of main memory, designate at least 66 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 165 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 1-5 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.<sup>†</sup>



**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 4.5, “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.

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.

---

<sup>†</sup> See *System and Network Administration* and `tmpfs(4S)` for details.



- 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.
- Will core files be dumped in `var` by default?  
The size of the core file is equal to the size of memory.



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 4.2, "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.

If you have two small disks (for example two 105 MB drives), you may want to move `/usr` to the second drive. This will provide space for nearly a full installation.

### *Sample Layout For Two Disks*

Table 4-3 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 4-3 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.

## 4.2. 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 find the correct CD-ROM with which to install your workstation.

Mount the 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, as well.

If you have a preinstalled disk, it is recommended that you check it in a nondestructive way to verify that the performance of your disk hasn't been affected by head movement that may have occurred during shipment.

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

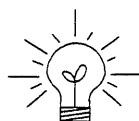
1. Select "Run Format" from the `install` script.
2. Choose `analyze` from the `format` menu.
3. Choose `read` from the `analyze` menu.

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

If you have 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.

### 4.3. 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.

Miniroot load and boot procedures are given here for those systems which will be installed from an attached CD-ROM drive (that is, local installation). If you are loading the miniroot from a remote CD-ROM, refer to Appendix B — "Loading and Booting the Miniroot from a Remote CD-ROM."

In any case, once the miniroot is booted, continue with "Running SunInstall," Section 4.4 below.

At this time your workstation should be powered on and displaying the `>` or `ok` PROM monitor prompt.

(Newer boot PROMS, particularly in the SPARCstation 1, may display the `ok` prompt. Others will display the `>` 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 one of the following commands 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 Sun4m and Sun4c systems beginning with the SPARCstation 2:

```
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.**

### *Resizing the root and swap Partitions*

If you decided to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see your entries on 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 the root partition or decrease the size of the swap partition, continue with "Loading and Booting the Miniroot" below. (You can use the SunInstall program without running `format` to make all other adjustments to partition sizes.)

### 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. 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)-sw
root on sd0b fstype 4.2
Boot: vmunix
Size: 811008+114720+60112 bytes
SunOS Release 4.1.3_U1(MINIROOT) #4: Wed Feb 13 01:10:16 PDT
Copyright (c) 1991 by Sun Microsystems, Inc.

. . .

WARNING: preposterous system time -- 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 4.4, "Running SunInstall," below.

#### 4.4. *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 E.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. 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.

*Figure 4-1 SunInstall Main Menu: First Appearance*

```
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` at this point.

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.

Figure 4-2 SunInstall Main Menu: After Completing the Host Information Form

```

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.

Figure 4-3 SunInstall Main Menu: After All Forms Are 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**  
**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. In addition, this control key is available:

**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 4-4 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 4-4 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 ...

The following sections explain how to fill out each of the onscreen forms that SunInstall requires.

## 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. (Here italicized items are example values for variables.)

```

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

- data file

After you accept the defaults or make any modifications, this menu choice will appear. This is the correct choice if you want to review your choices, or correct mistakes.

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 4.1.3\_U1 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 D — "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.)



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.

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		
e	0	0	0		
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 4.1.3\_U1. **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.**

### *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. 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 *undersize* 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] ?

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** 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 4.1.3\_U1 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 CD-ROM in Local SunCD 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       : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[sr0]
  Media Location    : x[local] [remote]
```

### Example for CD-ROM in Remote SunCD 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_] [xt0] [mt0] [fd0] x[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 4.1.3\_U1 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.

You have the SunOS 4.1.3\_U1 sun4c media loaded. Is this OK? [y/n]

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       : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[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 4-4. See Table 1-5 for detailed information about the listed categories.)

Table 4-4 Default Software for Networked Systems

Required Categories	Common and Desirable Categories
root	System_V
usr	Sys
Kvm	SunView_Users
Install	OpenWindows_Users
Networking	OpenWindows_Demo
	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       : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[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)                                47210496
Name: OpenWindows_Users (common)                            Hog: sd0h 31334400
                                                            Size : 41117538

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, "OpenWindows\_Users" 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 shows:

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

Destination fs: /usr (sd0g)

Name: OpenWindows_Users (common)
```

*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: 41117538
```

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

‡ 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.



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

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:
  *[add new release] [edit existing release]

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

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

Media Filenames:
root                SunView_Users
usr                 Text
Kvm                 OpenWindows_Users
Install             OpenWindows_Fonts
Networking          Manual

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  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 4.1.3\_U1 media.

```
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.4.1.3_U1.sun4c 'root' media file ...
Extracting sunos.4.1.3_U1.sun4c 'usr' media file ...
Extracting sunos.4.1.3_U1.sun4c 'Kvm' media file ...
Extracting sunos.4.1.3_U1.sun4c 'Install' media file ...
Extracting sunos.4.1.3_U1.sun4c 'Networking' 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 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 4.5, "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 various configurations. See the *Solaris 1.1.1 Release Notes* for tables that describe available `GENERIC_SMALL` kernel configuration files.

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
```

## *4.5. 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/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.

If you create your own kernel configuration file, make sure you include the following lines, so that the OpenWindows software loads the kernel drivers at run-time:

```
#  
# The following option adds support for loadable kernel modules.  
#  
options VDDRV # loadable modules
```

If you are not building your own kernel, you do not need to do anything, because these lines are already in the `GENERIC` and `GENERIC_SMALL` configuration files.

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



**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.

## *Mounting OpenWindows from a Server*

If you choose to mount OpenWindows software that has been installed on another machine, see *Mounting OpenWindows from a Server* in Chapter 5.

## *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.

## *4.6. Example Worksheets for Standalone Workstation*

This section presents a sample scenario illustrating installation of a Standalone configuration. Background information for this scenario is presented, followed by facsimiles of Worksheets completed to support the installation process.

Examining this set of completed Worksheets will help you understand the correct use of the Worksheets, provide ideas for implementing similar installation configurations, and generally clarify installation planning.

You can find sets of blank worksheets, along with detailed explanations of the worksheets themselves, in Appendix E, "Installation Worksheets."



---

## *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 <sup>1</sup>

Workstation Architecture: sun4 . sun4 <sup>2</sup>

Media Device Type: sr <sup>3</sup> and Number: 0 <sup>4</sup>

Media Device Name: sr0 <sup>5</sup>

System Disk Name: sd6 <sup>6</sup>

Other Disk Devices (if any): <sup>7</sup>

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

System Console Device: sun <sup>8</sup>

### Miscellaneous Information:

Local Timezone: Pacific <sup>9</sup>



Standalone Scenario:  
aslan

## Host Form Worksheet

### Workstation Information:

Name : aslan <sup>1</sup>

Type : [standalone] [server] [dataless] <sup>2</sup>

### Network Information:

Internet Address : 192 . 9 . 11 . 6 <sup>3</sup>

NIS Type : [none] [master] [slave] [client] <sup>4</sup>

Domain name : sw\_support <sup>5</sup>

### Miscellaneous Information:

Reboot after completed : [y] [n] <sup>6</sup>

### Dataless Configuration Information:

Server name : \_\_\_\_\_ <sup>7</sup>

Server Internet Address : \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_ <sup>8</sup>

Path of the executables on server: /export/exec/app\_arch <sup>9</sup>

Path of the kernel executables on server: /export/exec/kvm/kernel\_arch <sup>10</sup>



## Partition Planning Worksheet

Standalone Scenario:  
aslan

	Partition/Filesystem	Size	Position
<b>-Required-</b>			
<input checked="" type="checkbox"/>	/ (root)	16	sd6a
<input checked="" type="checkbox"/>	swap	32	sd6b
<input checked="" type="checkbox"/>	/usr*	-----	sd6g
	Sun unbundled	0	-----
	other vendors	+0	-----
	Local software	+0	-----
	Free Space	+10	-----
	Total over and above	=15	-----
<b>-Common-</b>			
<input checked="" type="checkbox"/>	/home	*	sd6h
<b>-Optional-</b>			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
<b>-Servers-</b>			
<input type="checkbox"/>	/export	-----	
	Sun unbundled <sup>†</sup>		-----
	other vendors <sup>†</sup>	+	-----
	Local software <sup>†</sup>	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
<b>-Custom-</b>			
<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.

Standalone Scenario:  
aslan

## Disk Form Worksheet

Disk Drive: sd6

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	32	(swap)	
c	327	-----	-----
d			
e			
f			
g	15	/usr	N
h	*	home	

Standalone Scenario:

aslan

## Software Form Worksheet

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	-
<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.

# *Installing a Homogeneous Server*

---



Chapter 5 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.

## 5.1. 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 following worksheets:

- Preliminary Information Worksheet
- Host Form Worksheet
- Software Form Worksheet

This section will help you complete the final worksheets:

- Partition Planning Worksheet
- Disk Form Worksheet
- Client Form Worksheet



Go to Appendix E 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 D, "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 5-1 shows the default layouts for homogeneous server configurations.

Table 5-1 Default Partitions for Homogeneous Servers (Release 4.1.3\_U1)

<b>Partition</b>	<b>Assignment</b>
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 5-2 shows the default sizes.



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

---

**Note** – On SPARCsystem 600MP machines, swap size is 64 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. If your workstation has 64 MB of main memory, designate at least 66 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 165 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 1-5 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.<sup>†</sup>



**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.**

<sup>†</sup> See *System and Network Administration* and `tmpfs (4S)` for details.

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 5.6, "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 5.3, "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 5-3 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 5-3 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.

## 5.2. 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.

## 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 CD-ROM) with which to install your workstation. The label on the disc should specify the same kernel architecture as you have noted for your workstation on Preliminary Information Worksheet.

Mount the selected 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 decided to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see your entries on 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 the root partition or decrease the size of the swap partition, continue with "Loading and Booting the Miniroot," in the next section. (You can use the SunInstall program without running `format` to

make all other adjustments to partition sizes.)

## 5.4. 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.

Miniroot load and boot procedures are given here for those systems which will be installed from an attached CD-ROM drive (local installation). Procedures for loading the miniroot from a remote CD-ROM, are given in Appendix B — “Loading and Booting the Miniroot from a Remote CD-ROM.”

### 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 (such as the SPARCstation 1, IPC, and SLC):

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

- For Sun4m and Sun4c systems beginning with the SPARCstation 2:

```
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.

1. 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. This process may take several minutes to complete, at which point 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:
```

2. 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 4.1.3_U1(MINIROOT) #4: Wed Feb 13 01:10:16 PDT
Copyright (c) 1991 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 E.1.1 "Preliminary Information Worksheet" in Appendix F 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 asks for your time zone:

```
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.

Figure 5-1 SunInstall Main Menu: First Appearance

```
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.

Figure 5-2 SunInstall Main Menu: After Completing the Host Information Form

```
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.

Figure 5-3 SunInstall Main Menu: After All Forms Are 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:

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

move forward through the menu items

move backward through the menu items

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

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 5-4 below for one example. Press  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 5-4 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]

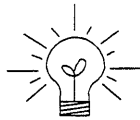
Network Information :
  Ethernet Interface : [none] x[le0]

  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 4.1.3\_U1 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 D — "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.)



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.**

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

- 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 4.1.3\_U1. **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.

### *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 to 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 *undersize* 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] ?

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** 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 4.1.3\_U1 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.

Example for CD-ROM in Local SunCD 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       : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[sr0]
  Media Location    : x[local] [remote]
```

Example for CD-ROM in Remote SunCD 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.

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



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_] [xt0] [mt0] [fd0] x[sr0]
  Media location    : [local] x[remote]
  Media Host       : persephone
  Media Host's Internet Address : 195.5.2.16
```

After you have provided the information needed to access the Release 4.1.3\_U1 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 5-4. See Table 1-5 for detailed information about the listed categories.)

Table 5-4 Default Software for Networked Systems

Required Categories	Common and Desirable Categories
root	System_V
usr	Sys
Kvm	SunView_Users
Install	OpenWindows_Users
Networking	OpenWindows_Demo
	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)                                47210496
Name: OpenWindows_Users (common)                          Hog: sd0h 31334400
                                                         Size : 41117538

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 shows:

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

Destination fs: /usr (sd0g)

Name: OpenWindows_Users (common)
```

*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: 41117538
```

*Available space in destination filesystem.‡*

*Current size of the free-hog partition.*

*Size of the displayed software category.*

‡ Pay particularly close attention to this value if your /usr partition is the designated free-hog. When software

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:

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

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

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

Media Filenames:
root          SunView_Users
usr           Text
Kvm           OpenWindows_Users
Install       OpenWindows_Fonts
Networking    Manual

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] ?
```

---

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.

- 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:

- 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.4.1.3_U1]
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]
```

- The **Architecture Type** field will display the name of the SunOS 4.1.3\_U1 release and the kernel architecture type of your server (and clients). Type **x** to accept the **Architecture Type**.
- The cursor will move into the **Client name** field. Enter the hostname of your first diskless client.
- As the cursor moves into the **Choice** field select **[create]**. SunInstall will display a form like the this:

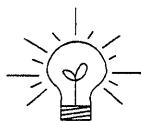
```

CLIENT FORM          [?=help] [DEL=erase one char] [RET=end of input data]
-----
Architecture Type : x[sun4.sunos.4.1.3_U1]
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.4.1.3_U1]
Client name       : squid-lips
Choice            : x[create] [delete] [display] [edit]

sun4.sunos.4.1.3_U1 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 4.1.3\_U1 media.

```
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.4.1.3_U1.sun4 'root' media file ...
Extracting sunos.4.1.3_U1.sun4 'usr' media file ...
Extracting sunos.4.1.3_U1.sun4 'Kvm' media file ...
Extracting sunos.4.1.3_U1.sun4 'Install' media file ...
Extracting sunos.4.1.3_U1.sun4 'Networking' 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 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 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`.

## *Installing a Small Kernel*

Pre-configured small kernels are available for various configurations. See the *Solaris 1.1 SMCC Version A Release Manual* for tables that describe available `GENERIC_SMALL` kernel configuration files.

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
```

## 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.

### *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.

If you create your own kernel configuration file, make sure you include the following lines, so that the OpenWindows software loads the kernel drivers at run-time:

```
#
# The following option adds support for loadable kernel modules.
#
options VDDRV # loadable modules
```

If you are not building your own kernel, you do not need to do anything, because these lines are already in the `GENERIC` and `GENERIC_SMALL` configuration files.



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.

## Mounting OpenWindows from a Server

You can mount an OpenWindows directory via the `mount` command each time you log on, or you can set up your `/etc/fstab` file to mount the directory automatically. Most users set up their `/etc/fstab` file to mount the OpenWindows directory automatically when their machine boots up. For information on how to mount the OpenWindows directory manually, or each time you log on, see the `mount(1)` man page or *SunOS User's Guide: Customizing Your Environment*.

NOTE: Starting the OpenWindows environment on top of an existing OpenWindows or SunView environment is not supported. You should exit the current environment before you start up the OpenWindows environment.

To mount the OpenWindows software using your `/etc/fstab` file, follow these steps:

1. Become `root`.

You must be `root` to perform the following steps. Use the `su` command, and remain `root` until instructed to exit from `root`.

```
example% su
Password: <enter root password>
example#
```

2. Create a directory in which to mount the OpenWindows software.

If the directory in which you are going to mount the OpenWindows software does not exist, create it using `mkdir`. (In the example below, replace `/usr/openwin` with the directory where you want the OpenWindows software to be mounted on your machine.)

```
example# mkdir /usr/openwin
```

3. Add a line of the following form to your `/etc/fstab` file:

You do not need to be able to write to the OpenWindows directory; therefore, mount it *read-only*. The options `bg`, `ro`, `hard`, and `intr` are suggested options; read the `mount(8)` and `mntent(5)` man pages if you would like a further explanation of the various options available. (In the example below, replace `server-machine` with the name of the server where the OpenWindows software resides, and replace `/usr/openwin-server` with the directory where the OpenWindows software resides on the server from which you are mounting.)

```
server-machine:/usr/openwin-server /usr/openwin nfs suid,bg,ro,hard,intr 0 0
```



**Caution** – The OpenWindows software includes both `setuid` and `setgid` programs. Therefore, make sure you mount the OpenWindows software with the `suid` option (i.e., do not use the `nosuid` option). The `suid` option is the default, so normally you will not have to do anything special.

4. Mount the directories in `/etc/fstab`:

Use the `mount` command with the `-a` option:

```
example# mount -a
```

5. Set the `OPENWINHOME` environment variable to the directory where you have mounted or installed the OpenWindows software.

NOTE: Make sure that the OpenWindows directory has been mounted with `suid` permissions as discussed in Step 3.

Replace `/usr/openwin` below with the directory where you want the OpenWindows software to be mounted on your machine. (This is the directory created with the `mkdir` command in Step 2.)

```
example# setenv OPENWINHOME /usr/openwin
```

6. Exit from `root`.

```
example# exit
example%
```

7. Set the `OPENWINHOME` environment variable to the directory where you have mounted or installed the OpenWindows software.

In the example below, replace `/usr/openwin` with the directory where the OpenWindows software is mounted on your machine. (This is the directory created with the `mkdir` command in Step 2.)

```
example% setenv OPENWINHOME /usr/openwin
```

8. Start-up the OpenWindows software using the `openwin` script.

For the average user, a shell script called `openwin` takes care of all the default server configuration issues. You should run `$OPENWINHOME/bin/openwin` to start the server. (Note that you should change directory to your home directory before you start the OpenWindows software.)

```
example% cd
example% $OPENWINHOME/bin/openwin
```

## 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.

### *5.7. Example Worksheets for Homogeneous Server*

This section presents a sample scenario illustrating installation of a Homogeneous Server configuration. Background information for this scenario is presented, followed by facsimiles of Worksheets completed to support the installation process.

Examining this set of completed Worksheets will help you understand the correct use of the Worksheets, provide ideas for implementing similar installation configurations, and generally clarify installation planning.

You can find sets of blank worksheets, along with detailed explanations of the worksheets themselves, in Appendix E, "Installation Worksheets."

### *Completed Worksheets: Homogeneous Server*

#### **Scenario: proton**

**proton** is a Sun SPARCserver 690MP that will be installed as a homogeneous server. The system has 64 Mbytes of main memory, and a monochrome bit mapped monitor.

Peripheral equipment includes two 1.3 Gbyte IPI disk drives on an `id` 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: 690MP <sup>1</sup>

Workstation Architecture: sun4 . sun4m <sup>2</sup>

Media Device Type: sr <sup>3</sup> and Number: 0 <sup>4</sup>

Media Device Name: sr0 <sup>5</sup>

System Disk Name: id000 <sup>6</sup>

Other Disk Devices (if any): <sup>7</sup>

Name: id001 Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

System Console Device: sun <sup>8</sup>

**Miscellaneous Information:**

Local Timezone: Eastern US <sup>9</sup>

Homogeneous Scenario:  
proton

## Host Form Worksheet

### Workstation Information:

Name : proton <sup>1</sup>

Type : [standalone] [server] [dataless] <sup>2</sup>

### Network Information:

Internet Address : 192 . 9 . 11 . 3 <sup>3</sup>

NIS Type : [none] [master] [slave] [client] <sup>4</sup>

Domain name : sw\_support <sup>5</sup>

### Miscellaneous Information:

Reboot after completed : [y] [n] <sup>6</sup>

### Dataless Configuration Information:

Server name : \_\_\_\_\_ <sup>7</sup>

Server Internet Address : \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_ <sup>8</sup>

Path of the executables on server: /export/exec/app\_arch <sup>9</sup>

Path of the kernel executables on server: /export/exec/kvm/kernel\_arch <sup>10</sup>

## Partition Planning Worksheet

Homogeneous Scenario:  
proton

	Partition/Filesystem	Size	Position
<b>-Required-</b>			
<input checked="" type="checkbox"/>	/ (root)	16	id000a
<input checked="" type="checkbox"/>	swap	32	id000b
<input checked="" type="checkbox"/>	/usr*	-----	id000g
	Sun unbundled Transcript	10	-----
	other vendors	+90	-----
	Local software	+10	-----
	Free Space	+30	-----
	Total over and above	=140	-----
<b>-Common-</b>			
<input checked="" type="checkbox"/>	/home	*	id000h
<b>-Optional-</b>			
<input type="checkbox"/>	/tmp		
<input checked="" type="checkbox"/>	/var print spooling	20	id001a
<input checked="" type="checkbox"/>	second swap	32	id001b
<b>-Servers-</b>			
<input type="checkbox"/>	/export	-----	id001d
	Sun unbundled <sup>†</sup>	0	-----
	other vendors <sup>†</sup>	+0	-----
	Local software <sup>†</sup>	+0	-----
	Free Space (for 2 clients)	+15	-----
	Total over and above	=15	-----
<input checked="" type="checkbox"/>	/export/swap (for 2 clients)	+60	id000e
<b>-Custom-</b>			
<input checked="" type="checkbox"/>	/database		id001f
<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.

Homogeneous Scenario:  
proton

## Disk Form Worksheet

Disk Drive: id000

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	32	(swap)	
c	656	-----	-----
d			
e	+60	/export/swap	N
f			
g	*	/usr	N
h			



Homogeneous Scenario:  
proton

## Disk Form Worksheet

Disk Drive: id001

PARTITION	SIZE	MOUNT PT	PRESERVE
a	20	/var	N
b	32	(swap)	
c	656	-----	-----
d	+15	/export	N
e			
f	200	/database	N
g			
h	*	/home	N

## Software Form Worksheet

Homogeneous Scenario:

proton

a-arch.k-arch: sun4 . sun4m

	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	-

## Client Form Worksheet

Homogeneous Scenario:  
proton

Client name: neutron<sup>1</sup> 4/60

Architecture Type: sun4 . sun4c<sup>2</sup>

Root fs: /export/root<sup>3</sup>

Swap fs: /export/swap<sup>4</sup>

## Client Information :

Internet Address: net . net . net . 37<sup>5</sup>

Ethernet Address: 8: 0: 20: 1: 6A: EA<sup>6</sup>

NIS Type: [none] [client]<sup>7</sup>

Domain name: server\_domainname<sup>8</sup>

Swap size (e.g. 8B, 8K, 8M): 16M<sup>9</sup>

Path to Root: /export/root/client\_name<sup>10</sup>

Path to Swap: /export/swap/client\_name<sup>11</sup>

Path to Executables: /usr<sup>12</sup>

Path to Kernel Executables: /usr/kvm<sup>13</sup>

Path to Home: /home/server\_name<sup>14</sup>

Terminal type: sun<sup>15</sup>

---

\* Only required if the system is connected to a network.

Homogeneous Scenario:  
proton

## Client Form Worksheet

Client name: electron<sup>1</sup> 4/60

Architecture Type: sun4 . sun4c<sup>2</sup>

Root fs: /export/root<sup>3</sup>

Swap fs: /export/swap<sup>4</sup>

### Client Information :

Internet Address: net . net . net . 40<sup>5</sup>

Ethernet Address: 8: 0: 20: 6: 6c: 20<sup>6</sup>

NIS Type: [none] [client]<sup>7</sup>

Domain name: server\_domainname<sup>8</sup>

Swap size (e.g. 8B, 8K, 8M): 24M<sup>9</sup>

Path to Root: /export/root/client\_name<sup>10</sup>

Path to Swap: /export/swap/client\_name<sup>11</sup>

Path to Executables: /usr<sup>12</sup>

Path to Kernel Executables: /usr/kvm<sup>13</sup>

Path to Home: /home/server\_name<sup>14</sup>

Terminal type: sun<sup>15</sup>



# Installing a Heterogeneous Server

---



Chapter 6 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 four Sun architectures and including all optional software categories would require the following (very approximate) amount of disk space for SunOS files:

Table 6-1 Disk Requirements for a Server Supporting Several Client Architectures

	Architectures				
	sun4.sun4	sun4.sun4c	sun3.sun3	sun3.sun3x	Totals
<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		18 MB
	Grand total				264 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.

\* Files sharable by systems of like *application* architecture.

† Files *not* sharable across differing architectures.

‡ Sun3 and Sun3x clients require a `/usr/share` for SunOS 4.1.1.

- 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.)
- 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.

## 6.1. 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 following worksheets:

- Preliminary Information Worksheet
- Host Form Worksheet
- Software Form Worksheet

This section will help you complete the final worksheets:

- Partition Planning Worksheet
- Disk Form Worksheet
- Client Form Worksheet



Go to Appendix E 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 D, "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 6-2 shows the default layouts for heterogeneous server configurations.

Table 6-2 Default Partitions for Heterogeneous Servers (Release 4.1.3\_U1)

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 6-3 shows the default sizes.

Table 6-3 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

---

**Note** – On SPARCsystem 600MP machines, swap size is 64 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. If your workstation has 64 MB of main memory, designate at least 66 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 150 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 1-5 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.<sup>†</sup>



**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 6.6,

<sup>†</sup> See *System and Network Administration* and *tmpfs(4S)* for details.

“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 6.3, "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.

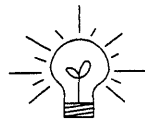
If you have decided to designate a separate partition for the `/var` filesystem, put it on drive 1. Availability of a second drive may make creation of a `/var` filesystem attractive from a performance standpoint.

### *Sample Layout For Two Disks*

Table 6-4 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 6-4 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.

## 6.2. 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.

## 6.3. 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 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.

Mount the selected 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 SPARCsystems 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

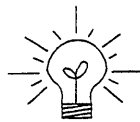
If you decided to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see the Partition Planning Worksheet) you must run the `format` program before running SunInstall. Refer to Appendix A for the necessary instructions.

If you do not plan to alter the size of the root partition or decrease the size of the swap partition, continue with "Loading and Booting the Miniroot" in the following section. (You can use the SunInstall program without running

format to make all other adjustments to partition sizes.)

## 6.4. 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.

Miniroot load and boot procedures are given here for those systems which will be installed from an attached CD-ROM drive (local installation). Procedures for loading the miniroot from a remote CD-ROM are given in Appendix B — “Loading and Booting the Miniroot from a Remote CD-ROM.” At this time your workstation should be powered on and displaying the > or ok PROM monitor prompt.

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

- For Sun4 systems:

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

- For Sun4c systems prior to the SPARCstation 2 (such as the SPARCstation 1, IPC, and SLC):

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

- For Sun4m and Sun4c systems beginning with the SPARCstation 2:

```
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. This process may take several minutes to complete, at which point 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 4.1.3_U1 (MINIROOT) #4: Wed Feb 13 01:10:16 PDT
Copyright (c) 1991 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 6.5, "Running SunInstall," below.

## 6.5. 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 Section E.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 asks for your time zone:

```
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.

Figure 6-1 SunInstall Main Menu: First Appearance

```
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.

Figure 6-2 SunInstall Main Menu: After Completing the Host Information Form

```

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.

Figure 6-3 SunInstall Main Menu: After All Forms Are 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 6-4 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 6-4 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 4.1.3\_U1 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 D — "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.



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.**

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

- 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 4.1.3\_U1. **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.**

### *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 to 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 *undersize* 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] ?

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** 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 4.1.3\_U1 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.

Example for CD-ROM in Local SunCD 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      : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[sr0]  
Media Location    : x[local] [remote]
```

---

\* 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 CD-ROM in Remote SunCD 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       : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] [sr0]
  Media location    : [local] x[remote]
  Media Host        : persephone
  Media Host's Internet Address : 195.5.2.16
```



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.

Having gathered the information needed to access the Release 4.1.3\_U1 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       : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[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 6-5. See Table 1-5 for detailed information about the listed categories.)

Table 6-5 Default Software for Networked Systems

Required Categories	Common and Desirable Categories
root	System_V
usr	Sys
Kvm	SunView_Users
Install	OpenWindows_Users
Networking	OpenWindows_Demo
	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: OpenWindows_Users (common)
Hog: sd0h      47210496
Size : 31334400
Size : 41117538

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] * [own c
Executables path: /usr
Kernel executables path: /usr/kvm

Destination fs: /usr (sd0g)

Name: OpenWindows_Users (common)
```

*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.

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

```

                                47210496
Hog: sd0h    31334400
Size: 41117538
```

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

‡ 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.

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:

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

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

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

Media Filenames:
  root           SunView_Users
  usr            Text
  Kvm            OpenWindows_Users
  Install        OpenWindows_Fonts
  Networking     Manual

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.4.1.3_U1] _[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 4.1.3\_U1 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.4.1.3_U1]
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**.

- 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.4.1.3_U1]
Client name       : squid-lips
Choice            : x[create] [delete] [display] [edit]

sun4.sunos.4.1.3_U1 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.**

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, 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 4.1.3\_U1 media.

```
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.4.1.3_U1.sun4 'root' media file ...
Extracting sunos.4.1.3_U1.sun4 'usr' media file ...
Extracting sunos.4.1.3_U1.sun4 'Kvm' media file ...
Extracting sunos.4.1.3_U1.sun4 'Install' media file ...
Extracting sunos.4.1.3_U1.sun4 'Networking' 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 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 6.6, "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 various configurations. See the *Solaris 1.1 SMCC Version A Release Manual* for tables that describe available `GENERIC_SMALL` kernel configuration files.

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
```

## 6.6. 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.

If you create your own kernel configuration file, make sure you include the following lines, so that the OpenWindows software loads the kernel drivers at run-time:

```
#  
# The following option adds support for loadable kernel modules.  
#  
options VDDRV # loadable modules
```

If you are not building your own kernel, you don't need to do anything, since these lines are already in the `GENERIC` and `GENERIC_SMALL` configuration files.

---

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.

### *Mounting OpenWindows from a Server*

You can mount an OpenWindows directory via the `mount` command each time you log on, or you can set up your `/etc/fstab` file to mount the directory automatically. Most users set up their `/etc/fstab` file to mount the OpenWindows directory automatically when their machine boots up. For information on how to mount the OpenWindows directory manually, or each time you log on, see the `mount(1)` man page or *SunOS User's Guide: Customizing Your Environment*.

NOTE: Starting the OpenWindows environment on top of an existing OpenWindows or SunView environment is not supported. You should exit the current environment before you start up the OpenWindows environment.

To mount the OpenWindows software using your `/etc/fstab` file, follow these steps:

1. Become `root`.

You must be `root` to perform the following steps. Use the `su` command, and remain `root` until instructed to exit from `root`.

```
example% su
Password:  <enter root password>
example#
```

2. Create a directory in which to mount the OpenWindows software.

If the directory in which you are going to mount the OpenWindows software does not exist, create it using `mkdir`. (In the example below, replace `/usr/openwin` with the directory where you want the OpenWindows software to be mounted on your machine.)

```
example# mkdir /usr/openwin
```

3. Add a line of the following form to your `/etc/fstab` file:

You do not need to be able to write to the OpenWindows directory; therefore, mount it *read-only*. The options `bg`, `ro`, `hard`, and `intr` are suggested options; read the `mount(8)` and `mntent(5)` man pages if you would like a further explanation of the various options available. (In the example below, replace `server-machine` with the name of the server where the OpenWindows software resides, and replace `/usr/openwin-server` with the directory where the OpenWindows software resides on the server from which you are mounting.)

```
server-machine:/usr/openwin-server /usr/openwin nfs suid,bg,ro,hard,intr 0 0
```



**Caution** – The OpenWindows software includes both `setuid` and `setgid` programs. Therefore, make sure you mount the OpenWindows software with the `suid` option (i.e., do not use the `nosuid` option). The `suid` option is the default, so normally you will not have to do anything special.

4. Mount the directories in `/etc/fstab`:

Use the `mount` command with the `-a` option:

```
example# mount -a
```

5. Set the `OPENWINHOME` environment variable to the directory where you have mounted or installed the OpenWindows software.

NOTE: Make sure that the OpenWindows directory has been mounted with `suid` permissions as discussed in Step 3.

Replace `/usr/openwin` below with the directory where you want the OpenWindows software to be mounted on your machine. (This is the directory created with the `mkdir` command in Step 2.)

```
example# setenv OPENWINHOME /usr/openwin
```

6. Exit from `root`.

```
example# exit
example%
```

7. Set the `OPENWINHOME` environment variable to the directory where you have mounted or installed the OpenWindows software.

In the example below, replace `/usr/openwin` with the directory where the OpenWindows software is mounted on your machine. (This is the directory created with the `mkdir` command in Step 2.)

```
example% setenv OPENWINHOME /usr/openwin
```

8. Start-up the OpenWindows software using the `openwin` script.

For the average user, a shell script called `openwin` takes care of all the default server configuration issues. You should run `OPENWINHOME/bin/openwin` to start the server. (Note that you should change directory to your home directory before you start the OpenWindows software.)

```
example% cd
example% OPENWINHOME/bin/openwin
```

## 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.

### 6.7. 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 4.1.3\_U1 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 4.1.3\_U1 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.

### 6.8. Example Worksheets for Heterogeneous Server

This section presents a sample scenario illustrating installation of a Heterogeneous Server configuration. Background information for this 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 similar installation configurations, and generally clarify installation planning.

You can find sets of blank worksheets, along with detailed explanations of the worksheets themselves, in Appendix E, "Installation Worksheets."

---

## 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.

The `sun3` and `sun3x` clients must use the SunOS 4.1.1 release; later releases do not support those architectures.

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 <sup>1</sup>

Workstation Architecture: sun4 . sun4 <sup>2</sup>

Media Device Type: sr <sup>3</sup> and Number: 0 <sup>4</sup>

Media Device Name: sr0 <sup>5</sup>

System Disk Name: xd0 <sup>6</sup>

Other Disk Devices (if any): <sup>7</sup>

Name: xd1 Name: xd2

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

System Console Device: wyse50 <sup>8</sup>

### Miscellaneous Information:

Local Timezone: CET <sup>9</sup>

Heterogeneous Scenario:  
estoril

## Host Form Worksheet

### Workstation Information:

Name : estoril <sup>1</sup>

Type : [standalone] [server] [dataless] <sup>2</sup>

### Network Information:

Internet Address : 192 . 3 . 11 . 2 <sup>3</sup>

NIS Type : [none] [master] [slave] [client] <sup>4</sup>

Domain name : ehg.engineering <sup>5</sup>

### Miscellaneous Information:

Reboot after completed : [y] [n] <sup>6</sup>

### Dataless Configuration Information:

Server name : \_\_\_\_\_ <sup>7</sup>

Server Internet Address : \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_ . \_\_\_\_\_ <sup>8</sup>

Path of the executables on server: /export/exec/app\_arch <sup>9</sup>

Path of the kernel executables on server: /export/exec/kvm/kernel\_arch <sup>10</sup>

## Partition Planning Worksheet

Heterogeneous Scenario:  
estoril

Transcript 10  
Phigs 15  
Comm 20  
----->  
45

	Partition/Filesystem	Size	Position
<b>-Required-</b>			
<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	-----
<b>-Common-</b>			
<input checked="" type="checkbox"/>	/home1	*	xd0h
<b>-Optional-</b>			
<input checked="" type="checkbox"/>	/tmp	30	xd1a
<input checked="" type="checkbox"/>	/var	50	xd2a
<input checked="" type="checkbox"/>	second swap	40	xd1b
<b>-Servers-</b>			
<input checked="" type="checkbox"/>	/export	-----	xd1d
	Sun unbundled <sup>†</sup> Transcript	10	-----
	other vendors <sup>†</sup> database-45, docpubs-45	+90	-----
	Local software <sup>†</sup>	+30	-----
	Free Space (w/2 clients)	+40	-----
	Total over and above	=170	-----
<input type="checkbox"/>	/export/swap/A (1 client)	+40	xd1e
<b>-Custom-</b>			
<input checked="" type="checkbox"/>	third swap	40	xd2b
<input checked="" type="checkbox"/>	/home2	*	xd1h
<input checked="" type="checkbox"/>	/export/swapB	+40	xd2e
<input 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.

Heterogeneous Scenario:  
estoril

## Disk Form Worksheet

Disk Drive: xd0

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	40	(swap)	
c	892	-----	-----
d			
e			
f			
g	+215	/usr	N
h	*	/home1	N

Heterogeneous Scenario:  
estoril

## Disk Form Worksheet

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: xd2

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 type="checkbox"/>	root	-
<input type="checkbox"/>	usr	-
<input type="checkbox"/>	Kvm	-
<input type="checkbox"/>	Install	-
<input 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 and 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 type="checkbox"/>	root	-
<input type="checkbox"/>	usr	-
<input type="checkbox"/>	Kvm	-
<input type="checkbox"/>	Install	-
<input 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.



Heterogeneous Scenario:  
estoril

## Client Form Worksheet

Client name: vienna<sup>1</sup> SPARCstation 1+ color

Architecture Type: sun4 . sun4c<sup>2</sup>

Root fs: /export/root<sup>3</sup>

Swap fs: /export/swap<sup>4</sup>

### Client Information :

Internet Address: net . net . net . 22<sup>5</sup>

Ethernet Address: 8 : 0 : 20 : 1 : 6c : 98<sup>6</sup>

NIS Type: [none] [client]<sup>7</sup>

Domain name: server\_domainname<sup>8</sup>

Swap size (e.g. 8B, 8K, 8M): 24M<sup>9</sup>

Path to Root: /export/root/client\_name<sup>10</sup>

Path to Swap: /export/swap/client\_name /export/swapA/vienna<sup>11</sup>

Path to Executables: /usr<sup>12</sup>

Path to Kernel Executables: /usr/kvm<sup>13</sup>

Path to Home: /home/server\_name /home1/estoril<sup>14</sup>

Terminal type: sun<sup>15</sup>

Heterogeneous Scenario:  
estoril

## Client Form Worksheet

Client name: zurich<sup>1</sup> SPARCstation 1+ monochrome monitor

Architecture Type: sun4 . sun4c<sup>2</sup>

Root fs: /export/root<sup>3</sup>

Swap fs: /export/swap<sup>4</sup>

### Client Information :

Internet Address: net . net . net . 7<sup>5</sup>

Ethernet Address: 8:0 :20 :1 :3e :1e<sup>6</sup>

NIS Type: [none] [client]<sup>7</sup>

Domain name: server\_domainname<sup>8</sup>

Swap size (e.g. 8B, 8K, 8M): 16M<sup>9</sup>

Path to Root: /export/root/client\_name<sup>10</sup>

Path to Swap: ~~/export/swap/client\_name~~ /export/swapA/zurich<sup>11</sup>

Path to Executables: /usr<sup>12</sup>

Path to Kernel Executables: /usr/kvm<sup>13</sup>

Path to Home: ~~/home/server\_name/home1~~ estoril<sup>14</sup>

Terminal type: sun<sup>15</sup>



## Client Form Worksheet

Heterogeneous Scenario:  
estoril

Client name: lyon<sup>1</sup> 4/110, color monitor

Architecture Type: sun4 . sun4<sup>2</sup>

Root fs: */export/root*<sup>3</sup>

Swap fs: */export/swap*<sup>4</sup>

### Client Information :

Internet Address: *net . net . net .* 25<sup>5</sup>

Ethernet Address: 8: 0: 20: 0: 18: AB<sup>6</sup>

NIS Type: [none] [client]<sup>7</sup>

Domain name: *server\_domainname*<sup>8</sup>

Swap size (e.g. 8B, 8K, 8M): 30M<sup>9</sup>

Path to Root: */export/root/client\_name*<sup>10</sup>

Path to Swap: ~~*/export/swap/client\_name*~~ */export/swapB/lyon*<sup>11</sup>

Path to Executables: */usr*<sup>12</sup>

Path to Kernel Executables: */usr/kvm*<sup>13</sup>

Path to Home: ~~*/home/server\_name*~~ */home2/estoril*<sup>14</sup>

Terminal type: *sun*<sup>15</sup>

Heterogeneous Scenario:  
estoril

## Client Form Worksheet

Client name: bagshot<sup>1</sup> 3/60 monochrome

Architecture Type: sun3 . sun3<sup>2</sup>

Root fs: /export/root<sup>3</sup>

Swap fs: /export/swap<sup>4</sup>

### Client Information :

Internet Address: net . net . net . 31<sup>5</sup>

Ethernet Address: 8: 0: 20: 1: 0: 93<sup>6</sup>

NIS Type: [none] [client]<sup>7</sup>

Domain name: server\_domainname<sup>8</sup>

Swap size (e.g. 8B, 8K, 8M): 12M<sup>9</sup>

Path to Root: /export/root/client\_name<sup>10</sup>

Path to Swap: /export/swap/client\_name /export/swapB/bagshot<sup>11</sup>

Path to Executables: /usr<sup>12</sup>

Path to Kernel Executables: /usr/kvm<sup>13</sup>

Path to Home: /home/server\_name/home/estoril<sup>14</sup>

Terminal type: sun<sup>15</sup>



# *Installing a Dataless Workstation*

---



Chapter 7 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.

## *7.1. 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.

## 7.2. 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 following worksheets

- Preliminary Information Worksheet
- Host Form Worksheets

This section will help you complete the final worksheets:

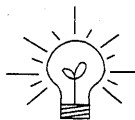
- Partition Planning Worksheet
- Disk Form Worksheet



Go to Appendix E 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 D, “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 7-1 shows the default layout for dataless configurations.

Table 7-1 Default Partitions for Dataless Workstations (Release 4.1.3\_U1)

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 7-2 shows the default sizes.\*

---

\* Disk drives used with dataless workstations are typically of fairly small capacity; usually less than 200 megabytes.





Table 7-2 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

---

**Note** – On SPARCsystem 600MP machines, swap size is 64 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. If your workstation has 64 MB of main memory, designate at least 66 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.

## 7.3. 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 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.

Mount the selected 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 decided to size your root partition differently from the default, or to size the swap partition on your system disk **smaller** than the default (see your entries on 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 the root partition or decrease the size of the swap partition, continue with "Loading and Booting the Miniroot" in the following section. (You can use the SunInstall program without running `format` to make all other adjustments to partition sizes.)

## 7.4. 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.

Miniroot load and boot procedures are given here for those systems which will be installed from an attached CD-ROM drive (local installation). Procedures for loading the miniroot from a remote CD-ROM are given in Appendix B — "Loading and Booting the Miniroot from a Remote 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:

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 Sun4m and Sun4c systems beginning with the SPARCstation 2:

```
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:
```

---

\* 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. This process may take several minutes to complete, at which point 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 4.1.3_U1(MINIROOT) #4: Wed Feb 13 01:10:16 PDT
Copyright (c) 1991 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 7.5, "Running SunInstall," below.

## 7.5. 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 E.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 asks for your time zone:

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.

Figure 7-1 SunInstall Main Menu: First Appearance

```
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 7-2 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 4.1.3\_U1 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 D — "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.)



Since a dataless workstation has, by definition, no user data on its local disk *no* filesystem should be set to PRESERVE(Y/N) **y**.

Following is a default partition table for a standalone system.

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		



Remember that for the dataless workstation we have chosen to display SIZE in *cylinders* rather than in the more common *megabytes*.

### *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.

6. 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, backspace 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		

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 4.1.3\_U1 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:

```
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.

---

\* 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 CD-ROM in Local SunCD 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          : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[sr0]
Media Location       : x[local] [remote]
```

### Example for CD-ROM in Remote SunCD 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_] [xt0] [mt0] [fd0] x[sr0]
Media location       : [local] x[remote]
Media Host           : persephone
Media Host's Internet Address : 195.5.2.16
```



After you provide the information needed to access the Release 4.1.3\_U1 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   : [st0] [st1] [st2] [st_] [xt0] [mt0] [fd0] x[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 4.1.3\_U1 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.4.1.3_U1.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 7.6, “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
```

## *7.6. 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 various configurations. See the *Solaris 1.1 SMCC Version A Release Manual* for tables that describe available `GENERIC_SMALL` kernel configuration files.

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.

If you create your own kernel configuration file, make sure you include the following lines, so that the OpenWindows software loads the kernel drivers at run-time:

```
#
# The following option adds support for loadable kernel modules.
#
options VDDRV                               # loadable modules
```

If you are not building your own kernel, you do not need to do anything, because these lines are already in the *GENERIC* and *GENERIC\_SMALL* configuration files.

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.

### Mounting OpenWindows from a Server

You can mount an OpenWindows directory via the `mount` command each time you log on, or you can set up your `/etc/fstab` file to mount the directory automatically. Most users set up their `/etc/fstab` file to mount the OpenWindows directory automatically when their machine boots up. For information on how to mount the OpenWindows directory manually, or each time you log on, see the `mount(1)` man page or *SunOS User's Guide: Customizing Your Environment*.

NOTE: Starting the OpenWindows environment on top of an existing OpenWindows or SunView environment is not supported. You should exit the current environment before you start up the OpenWindows environment.

To mount the OpenWindows software using your `/etc/fstab` file, follow these steps:

1. Become `root`.

You must be `root` to perform the following steps. Use the `su` command, and remain `root` until instructed to exit from `root`.

```
example% su
Password: <enter root password>
example#
```

2. Create a directory in which to mount the OpenWindows software.

If the directory in which you are going to mount the OpenWindows software does not exist, create it using `mkdir`. (In the example below, replace `/usr/openwin` with the directory where you want the OpenWindows software to be mounted on your machine.)

```
example# mkdir /usr/openwin
```

3. Add a line of the following form to your `/etc/fstab` file:



You do not need to be able to write to the OpenWindows directory; therefore, mount it *read-only*. The options `bg`, `ro`, `hard`, and `intr` are suggested options; read the `mount(8)` and `mntent(5)` man pages if you would like a further explanation of the various options available. (In the example below, replace *server-machine* with the name of the server where the OpenWindows software resides, and replace `/usr/openwin-server` with the directory where the OpenWindows software resides on the server from which you are mounting.)

```
server-machine:/usr/openwin-server /usr/openwin nfs suid,bg,ro,hard,intr 0 0
```



**Caution** – The OpenWindows software includes both `setuid` and `setgid` programs. Therefore, make sure you mount the OpenWindows software with the `suid` option (i.e., do not use the `nosuid` option). The `suid` option is the default, so normally you will not have to do anything special.

4. Mount the directories in `/etc/fstab`:

Use the `mount` command with the `-a` option:

```
example# mount -a
```

5. Set the `OPENWINHOME` environment variable to the directory where you have mounted or installed the OpenWindows software.

**NOTE:** Make sure that the OpenWindows directory has been mounted with `suid` permissions as discussed in Step 3.

Replace `/usr/openwin` below with the directory where you want the OpenWindows software to be mounted on your machine. (This is the directory created with the `mkdir` command in Step 2.)

```
example# setenv OPENWINHOME /usr/openwin
```

6. Exit from `root`.

```
example# exit
example%
```



7. Set the `OPENWINHOME` environment variable to the directory where you have mounted or installed the OpenWindows software.

In the example below, replace `/usr/openwin` with the directory where the OpenWindows software is mounted on your machine. (This is the directory created with the `mkdir` command in Step 2.)

```
example% setenv OPENWINHOME /usr/openwin
```

8. Start-up the OpenWindows software using the `openwin` script.

For the average user, a shell script called `openwin` takes care of all the default server configuration issues. You should run `$OPENWINHOME/bin/openwin` to start the server. (Change to your home directory before you start OpenWindows.)

```
example% cd
example% $OPENWINHOME/bin/openwin
```

## 7.7. Example Worksheets for Dataless Workstation

This section presents a sample scenario illustrating installation of a Dataless Workstation configuration. Background information for this scenario is presented, followed by facsimiles of Worksheets completed to support the installation process.

Examining this set of completed Worksheets will help you understand the correct use of the Worksheets, provide ideas for implementing similar installation configurations, and generally clarify installation planning.

You can find sets of blank worksheets, along with detailed explanations of the worksheets themselves, in Appendix E, "Installation Worksheets."

### *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 SunCD drive, it will be installed using the remote method explained in Appendix B.



Dataless Scenario:  
helsinki

## Preliminary Information Worksheet

Name: helsinki

### Hardware Information:

Workstation Model: SPARCstation 1+ (4/65) <sup>1</sup>

Workstation Architecture: sun4 . sun4c <sup>2</sup>

Media Device Type: \_\_\_\_\_ <sup>3</sup> and Number: \_\_\_\_\_ <sup>4</sup>

Media Device Name: \_\_\_\_\_ <sup>5</sup>

System Disk Name: sd0 <sup>6</sup>

Other Disk Devices (if any): <sup>7</sup>

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

System Console Device: sun <sup>8</sup>

### Miscellaneous Information:

Local Timezone: CET <sup>9</sup>



Dataless Scenario:  
helsinki

## Host Form Worksheet

### Workstation Information:

Name : helsinki <sup>1</sup>

Type : [standalone] [server] [dataless] <sup>2</sup>

### Network Information:

Internet Address : 193 . 3 . 11 . 4 <sup>3</sup>

NIS Type : [none] [master] [slave] [client] <sup>4</sup>

Domain name : ehq.engineering <sup>5</sup>

### Miscellaneous Information:

Reboot after completed : [y] [n] <sup>6</sup>

### Dataless Configuration Information:

Server name : estoril <sup>7</sup>

Server Internet Address : 192 . 3 . 11 . 2 <sup>8</sup>

Path of the executables on server: /export/exec/app\_arch <sup>9</sup>



Dataless Scenario:  
helsinki

## Partition Planning Worksheet

	Partition/Filesystem	Size	Position
<b>-Required-</b>			
<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	=	-----
<b>-Common-</b>			
<input type="checkbox"/>	/home		
<b>-Optional-</b>			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
<b>-Servers-</b>			
<input type="checkbox"/>	/export	-----	
	Sun unbundled <sup>†</sup>		-----
	other vendors <sup>†</sup>	+	-----
	Local software <sup>†</sup>	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export /swap	+	
<b>-Custom-</b>			
<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:  
helsinki

Disk Drive: sd0

PARTITION	SIZE	MOUNT PT	PRESERVE
a	16	/	N
b	*	(swap)	
c	105	-----	-----
d			
e			
f			
g			
h			

# 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 workstation, homogenous server, heterogeneous server, or dataless workstation, see the first section in Chapter 5, 6, 7, or 8 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>
```

You can also enter `?` (question mark) at the `format` prompt to get the format menu.

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 D, 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.

---

\* 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  $16 \times 2048 = 32,768$  blocks.





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.

```
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 [175]: 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 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 CD-ROM

---



## B.1. Booting the Miniroot from a Remote CD-ROM

If your system does not have local CD-ROM capabilities, you will need to boot the miniroot from a remote system using its CD-ROM drive. 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 1.11, "Pre-Installation Checklist."**

This appendix uses the terms *target* and *mediahost* as they were defined in the main text: The system without local CD-ROM that is booting the miniroot from a remote source is the *target* system; the remote system with local CD-ROM 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

## B.2. Copying the Miniroot from CD-ROM to the Mediahost

The mediahost you use for remote booting must be a server running a version of SunOS 4.1.x that supports the *target* system (for example, 4.1.3 is needed for the SPARCstation-10). 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:

```
% su
Password:
# cd /usr/etc/install
```

– Enter the *root* password at Password:

2. Now make the target system a client of the mediahost. The procedure you use at this point depends on whether your site uses NIS, a network information service

**Sites Using NIS:** If your site uses NIS, 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. You must type a literal "." at the end of entries for systems with Sun4 kernel architecture:

sun4., Sun4c, Sun4m

– *client* is the name of the target system

### Example

For a Sun4c target system named *xyz*, you would enter:

```
# add_client -a sun4c xyz
```

Before you carry 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.



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

- 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. You must type a literal "." at the end of entries for systems with Sun4 kernel architecture: Sun4., Sun4c, Sun4m
- *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
```

- Copy the miniroot from CD to the mediahost's `/export/exec/kvm/k-arch.sunos.release` directory, as shown below— in the command lines, 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_3
# cp miniroot_sun4c /export/exec/kvm/sun4c.sunos.4.1.3_U1/miniroot
```

(This is assuming the remote host runs SunOS 4.1.3.)





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.

### B.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 Sun4:

```
>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 Sun4m and 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/rd0nb
```

- 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.

#### B.4. Booting the Target System from the Miniroot

Now the miniroot that had been 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.

7. 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.

8. 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 4.1.3_U1 (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 4.4, 5.5, 6.5, or 7.5, "Running SunInstall" as appropriate to your system configuration.

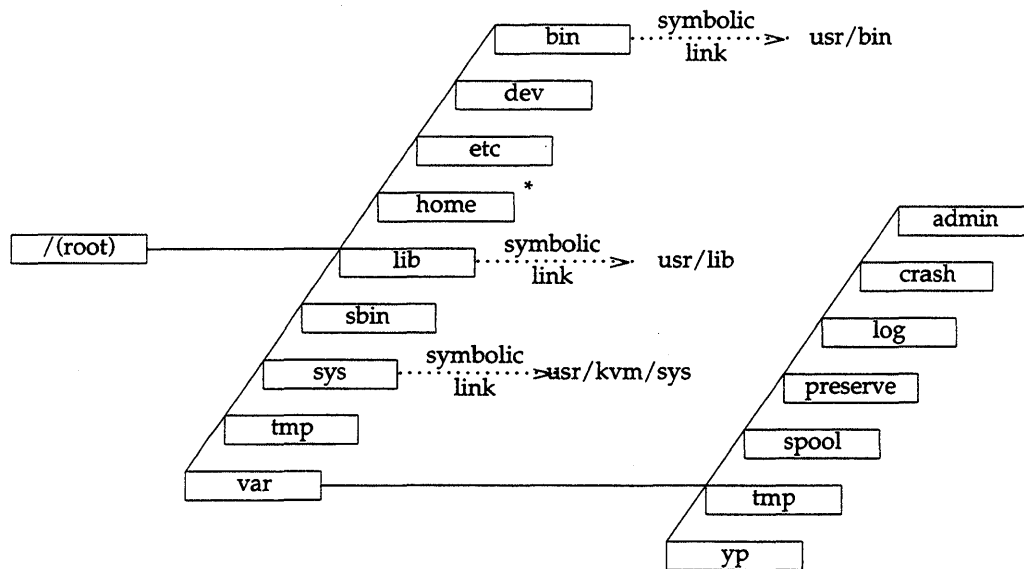
# The SunOS Filesystem



## C.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 C-1 shows directories in the root filesystem for Release 4.1.3\_U1.

Figure C-1 Directories in the Root Filesystem



\* On smaller disks (under 130MB), `/home` is a symbolic link to `/usr/export/home`.



Here are some important directories in the root filesystem:

- `/dev` Contains device files and the MAKEDEV shell script. MAKEDEV is used to add devices to an installed system.
- `/etc` Contains data files and subdirectories used in system administration.
- `/tmp` Contains temporary files, such as those created by the C compiler. The contents of all files in `/tmp` are automatically cleared whenever you boot the system.
- `/var` Contains some temporary files and files that vary in size. Spooling programs create files in subdirectories of `/var/spool`, such as `/var/spool/mail` for incoming mail, and `/var/spool/lpd` for queued print jobs.

Before SunOS 4.0, the directory `/bin` contained UNIX executables. It is now a symbolic link to `/usr/bin` (see Section C.2, "The `/usr` Filesystem").

### *Changes to the Root Filesystem Since Release 4.0*

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.

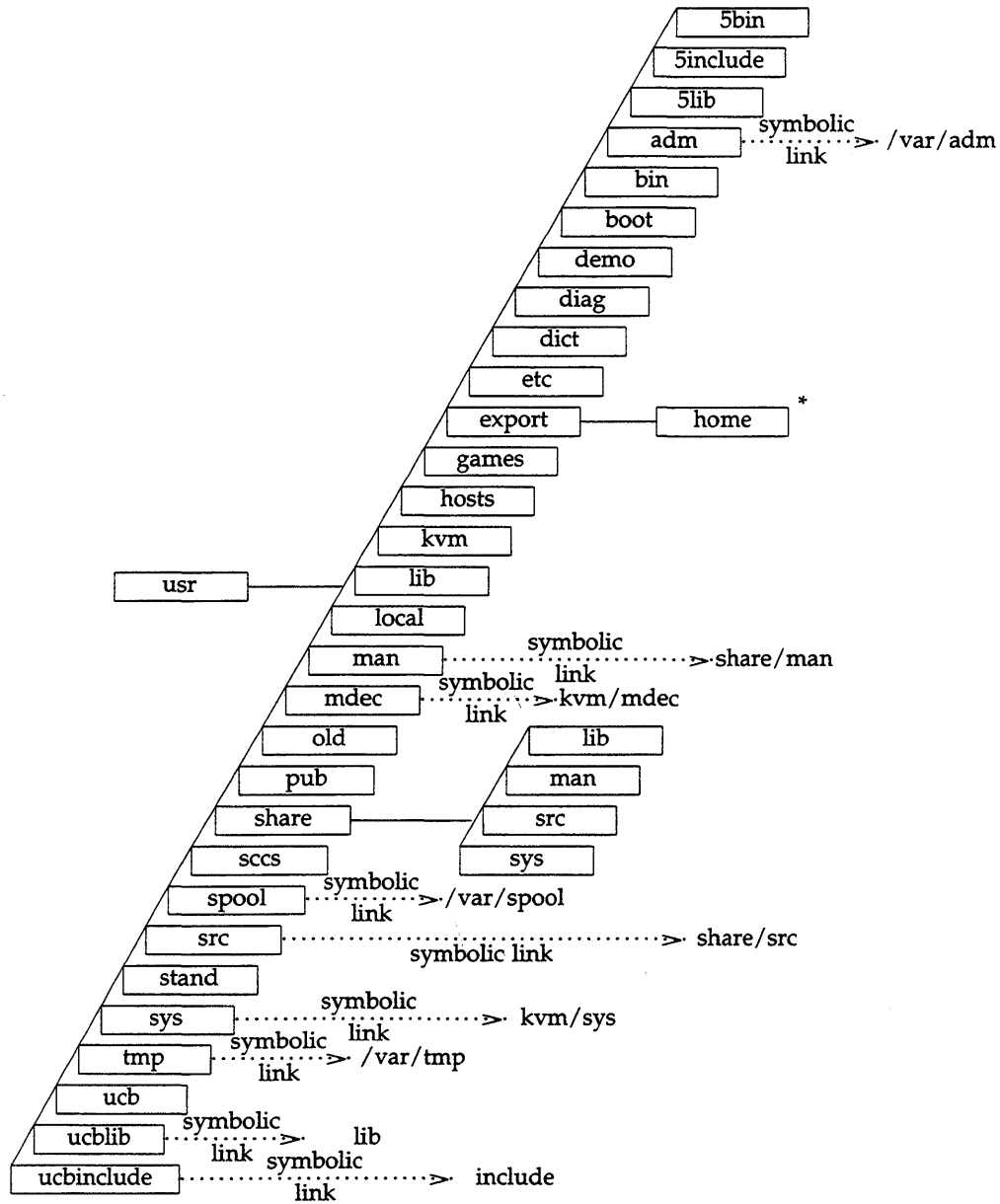
## *C.2. The `/usr` Filesystem*

The `/usr` filesystem contains executable commands, system programs, and library routines. Figure C-2 shows the `/usr` filesystem for Release 4.1.3\_U1. Some important directories in `/usr` are described below.

- `/usr/bin` Contains basic SunOS commands (`ls`, `cat`, `chmod`, etc.).
- `/usr/etc` Contains system administration and maintenance commands.
- `/usr/lib` Contains miscellaneous utilities, system libraries, macro packages, line-printer filters, and more.
- `/usr/local` Empty on a newly installed system; can be used to store third-party software added after installation.
- `/usr/kvm` Contains kernel-architecture-dependent software.
- `/usr/share` Contains software that is independent of system architecture. The man pages, for example, are located in `/usr/share`.



Figure C-2 Release 4.1.3\_U1 /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:

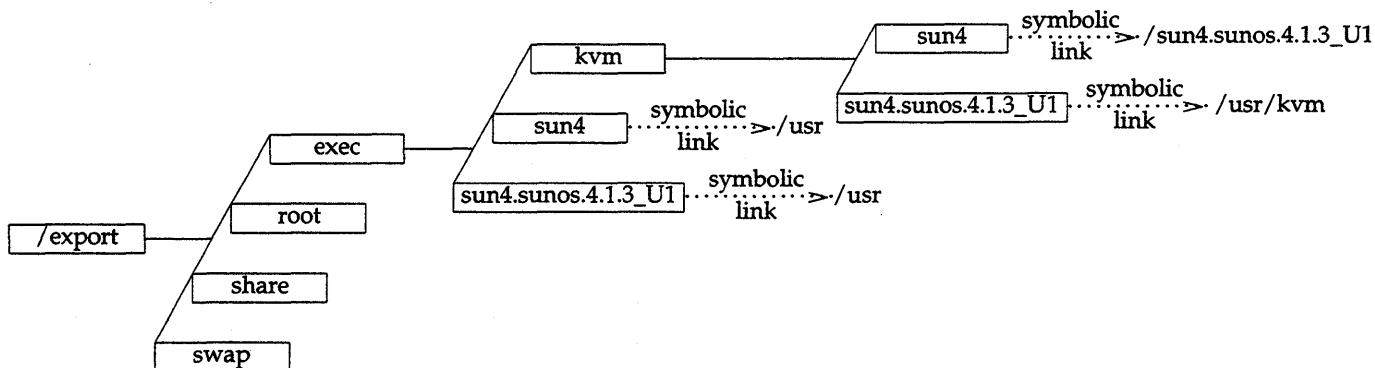
```
/usr/boot  
/usr/stand  
/usr/mdec
```

In addition, /usr/share/sys is now a symbolic link to /usr/kvm/sys, which contains files for building and reconfiguring a kernel.

### C.3. The /export Filesystem

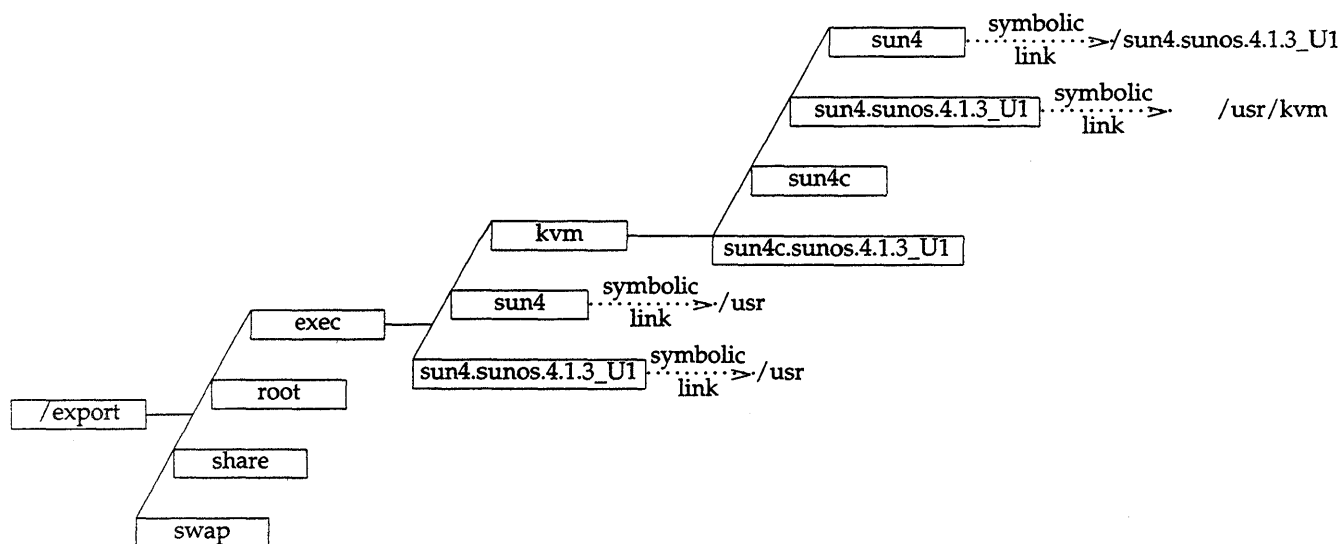
On a server that runs Release 4.1.3\_U1, the /export filesystem contains directories that the server exports to clients. Figure C-3 shows the /export filesystem of a homogeneous server. In the example, both server and clients have sun4.sun4 system architectures.

Figure C-3 /export Filesystem of a Homogeneous Server



The /export filesystem of a heterogeneous server is shown in Figure C-4. In the example, a sun4.sun4c client has been added to the sun4.sun4 server of the previous figure.

Figure C-4 /export Filesystem of a Heterogeneous Server



Some 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

---



## D.1. Disk Partitions

The SunOS operating system divides a disk into eight logical 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 C, *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.

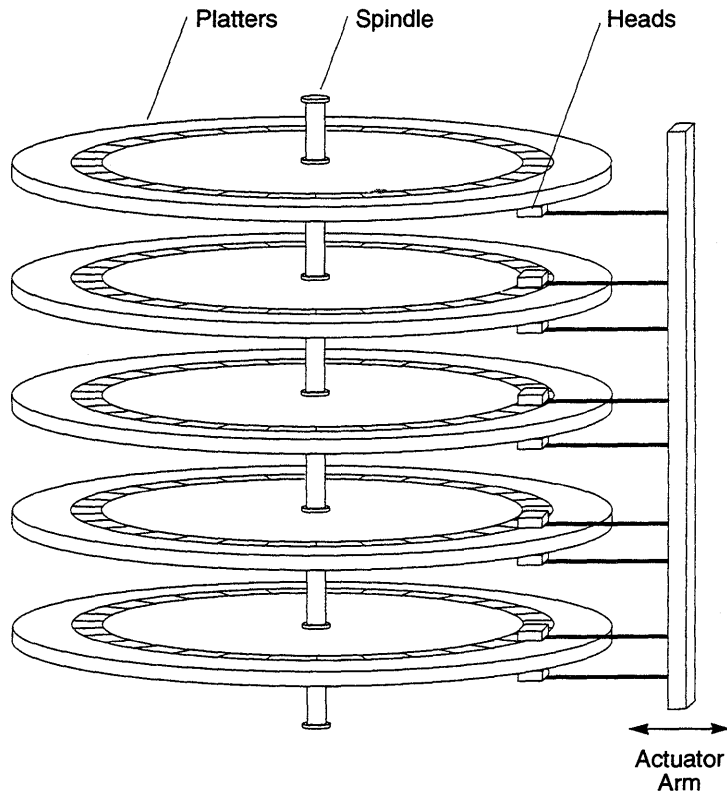
When you install the SunOS operating system, each partition your system is going to use must be allocated disk space in terms of *tracks*, *cylinders*, and *sectors*, or *blocks*. The following section describes the way disks are physically structured and explains these terms.

A partition cannot be spread out over more than one mount point.

## D.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 D-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 D-1 Disk Structure—Platters, Spindle, and Read/Write Heads

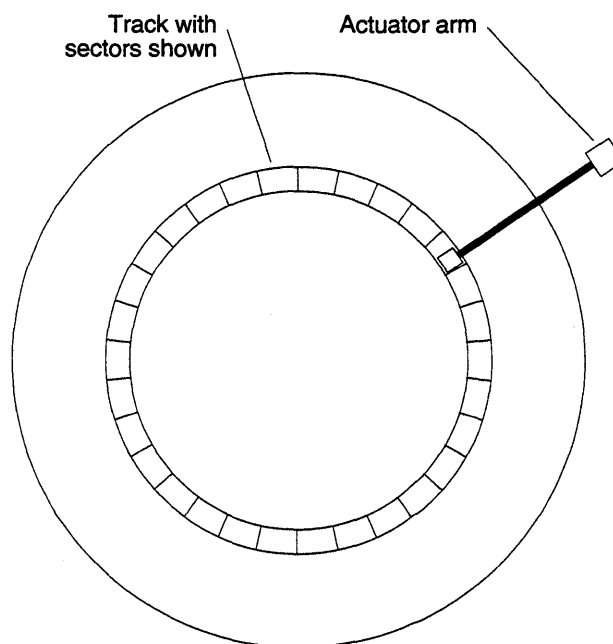


The top and bottom surfaces of most platters (bottom only, for the top platter; top only, for the bottom platter) are divided into circular *tracks*. There may be several thousand tracks on a single platter.

Tracks are divided into *sectors*, or *blocks*, each of which contains 512 bytes. (These are disk *hardware* blocks. In other contexts involving UNIX, the term *block* means two sectors that contain a total of 1,024 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.

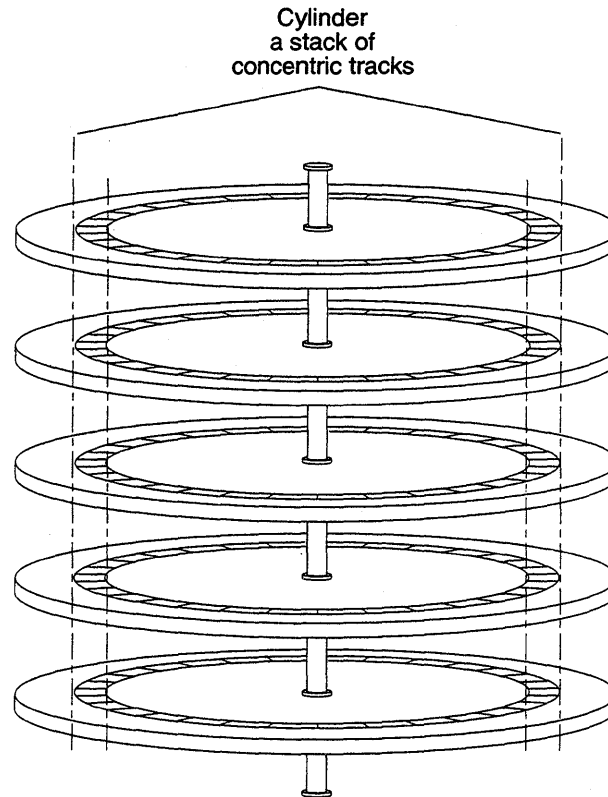
All the platters making up a given disk will have the same number of tracks and blocks, but different disks may vary in both of these respects. Figure D-2 shows a platter divided into tracks and sectors.

Figure D-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 D-3.

Figure D-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 D-4.

Figure D-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 D-4, partition b (the swap partition) starts at cylinder 59 and contains 33,456 blocks. At 512 bytes per block, this is equivalent to 16.3 Mbytes. 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 E.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 E.2, "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.

The chapters covering custom installations each conclude with a set of completed worksheets illustrating a scenario of that system configuration. Refer to those examples to help understand the correct use of the worksheets, the implementation of some common installation configurations, and the process of installation planning.



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## E.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.sun4c**.
3. Media device type. Example: **sr** for SCSI SunCD drive. 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\_arch 9

Path of the kernel executables on server: /export/exec/kvm/kernel\_arch 10





## 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, the disk name and partition letter indicating 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
<b>-Required-</b>			
<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	=	-----
<b>-Common-</b>			
<input type="checkbox"/>	/home		
<b>-Optional-</b>			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
<b>-Servers-</b>			
<input type="checkbox"/>	/export	-----	
	Sun unbundled†		-----
	other vendors†	+	-----
	Local software†	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
<b>-Custom-</b>			
<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	-
<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 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 4.1, "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





---

## *E.2. 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.

---

## Preliminary Information Worksheet

Name: \_\_\_\_\_

### Hardware Information:

Workstation Model: \_\_\_\_\_<sup>1</sup>

Workstation Architecture: \_\_\_\_\_ . \_\_\_\_\_<sup>2</sup>

Media Device Type: \_\_\_\_\_<sup>3</sup> and Number: \_\_\_\_\_<sup>4</sup>

Media Device Name: \_\_\_\_\_<sup>5</sup>

System Disk Name: \_\_\_\_\_<sup>6</sup>

Other Disk Devices (if any):<sup>7</sup>

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

System Console Device: \_\_\_\_\_<sup>8</sup>

### Miscellaneous Information:

Local Timezone: \_\_\_\_\_<sup>9</sup>



---

## Preliminary Information Worksheet

Name: \_\_\_\_\_

### Hardware Information:

Workstation Model: \_\_\_\_\_<sup>1</sup>

Workstation Architecture: \_\_\_\_\_ . \_\_\_\_\_<sup>2</sup>

Media Device Type: \_\_\_\_\_<sup>3</sup> and Number: \_\_\_\_\_<sup>4</sup>

Media Device Name: \_\_\_\_\_<sup>5</sup>

System Disk Name: \_\_\_\_\_<sup>6</sup>

Other Disk Devices (if any):<sup>7</sup>

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Name: \_\_\_\_\_ Name: \_\_\_\_\_

System Console Device: \_\_\_\_\_<sup>8</sup>

### Miscellaneous Information:

Local Timezone: \_\_\_\_\_<sup>9</sup>



---

## 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

---

## 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

## Partition Planning Worksheet

	Partition/Filesystem	Size	Position
<b>-Required-</b>			
<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	=	-----
<b>-Common-</b>			
<input type="checkbox"/>	/home		
<b>-Optional-</b>			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
<b>-Servers-</b>			
<input type="checkbox"/>	/export	-----	
	Sun unbundled†		-----
	other vendors†	+	-----
	Local software†	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
<b>-Custom-</b>			
<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.

## Partition Planning Worksheet

	Partition/Filesystem	Size	Position
<b>-Required-</b>			
<input checked="" type="checkbox"/>	/ (root)		
<input checked="" type="checkbox"/>	swap		
<input checked="" type="checkbox"/>	/usr <sup>†</sup>	-----	
	Sun unbundled		-----
	other vendors	+	-----
	Local software	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<b>-Common-</b>			
<input type="checkbox"/>	/home		
<b>-Optional-</b>			
<input type="checkbox"/>	/tmp		
<input type="checkbox"/>	/var		
<input type="checkbox"/>	second swap		
<b>-Servers-</b>			
<input type="checkbox"/>	/export	-----	
	Sun unbundled <sup>†</sup>		-----
	other vendors <sup>†</sup>	+	-----
	Local software <sup>†</sup>	+	-----
	Free Space	+	-----
	Total over and above	=	-----
<input type="checkbox"/>	/export/swap	+	
<b>-Custom-</b>			
<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 Drive: \_\_\_\_\_

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			





## Disk Form Worksheet

Disk Drive: \_\_\_\_\_

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			



## Disk Form Worksheet

Disk Drive: \_\_\_\_\_

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			



## Disk Form Worksheet

Disk Drive: \_\_\_\_\_

PARTITION	SIZE	MOUNT PT	PRESERVE
a			
b			
c		-----	-----
d			
e			
f			
g			
h			



## 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	-
<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.



## 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	-
<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.



## 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	-
<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.



## 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	-
<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

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





## 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



## Client Form Worksheet

Client name: \_\_\_\_\_<sup>1</sup>

Architecture Type: \_\_\_\_\_ . \_\_\_\_\_<sup>2</sup>

Root fs: */export/root*<sup>3</sup>

Swap fs: */export/swap*<sup>4</sup>

Client Information :

Internet Address: *net . net . net .* \_\_\_\_\_<sup>5</sup>

Ethernet Address: \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_<sup>6</sup>

NIS Type: [none] [client]<sup>7</sup>

Domain name: *server\_domainname*<sup>8</sup>

Swap size (e.g. 8B, 8K, 8M): \_\_\_\_\_**M**<sup>9</sup>

Path to Root: */export/root/client\_name*<sup>10</sup>

Path to Swap: */export/swap/client\_name*<sup>11</sup>

Path to Executables: */usr*<sup>12</sup>

Path to Kernel Executables: */usr/kvm*<sup>13</sup>

Path to Home: */home/server\_name*<sup>14</sup>

Terminal type: *sun*<sup>15</sup>



## 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



## 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

## 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



## 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

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Domain name: *server\_domainname* 8

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Terminal type: *sun* 15



## Client Form Worksheet

Client name: \_\_\_\_\_ 1

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Terminal type: *sun* 15

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Part No.: 801-5127-10  
Version A of November 1993



*SunSoft*

A Sun Microsystems, Inc. Business

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Mountain View, CA 94043 U.S.A.