Tru64 UNIX

Sharing Software on a Local Area Network

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This manual describes Remote Installation Services (RIS) and Dataless Management Services (DMS) for Tru64 UNIX (formerly DIGITAL UNIX). RIS is used to install software kits across a network instead of using locally mounted distribution media. DMS lets client systems share the `/usr` file system on a networked server while maintaining their own `root` (`/`) and `/var` file systems on a DMS server.

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About This Manual

This manual describes the Remote Installation Services (RIS) and Dataless Management Services (DMS) environments and utilities maintained on a Compaq Tru64™ UNIX® (formerly DIGITAL UNIX) operating system.

- RIS is used for installing software kits across a network from a centrally administered server instead of using locally mounted media.
- DMS lets client systems share the `/usr` file system on a centrally administered server over a network while still maintaining their own root (`/`) and `/var` file systems that reside on the DMS server.

Audience

This manual is intended for anyone using the Remote Installation Services (RIS) or the Dataless Management Services (DMS), especially those system administrators responsible for maintaining RIS and DMS environments on your LAN. The following assumptions are made:

- Your hardware is working properly.
- You have read the owner's manuals supplied with your hardware.
- You know the location and function of the controls and indicators on your hardware.
- You understand how to load and unload the installation media and any disks needed during the installation.
- You know how to use the operating system software.

New and Changed Features

The following list describes the major changes made to this book:

- Using new device naming conventions. Refer to the *Installation Guide* for more information.
- Loading software subsets with SysMan Menu instead of the `setld` utility. Refer to the `sysman`(8) reference page and the SysMan Menu online help volume for information about this facility.
- Discussing profile set management in Chapter 7 to support full installation and installation cloning. Refer to the *Installation Guide* for

information about full installation and the *Installation Guide — Advanced Topics* for a complete discussion of installation cloning.

- Moving the `bootpd` bootstrap daemon to the Obsolete Commands and Utilities (Obsolete Components) subset (`OSFOBSOLETE500`). The `joind` daemon is the default `BOOTP` server daemon.
- Updating installation document references to include the *Installation Guide — Advanced Topics*.
- Adding Appendix C to provide information about the `utilupdate` utility.
- Removing references to ULTRIX and VAX-based clients.

Organization

This manual is organized as follows:

Chapter 1	Introduces the concept of servers and clients, explaining what a server is, what a client is, and how they work together. It also describes the basic architecture of the server/client environment.
Chapter 2	Describes the relationship between the RIS server and RIS clients.
Chapter 3	Lists the formats in which distribution media are available and describes the preliminary setup procedures for RIS.
Chapter 4	Describes the procedure for setting up a RIS server, including installing and updating software.
Chapter 5	Describes networking-related files and daemons used by the remote installation services (`ris`) utility and the process a client goes through to boot over the network.
Chapter 6	Describes processes and procedures for maintaining and managing a RIS system, including adding, deleting, and modifying clients.
Chapter 7	Describes how to manage profile sets to support full installation and installation cloning.
Chapter 8	Provides information on troubleshooting RIS client problems.
Chapter 9	Introduces DMS and the dataless management utility (`dmu`).
Chapter 10	Describes how to prepare a server system for DMS.
Chapter 11	Describes the steps necessary to configure a DMS server including how to install software into a DMS environment.

Chapter 12	Describes how to use the `dmu` utility to add, modify, remove, and list DMS clients, and how to list or delete a DMS environment.
Chapter 13	Provides information on troubleshooting DMS client problems.
Appendix A	Contains a worksheet to use when you install RIS.
Appendix B	Contains worksheets to calculate space requirements on DMS servers and clients, and a DMS client setup worksheet.
Appendix C	Describes the `utilupdate` utility.

Related Documents

You should have the following documentation available:

- The hardware documentation for your system
- *Release Notes*
- *Reference Pages Sections 8 and 1m*
- *System Administration*
- *Installation Guide*
- *Installation Guide — Advanced Topics*

The printed version of the Tru64 UNIX documentation uses letter icons on the spines of the books to help specific audiences quickly find the books that meet their needs. (You can order the printed documentation from Compaq.) The following list describes this convention:

G	Books for general users
S	Books for system and network administrators
P	Books for programmers
D	Books for device driver writers
R	Books for reference page users

Some books in the documentation help meet the needs of several audiences. For example, the information in some system books is also used by programmers. Keep this in mind when searching for information on specific topics.

The *Documentation Overview* provides information on all of the books in the Tru64 UNIX documentation set.

Reader's Comments

Compaq welcomes any comments and suggestions you have on this and other Tru64 UNIX manuals.

You can send your comments in the following ways:

- Fax: 603-884-0120 Attn: UBPG Publications, ZKO3-3/Y32
- Internet electronic mail: `readers_comment@zk3.dec.com`

  A Reader's Comment form is located on your system in the following location:

  `/usr/doc/readers_comment.txt`

- Mail:

  Compaq Computer Corporation
  UBPG Publications Manager
  ZKO3-3/Y32
  110 Spit Brook Road
  Nashua, NH 03062-9987

  A Reader's Comment form is located in the back of each printed manual. The form is postage paid if you mail it in the United States.

Please include the following information along with your comments:

- The full title of the book and the order number. (The order number is printed on the title page of this book and on its back cover.)
- The section numbers and page numbers of the information on which you are commenting.
- The version of Tru64 UNIX that you are using.
- If known, the type of processor that is running the Tru64 UNIX software.

The Tru64 UNIX Publications group cannot respond to system problems or technical support inquiries. Please address technical questions to your local system vendor or to the appropriate Compaq technical support office. Information provided with the software media explains how to send problem reports to Compaq.

Conventions

The following conventions are used in this manual:

`%` `$`	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne, Korn, and POSIX shells.

#	A number sign represents the superuser prompt.
`% cat`	Boldface type in interactive examples indicates typed user input.
file	Italic (slanted) type indicates variable values, placeholders, and function argument names.
[|] { | }	In syntax definitions, brackets indicate items that are optional and braces indicate items that are required. Vertical bars separating items inside brackets or braces indicate that you choose one item from among those listed.
cat(1)	A cross-reference to a reference page includes the appropriate section number in parentheses. For example, cat(1) indicates that you can find information on the cat command in Section 1 of the reference pages.
Return	In an example, a key name enclosed in a box indicates that you press that key.
Ctrl/*x*	This symbol indicates that you hold down the first named key while pressing the key or mouse button that follows the slash. In examples, this key combination is enclosed in a box (for example, Ctrl/C).

1

Introduction to Sharing Software

This chapter introduces software sharing and the components that make up a software sharing environment. Topics include:

- Defining software sharing concepts and components
- Listing the benefits of software sharing
- Describing the software sharing environment

1.1 What is Software Sharing?

A **server** is a computer system that provides another computer system with required or useful information or resources. The system that uses the information or resources from the server is called a **client**. A given server can serve one or many clients. Computers in a network can share disk space, lists of names, software kits, processing services, and other entities.

For sharing software using Remote Installation Services (RIS) and Dataless Management Services (DMS), the server supplies software, software kits, and disk space for clients to use.

The RIS and DMS services let you share software in the following ways:

- RIS sets up a system where one or more installable software kits are stored for installation across a local area network (LAN). With RIS, one computer, the **RIS server**, stores the kit in a special area (called the **RIS area**) on its disk. Other computers, called **RIS clients**, can install the software onto their own disks by accessing it across the network instead of from locally mounted distribution media (such as CD-ROM).
- DMS sets up a system in which you can save disk space by sharing the actual operating system software between computers. Without DMS, each computer has a copy of its operating system software on its own disk. With DMS, one computer, acting as a **DMS server**, stores the software in a special area (called the **DMS area**) on its disk. Other computers, called **DMS clients**, run by accessing the software across the local area network (LAN) instead of from their local disks.

The RIS and DMS utilities share architectural similarities; the primary differences are in the contents of their respective server disk areas.

1.2 Benefits of Sharing Software

You can reduce your software and hardware costs by sharing software between computers.

- When you share software with RIS, you have a central location for all the software to install on your system and can install the same software simultaneously on several clients.
- When you share software with DMS, several of the computers in your local area network (LAN) use a single copy of a given piece of software. This reduces the need for multiple copies of the same software, reduces the disk space required for software storage, and allows central administration of software resources.

You are not limited to sharing one piece of software; you can share virtually all of your operating system software.

1.3 Software Sharing Environment

The following components make up the environment for software sharing:

A server

The server's system administrator prepares the server for RIS or DMS by creating the RIS or DMS areas on the server and ensuring that the server is connected to a LAN. A single server can serve both RIS and DMS clients, however a client cannot be registered to both RIS and DMS.

A distribution device on the server

For most servers, the distribution device is a CD–ROM optical disk driver or a software distribution copied directly to magnetic disk. You transfer or link the software subsets for one or more specific products and architectures from the distribution media to the RIS or DMS areas on the server. Registered clients can then access the software.

A local area network (LAN)

You must set up the server and all client processors as hosts on the LAN (using Ethernet, FDDI, or Token Ring for RIS and Ethernet or FDDI for DMS). Clients use the LAN to access the server's RIS and DMS areas.

Clients

RIS clients are systems that can run the operating system for which the server provides kits. RIS clients must also be capable of booting

over Ethernet or FDDI using the BOOTP and TFTP protocols to install the base operating system from a server. Layered products can be installed after the client's operating system is running with the SysMan Menu.

DMS clients must be capable of booting over Ethernet or FDDI using the BOOTP and TFTP protocols. Most Alpha workstations and servers have this capability, but some data center servers cannot be configured as DMS clients. Consult your system's user guide and related documentation to determine whether it supports BOOTP and TFTP over Ethernet or FDDI.

Note

You cannot use RIS or DMS to install software on DEC 2000 series or DEC 7000 series servers.

2

RIS Servers and Clients

This chapter describes Remote Installation Services (RIS), the `ris` utility, and the relationship between the RIS servers and clients. Topics include:

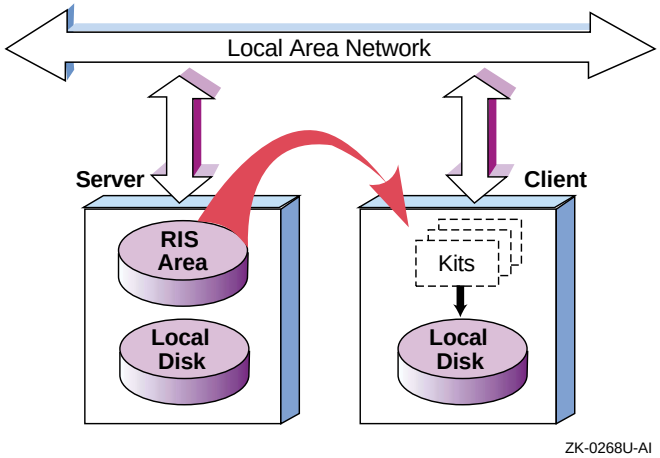
- RIS concepts and the benefits of using RIS
- How to start RIS
- RIS areas and product environments
- RIS client characteristics
- Registering RIS clients

2.1 What is RIS?

Remote Installation Services (RIS) uses the `ris` utility to set up a central computer system (a server) to service multiple computer systems (clients) on a local area network (a LAN) with required software.

With RIS, the server has a disk area set aside as the RIS area. The RIS area contains copies of software kits that are available for installation on to registered clients. Figure 2–1 shows how the RIS system works.

Figure 2–1: RIS Server and Client



In the RIS area, the server maintains information about what software kits the clients can access. Kits are organized so that a software product can supply several different versions to allow for the differences between multiple hardware platforms and operating systems. The server's RIS area is made available for read-only access to clients by means of the Network File System (NFS®).

The server is a passive partner in the day-to-day operation of a RIS system. Beyond verifying clients' identities and their kit load requests, and managing accepted requests, the server does not interact directly with the clients. A system does not have to be a dedicated RIS server; it also can support local timesharing users.

A RIS client installs software kits on to the server by using the `ris` utility; the utility copies the kit contents across the network from the server instead of from local media.

The benefits and advantages of RIS include the following:

- Installation and setup of servers and clients are done by scripts, thereby simplifying the server system administrator's task. Maintenance of the server's disk areas is similarly straightforward. The system interface is the same regardless of system type.
- Because RIS supports different hardware platforms and different software versions, it is adaptable to a wide variety of client systems and requirements. Servers running a given version of an operating system can serve clients running the same version or an earlier version of the operating system. In addition, if the `ris` utility on the server is updated to the current version using the `utilupdate` utility, servers running an earlier version of the operating system can support the current version.
- RIS uses a single set of kit files for all clients having the same architecture.
- You can perform a cloned installation on a RIS client, letting you duplicate a system configuration from a similar type of system.

2.2 Starting RIS

You always should run the `ris` utility as superuser. To start the `ris` utility, enter the following command:

```
# /usr/sbin/ris
```

When RIS starts up, it checks the status of the RIS areas.

If RIS can access all the products it was able to access the last time RIS was started, it displays the following message:

```
Checking accessibility of RIS areas...  done
```

If RIS cannot access all the products it was able to access previously, it displays the following message:

```
No Products Available in /var/adm/ris/ris0.alpha

Delete RIS environment? [y]:
```

This may occur because the source for this RIS environment is no longer mounted, and can be corrected by remounting the source. If the source is no longer available, you may delete this RIS environment. If you remount the source, you must restart RIS so that the environment is available.

If you try to start RIS without superuser privileges, the following message may be displayed:

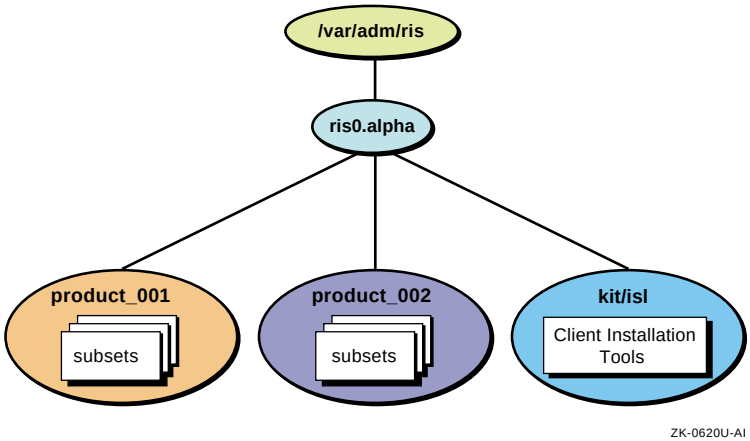
```
Checking accessibility of RIS areas...
No permission to write /usr/var/adm/ris/ris0.alpha/ProdNames
done
```

You can correct this problem by logging in as `root` or using the `su` command to gain superuser privileges before you start RIS.

2.3 RIS Areas and Product Environments

In addition to the server's normal disk area, a partition or area is reserved on the server to hold RIS software kits. This **RIS area** contains one or more **product environments**. Each product environment contains one or more software kits suitable for installation on a given hardware or software platform. Figure 2–2 shows a generalized illustration of a sample RIS area.

Figure 2–2: Sample RIS Area Overview



In Figure 2–2, the RIS area `/var/adm/ris` contains one product environment, `ris0.alpha`. Each product environment contains products

for a specific platform. In Figure 2–2, the target platform is machines using Alpha processors. Multiple product environments can exist in a single RIS area. Each product environment contains one or more product directories, each product directory contains several product kit archives, called software **subsets**. Figure 2–2 shows a product environment named `ris0.alpha` containing directories called `product_001` and `product_002`.

Figure 2–2 also shows the `kit/isl` directory. The `kit/isl` directory contains installation tools required by clients when they install software over the network. If your environment is in Direct CD-ROM (DCD) format, the `kit/isl` directory does not exist. An environment in DCD format is the same as a system disk format, it includes `root`, `/usr`, and so on.

The server itself usually does not use any of the RIS areas. System administrators can access the product area as required for maintenance and for installation or removal of product kits.

For more flexibility, you can establish multiple RIS areas in separate partitions. RIS areas on a given server can be exported to other servers using the Network File System (NFS). Servers that import such RIS areas can use them as if they were local, supplying the imported subsets to their own set of clients. Section 4.3 describes how to use NFS to mount a RIS area. The *Network Administration* guide describes how to export and import file systems.

2.4 RIS Client Characteristics

A RIS installation uses the LAN as its installation media instead of a distribution CD–ROM. A RIS client can install any software kit for which it is registered on the server. The installation procedure runs entirely on the client and, after the necessary software is installed, no continuing relationship is required between the RIS server and client.

The operating system itself can be among the kits that are available from the server. To install the operating system, the client processor is booted across the network using a minimal generic kernel that is part of the software kit. The RIS area is NFS mounted and becomes the client's root file system during the installation.

Once the client is booted, either the character-cell or graphical installation interface is launched. After all installation responses are entered, the installation software configures the file system and then uses the SysMan Menu to load the selected software. For more information about the SysMan Menu, refer to the `sysman`(8) reference page.

After the installation is complete, the system is rebooted using the newly installed software. For information on installation procedures, refer to the *Installation Guide*.

2.5 Registering Clients

A client must be registered with only one server for the base operating system. If you register a client with more than one server for the base operating system, each server the client is registered on will attempt to respond to the client's network boot request with unpredictable results.

To change the server with which a client is registered for the base operating system, first remove the client from the current server's client database and then register it with the new server. See Chapter 6 for information about registering and removing RIS clients.

A client can be registered with multiple servers for optional subsets and products other than the base operating system. When you load optional subsets or layered products with the SysMan Menu, you specify the name of the server from which you will copy the kits.

3

Preparing the RIS Server

This chapter provides the information you need to prepare a RIS server. Topics include:

- Reviewing RIS server/client version compatibility
- Planning disk space for RIS
- Installing the operating system on the RIS server
- Setting up a local area network
- Loading and registering the server extensions license
- Preparing RIS for running on a server with C2 security enabled

3.1 Reviewing RIS Server/Client Version Compatibility

This section only applies if you are installing a new version of the operating system into a RIS environment on a server that is running a previous version of the operating system. If not, go to section Section 3.2.

Note

If you plan to serve third-party software products from this RIS area where a new driver is needed to boot the client, the RIS server must be running the latest version of the operating system. If this is the case, go to section Section 3.2.

To install the operating system into a RIS environment on a RIS server running a previous version of the operating system, you must do the following:

1. Log in to the RIS server as `root`, or use the `su` command to gain superuser privileges.
2. If your distribution media is CD–ROM, enter a `mount` command similar to the following:

```
# mount -rd /dev/rz4c /mnt
```

This example uses a CD–ROM drive that is unit 0 and specifies /mnt as the mount point; if your drive is a different unit, substitute the device special file name for that unit. If you are uncertain of your CD–ROM's unit number, use the file command as follows:

```
# file /dev/rrz*c
/dev/rrz1c: char special (8/1026) SCSI #0 RZ25 disk #8 (SCSI ID #1)
/dev/rrz2c: char special (8/2050) SCSI #0 RZ25 disk #16 (SCSI ID #2)
/dev/rrz3c: char special (8/3074) SCSI #0 RZ25 disk #24 (SCSI ID #3)
/dev/rrz4c: char special (8/4098) SCSI #0 RRD43 disk #32 (SCSI ID #4)
/dev/rrz9c: char special (8/17410) SCSI #1 RZ57 disk #72 (SCSI ID #1)
#
```

The CD-ROM device corresponds to the RRD device, in this example RRD43.

3. To update the necessary RIS utilities on the server, assuming the distribution media is mounted at /mnt, enter the following:

```
# /mnt/isl/utilupdate -r -m /mnt
```

   - In this example, the -r flag causes utilupdate to copy several files from the distribution CD to the server's /usr/sbin directory. This ensures RIS compatibility with the operating system.
   - The -m *directory* is the mount point of the distribution media. In this example, *directory* is /mnt, and is a required parameter.

This command copies any files in /usr/sbin that would be overwritten to files with a *.pre-V5.0 suffix. For example: /usr/sbin/setld is copied to /usr/sbin/setld.pre-V5.0.

When the utilupdate script completes, this RIS server can serve the current version of the operating system to RIS clients. Appendix C describes the utilupdate utility.

When you are installing the operating system, if the utility finds existing *.pre-V files on your system, the existing utilities are updated with no changes to the saved *.pre-V files. If the server is already running the new or updated version of the operating system, a confirmation message is displayed and no copies are made.

After a client's operating system is installed and running, a server can serve additional product subsets to a client running a compatible operating system. The client loads the additional subsets with the SysMan Menu.

A RIS client can be booted by a RIS server by using the BOOTP protocol. This means that a server can serve both the base operating system as well as additional product subsets to the client over the network. The client loads additional product subsets with the SysMan Menu.

3.2 Planning Disk Space for RIS

Before beginning to set up a RIS area, you must calculate the amount of disk storage required for the software subsets in the RIS areas on the server. If space on the server's system disk is an issue and your server's distribution media is a CD–ROM, you might want to create symbolic links from the RIS server area to the software on the CD–ROM. Section 4.1 briefly describes the advantages and disadvantages of establishing symbolic links instead of extracting the software subsets into the RIS server area.

See Chapter 1 for a description of the RIS area's contents. A given server can have multiple RIS areas, in which some of the subsets can be duplicated. To organize your RIS server's disk space, perform the following steps:

1. Determine how many RIS environments you want.
2. Choose the software subsets you want to install, organizing them by the environments where they are to be installed.
3. Use the subset size information in the *Release Notes* to ensure that you have adequate disk space.

3.3 Installing the Operating System on the RIS Server

The *Installation Guide* describes how to install the operating system on the server. It lists all of the standard supported software subsets with subset names, sizes, and descriptions of their contents. This information will help you organize the process before you perform the installation.

Because RIS areas are created in `/var/adm/ris`, you may want to specify a separate `/var` file system during the installation to get extra disk space. To specify a separate file system for `/var`, refer to the instructions in the *Installation Guide*.

A RIS server must have the `Remote Installation Service` and `Additional Networking Services` subsets installed. These subsets contain the `tftp` networking utility and the `joind` bootstrap daemon. If you want to use the Internet Boot Protocol (BOOTP) server daemon `bootpd`, you must install the Obsolete Commands and Utilities (Obsolete Components) subset `OSFOBSOLETE500`.

Enter the following command to see if these subsets are installed:

```
# /usr/sbin/setld -i | grep -E "RIS|INET|OBSOLETE"
```

Your output is similar to the following:

```
OSFCLINET500   installed Basic Networking Services
    (Network-Server/Communications)
OSFINET500     installed Additional Networking Services
    (Network-Server/Communications)
OSFOBSOLETE500 installed Obsolete Commands and Utilities
    (Obsolete Components)
OSFRIS500      installed Remote Installation Service
    (Network-Server/Communications)
```

The `Basic Networking Services` subset is mandatory and is installed as a mandatory subset when you install the base operating system. If the `Additional Networking Services`, `Remote Installation Service`, or `Obsolete Commands and Utilities` subsets are not installed, you must install them with the SysMan Menu.

Refer to the *Installation Guide* and the `sysman`(8) reference page for more information about installing subsets.

3.4 Setting Up a Local Area Network

You must connect the RIS server and all of the client processors to a LAN using either Ethernet, FDDI, or Token Ring. The server and clients all must be on the same network or subnetwork unless the router connecting the networks or subnetworks can forward `BOOTP` requests.

For instructions on setting up a local area network, refer to the *Network Administration* guide.

3.5 Loading and Registering the Server Extensions License

The Server Extensions license (OSF-SVR or UNIX-SERVER) provides the right to use the RIS software if you are running this operating system. A product authorization key (PAK) accompanies the license. You must register the PAK information for your system before it can be configured as a RIS server. Register the PAK information by using the License Manager application.

Refer to the `dxlicense`(8) reference page, the *Software License Management* guide, and the License Manager online help for more information about registering license PAKs.

After you have registered the PAK information, you can complete the server setup tasks described in Chapter 4.

3.6 Preparing RIS for C2 Security

If your RIS server will have C2 security enabled, the `ris` user file must be changed to ensure that the `ris` password does not expire and deny client access.

Perform the following steps on the RIS server as superuser to modify the `ris` user file if you are going to use RIS with C2 security enabled:

1. Edit the file `/tcb/files/auth/r/ris`. Each field is delimited by a colon (`:`).
2. Set the current password field `u_pwd` to an asterisk (`*`).
3. Set the `u_succhg` value to any non-zero value. This value is a `time_t` type printed with `%ld`.
4. Set the `u_life` and `u_exp` fields to zero.

The following is an example of a modified `/tcb/files/auth/r/ris` user file:

```
ris:u_name=ris:u_id#11:u_oldcrypt#0:u_pwd=*:u_exp#0:u_life#0:
u_succhg#79598399:u_suclog#79598399:u_lock@:chkent:
```

After you make these changes, the RIS password should not expire and cause a denial of service to clients.

4

Setting Up a RIS Area on the Server

This chapter describes how to use the `ris` utility to configure a RIS server. Topics include:

- Establishing a new RIS server area using the `ris` utility
- Installing software kits in existing RIS area
- Using a RIS area mounted on NFS
- Modifying the `/etc/exports` file, if necessary, to export RIS areas

The `ris` utility can be invoked in two ways:

- Interactively through a menu-driven interface
- From the command line by issuing commands to perform the various tasks one at a time

This chapter describes how to use the `ris` utility's menu-driven interface. Chapter 6 describes how to use individual `ris` commands. For additional information on the `ris` utility, refer to the `ris`(8) reference page.

4.1 Installing Software into a New RIS Area

After you create a RIS area and install the first software kit there, you can install more kits into that area or create other areas as you need them. (Section 4.2 describes how to install additional software into an existing RIS environment.)

Use the following procedure to create a new `ris`*N*`.alpha` environment and install the first software kit into it:

1. Insert the *Operating System Volume 1* CD-ROM into the drive, then mount the CD-ROM.
   - If your RIS server is running the current version of the operating system, use a command similar to the following example:

     ```
     # mount -rd /dev/disk/cdrom0c /mnt
     ```

     This example mounts a CD-ROM drive that is device 0 on the mount point `/mnt`. If your drive is a different device, substitute

the correct device name. The mount point does not have to be /mnt. If you do not know CD-ROM drive's unit number, use the ls command as follows:

```
# ls -l /dev/disk/cdrom*
brw-------   1 root     system    19, 69 Nov 18 06:11 /dev/disk/cdrom0a
brw-------   1 root     system    19, 71 Nov 18 06:11 /dev/disk/cdrom0c
#
```

- If your RIS server is running an earlier version of the operating system, use a command similar to the following example:

  ```
  # mount -rd /dev/rz4c /mnt
  ```

  This example uses a CD-ROM drive that is unit 4 and specifies /mnt as the mount point. If your drive is a different unit, substitute the device special file name for that unit. If you do not know your CD-ROM's unit number, use the file command, specifying the raw device, as follows:

  ```
  # file /dev/rrz*c

  /dev/rrz1c: char special (8/1026) SCSI #0 RZ25  disk #8  (SCSI ID #1)
  /dev/rrz2c: char special (8/2050) SCSI #0 RZ25  disk #16 (SCSI ID #2)
  /dev/rrz3c: char special (8/3074) SCSI #0 RZ25  disk #32 (SCSI ID #3)
  /dev/rrz4c: char special (8/4098) SCSI #0 RRD43 disk #64 (SCSI ID #4)
  ```

  The CD-ROM device corresponds to an RRD device, in this example RRD43.

Note

You can use a Network File System (NFS) mount of the *Operating System Volume 1* CD-ROM to install the base operating system subsets into an extracted RIS area. You cannot use this NFS mount point as the source for a symbolically linked RIS area for the base operating system subsets. Refer to Section 4.3 for more information about using an NFS mounted RIS area.

2. Enter the following command to invoke the ris utility from the root system prompt:

   ```
   # /usr/sbin/ris
   ```

   The RIS Utility Main Menu is displayed. Each available menu item is preceded by a letter.

The first time you invoke the utility, the display looks similar to the following:

```
Checking accessibility of RIS areas.... done

*** RIS Utility Main Menu ***

Choices without key letters are not available.

  ) ADD a client
  ) DELETE software products
 i) INSTALL software products
  ) LIST registered clients
  ) MODIFY a client
  ) REMOVE a client
  ) SHOW software products in remote installation environments
 x) EXIT

Enter your choice:
```

The RIS Utility Main Menu does not display option letters for menu items that cannot be accessed. As you add environments, software, and clients to the system, other menu options will become available.

3. Choose the `Install software products` option by entering `i` at the prompt:

```
Enter your choice:  i
```

The RIS Installation menu displays the installation options. Choose option 1, the `Install software into a new area` option.

```
RIS Software Installation Menu:

    1)  Install software into a new area
    2)  Add software into an existing area
    3)  Return to previous menu

Enter your choice:  1

You have chosen to establish a new remote installation
environment.
```

4. Enter the full pathname or the device special file name for the distribution media. If your distribution media is CD–ROM mounted on `/mnt`, the directory where the software is located is `/mnt/ALPHA/BASE`. Enter a device specific file name only for magnetic tape media.

```
Enter the device special file name or the path of the directory
where the software is located
(for example, /mnt/ALPHA/BASE): /mnt/ALPHA/BASE
```

5. The utility asks whether you want to use the standard boot method or the boot-link method.

```
Select the type of operating system base product to create. If the software you
are offering supports add-on hardware that is needed to boot the client
system, select "boot-link" as the type of RIS area to create. Otherwise,
select "standard". If you select "boot-link", the software will be extracted
(or copied) to the RIS area because symbolically linked RIS areas do not
support this feature.

Choose one of the following options:

    1)  Standard boot method
    2)  Boot-Link method

Enter your choice: 1
```

6. When you select the standard boot method, the utility asks whether you want to create symbolic links to the software or to extract the software into the RIS area.

```
Choose one of the following options:

    1)  Extract software from /mnt/ALPHA/BASE
    2)  Create symbolic link to /mnt/ALPHA/BASE

Enter your choice:
```

   - If you select `1` to extract subsets, the subsets you select are copied from the specified source into the RIS area. You must know the specific subsets to extract and whether there is sufficient disk space. Refer to Section 3.2 for information about planning disk space for RIS.

     Clients can install only the subsets that were extracted into RIS product areas for which they are registered. Using extracted subsets improves RIS environment performance.

   - If you select `2` to link to the specified source, symbolic links are created in the RIS area that point to the subset directories on the specified source. Disk space planning is not required because the subsets do not reside in the RIS area. However, the specified source must be online and mounted for clients to access the subsets. Unlike subset extraction, no subset selection is required. Clients registered for RIS product areas that are symbolic links can access all subsets.

Caution

Unmounting, deleting, or switching the source where the RIS area is linked corrupts the RIS area. To restore the RIS area, remount the source pointed to by the RIS area.

7. If you chose to extract subsets, the utility lists the mandatory and optional software subsets you can install. Choose the subsets that you want from the list; the utility displays your list for confirmation.

```
The following subsets are mandatory and will be installed
automatically unless you choose to exit without installing
any subsets:
                .
                .
                .
     {mandatory subset list}
                .
                .
                .
Optional subsets are listed below.  There may be more optional
subsets than can be presented on a single screen.  If this is
the case, you can choose subsets screen by screen, or all at
once on the last screen.  All of the choices you make will be
collected for your confirmation before any subsets are installed.
                .
                .
                .
     {optional subset list}
                .
                .
                .
The following choices override your previous selections:
74) ALL mandatory and all optional subsets
75) MANDATORY subsets only
76) CANCEL selections and redisplay menus

Choices (for example, 1 2 4-6):  74

The following subsets will be loaded:
                .
                .
                .
{selected subset list - all mandatory & optional in this example}
                .
                .
                .
Are these the subsets that should be loaded (y/n) ?
```

If you enter `y`, the subset extraction process begins. If you enter `n`, the list of subsets is displayed again and you can restart your selection process.

When you confirm your selections, the `ris` utility extracts the subsets and displays the name of the new RIS environment. The RIS Utility main menu is then displayed.

8. If you are installing a product that is not part of the base operating system that the RIS environment will serve, the process attempts to determine the appropriate architecture.

   If the attempt is unsuccessful, you see a prompt similar to the following example:

```
Choose the architecture of the clients that the environment
will serve:

    1) alpha
    2) custom
    3) mips

Enter your choice: 1

The new environment is in /usr/var/adm/ris/ris0.alpha.
```

Once you set up the RIS areas and register clients in those areas, the clients can access the areas they need. Client registration is discussed in Chapter 6.

4.2 Installing Software into an Existing RIS Area

To install software subsets compatible with `setld` into an existing RIS environment, enter the following command as superuser and follow the procedures as they appear on the screen:

```
# /usr/sbin/ris
```

1. Next the RIS Utility Main Menu is displayed. Choose the option `INSTALL software products` by entering `i` at the prompt:

```
Checking accessibility of RIS areas... done

*** RIS Utility Main Menu ***

Choices without key letters are not available.

    a) ADD a client
    d) DELETE software products
    i) INSTALL software products
     ) LIST registered clients
     ) MODIFY a client
     ) REMOVE a client
    s) SHOW software products in remote installation environments
    x) EXIT

Enter your choice: i
```

2. The RIS Software Installation Menu is displayed:

```
RIS Software Installation Menu:

    1)  Install software into a new area
    2)  Add software into an existing area
    3)  Return to previous menu

Enter your choice: 2
```

Enter **2** to select `Add software into an existing area`.

The utility displays a list of the existing RIS areas, similar to the following example:

```
You have chosen to add a product to an existing environment.

Select the remote installation environment:

1) /usr/var/adm/ris/ris0.alpha
      'POLYCENTER Advanced File System'
      'DECsafe Available Server Environment (ASE)'
      'System V Environment'

2) /usr/var/adm/ris/ris1.alpha
      'Sort Runtime Library'
      'Free Software Foundation GNU Source (Rev nnn)'
      'DEC Ada Support Library'

Enter your choice or press RETURN to quit:
```

3. Choose the area that you want to use, and then proceed as described in Section 4.1 to mount the distribution media and choose subsets. Press the Return key if you want to return to the RIS Utility Main Menu.
4. Repeat this procedure for each additional group of subsets you want to install.

4.3 Using a RIS Area Mounted on NFS

You can use an NFS mount point to install software from an extracted RIS area on another system or from an operating system distribution CD–ROM mounted on another system. You can use this method to create an extracted RIS area with the base operating system subsets.

Caution

The information in this section can be used only if you are installing software on a client after you install the operating system software.

For example, if a system named chicago has a CD–ROM containing the operating system subsets mounted on /mnt and listed in its /etc/exports file, the system administrator on newyork can NFS mount that CD–ROM with the following command:

```
newyork_root# mount chicago:/mnt/ALPHA/BASE /mnt
```

After chicago is mounted, the system administrator on newyork can use the ris utility to install software from the CD-ROM as if it were local to newyork.

If another system exports an extracted RIS area with the subsets you need on a local system, you can create an extracted RIS area from the remote RIS area. For example, if a system named seattle has the operating system subsets in its ris0.alpha product environment, the system administrator on newyork can NFS mount that product environment with the following command:

```
newyork_root# mount seattle:/var/adm/ris/ris0.alpha  /mnt
```

After the remote product environment is mounted, the system administrator for newyork can use the ris utility to install software from it as if it were local to newyork.

4.4 Modifying the /etc/exports File

RIS client installations of the base operating system prior to this version rely on files located in the server's /var/adm/ris/ris*N.arch*/kit directories. The RIS server must export these directories.

For this version of the operating system base product, the /var/adm/ris/ris*N.arch*/product_1 product directory that is exported contains the distribution image. In this directory path, *N* is the number of the RIS area and *arch* is the architecture of the client systems that the area serves. When you create the RIS area, ris*N.arch*, the ris utility supplies you with a name based on the choices you make when you create the RIS area.

The server's /etc/exports file must include an entry for each RIS area that it is exporting. When you create a RIS area, the ris utility automatically edits the /etc/exports file and adds the correct entry for that area. However, if you modify the path to a RIS area, you must also modify the corresponding line in the /etc/exports file.

- The RIS area entries in the /etc/exports file of a system that acts as a RIS server for two Alpha environments look similar to the following:

```
/var/adm/ris/ris0.alpha/kit  -root=0  -ro
/var/adm/ris/ris1.alpha/kit  -root=0  -ro
/ris/r2p1                    -root=0  -ro
```

- The previous example shows a /ris/r2p1 entry in /etc/exports. This entry is created by RIS and is a symbolic link from /ris/r2p1 to /var/adm/ris/ris2.alpha/product_1. This link shortens the path sent to the client during the boot process.
- When you create a /ris*N* .alpha area, the path to the kit directory is /var/adm/ris/ris0.alpha/kit and the ris utility places the following line in the /etc/exports file:

  ```
  /var/adm/ris/ris0.alpha/kit -root=0 -ro
  ```

  If you create another directory in this RIS area, for example, dsk1, mount another file system there, move the contents of ris0.alpha to that directory, and then link it to ris0.alpha, a listing of the RIS area shows the following entry:

  ```
  ris0.alpha -> ./dsk1/ris0.alpha
  ```

  The path to the kit directory is now effectively /var/adm/ris/dsk1/ris0.alpha/kit. You must edit the corresponding line in the /etc/exports file to read:

  ```
  /var/adm/ris/dsk1/ris0.alpha/kit -root=0 -ro
  ```

  If you fail to edit the /etc/exports file in this case, there will be a kit directory mount failure when you attempt a client installation.

5

Booting a RIS Client

This chapter describes the network files and daemons that the `ris` utility uses and the sequence of events that occur when a client broadcasts a `BOOTP` request. Topics include:

- Describing remote boot files and daemons
- Explaining the remote boot process flow

The client must be registered on the RIS server before you can install the operating system. If you use RIS to install the operating system on a client, the client must boot across the network.

5.1 Remote Boot Files and Daemons

This section introduces the files and daemons associated with booting a RIS client over the network. Topics include:

- The `inetd` internet daemon and its configuration file, `inetd.conf`
- The `joind` `BOOTP` daemon
- The `/etc/bootptab` file
- The TFTP daemon `tftpd`

Refer to the `joind`(8), `bootptab`(4), `inetd`(8), `inet`(7), and `inetd.conf`(4) reference pages for more information.

Table 5–1 describes the files and daemons used by RIS servers to boot a remote client.

Table 5–1: Remote Boot Files and Daemons

Name	Description
`/etc/bootptab`	Contains information needed to boot remote clients
`/sbin/init.d/dhcp`	Script used to start `joind`
`/etc/inetd.conf`	Contains start-up information for various internet daemons

Table 5–1: Remote Boot Files and Daemons (cont.)

Name	Description
/usr/sbin/joind	The BOOTP server daemon (handles both BOOTP and DHCP requests, if configured)
/usr/sbin/tftpd	The tftpd server daemon
/usr/sbin/inetd	The Internet server daemon

5.1.1 The Internet Daemon and Configuration File

The inetd internet daemon starts networking-related daemons on the system. Some of these daemons, such as tftpd, are related to RIS; others, such as fingerd, are not. On request, the inetd daemon starts any of the daemons listed in its configuration file, /etc/inetd.conf.

Network boots use the BOOTP protocol and are serviced by the joind daemon, discussed in Section 5.1.2.

5.1.2 The BOOTP Daemon

The internet boot protocol (BOOTP) daemon joind processes any BOOTP requests received by the RIS server. As it starts, the BOOTP daemon reads the /etc/bootptab file to determine the systems from which it will recognize remote boot requests. Whenever the /etc/bootptab file is modified, the BOOTP daemon rereads it.

The joind daemon provides configuration to network clients using either BOOTP or the Dynamic Host Configuration Protocol (DHCP). If joind is not running, RIS restarts it with the /sbin/init.d/dhcp script.

Section 5.1.3 describes the content and format of the /etc/bootptab file. Refer to the bootptab(4) and dhcptags(4) reference pages for more information.

5.1.3 The /etc/bootptab File

The /etc/bootptab file is a text file containing information that a server needs to boot a remote client. The ris utility adds and removes entries from this file during client management. Other applications may place entries in the /etc/bootptab file.

Example 5–1 describes the entries in an /etc/bootptab file for RIS clients.

Example 5–1: Sample /etc/bootptab File

```
.ris.dec:hn:vm=rfc1048 [1]
.ris0.alpha:tc=.ris.dec:bf=/var/adm/ris/ris0.alpha/vmunix: [2]
atlanta:tc=.ris0.alpha:ht=ethernet:gw=nn.nn.nnn.nnn: \
  ha=nnnnnnnnnnnn:ip=nn.nn.nnn.nnn : [3]
.ris93.alpha:tc=.ris.dec:bf=/ris/ris93.a/vmunix: \
  rp="ds9:/ris/ris93.a/product_001": [4]
```

[1] The `.ris.dec` entry defines characteristics common to all clients. The fields specify the following:

- `hn`: Tells the boot server to send the name of the client system to the client when it makes a boot request.
- `vm`: Vendor-specific information

[2] The `.ris`*N*`.`*arch* entry, in this example `.ris0.alpha`, defines characteristics common to all clients using this RIS area. The fields specify the following:

- `tc`: Table continuation

  The `tc` field lets you follow pointers back to common entries. For example, the `tc` entry for `.ris0.alpha` in Example 5–1 points to the `.ris.dec` entry. The `.ris.dec` entry contains the common hardware type (`ht`) and vendor specific (`vm`) information. The `.ris0.alpha` entry, itself, contains common information about the boot file location.

- `bf`: Name of the boot file

[3] The *hostname* entry, in this example `atlanta`, defines characteristics for a specific client. The fields specify the following:

- `tc`: Table continuation

  The following describes the entry for the host `atlanta`: its `tc` entry points to `ris0.alpha`, which contains its boot file information. The `ris0.alpha` entry in turn points back to `ris.dec`, which contains relevant hardware type and vendor specific information. If you added another host entry to the `/etc/bootptab` file, it would look similar to the following:

  ```
  lee:tc=ris0.alpha:ht=ethernet:ha=nnnnnnnnnnnn : \
    ip=nn.nn.nnn.nnn :
  ```

- `ht`: The client's hardware type is either `ethernet`, `fddi`, or `ieee802` (for Token Ring)

- ha: Client's network hardware address
- ip: Client's IP address

4 The .ris93.alpha entry defines characteristics for the current version of the operating system RIS area. The fields specify the following:

- tc: Table continuation

  The tc field lets you follow pointers back to common entries. For example, the tc entry for .ris93.alpha in Example 5–1 points to the .ris.dec entry. The .ris.dec entry contains the common hardware type (ht) and vendor specific (vm) information. The .ris93.alpha entry contains common information about the boot file location.

- bf: Name of the boot file
- rp: The client will mount its root on the server.

The general format for entries in the bootptab file is a *label* followed by one or more colon-separated fields. Each of these fields consists of a two-character tag field *tg* followed by an equal sign (=) and the tag value *value*:

```
[label]:tg[=value][:tg[=value]:…]
```

For additional information about the contents of the bootptab file, refer to the bootptab(4) reference page. For information about valid *tg* tags, refer to the dhcptags(4) reference page.

5.1.4 The tftpd Daemon

The tftpd daemon uses the Trivial File Transfer Protocol (TFTP) to transfer the boot file during a remote boot process. The tftpd daemon starts when a file is ready to be transferred. Refer to the tftp(1) and tftpd(8) reference pages for more information.

5.2 Remote Boot Process Flow

Client systems use the bootp protocol to perform the remote bootstrap operation from a RIS server. The command used to initiate a remote boot is processor-specific. For additional information, refer to the *Installation Guide — Advanced Topics*. However, once the remote boot operation has started, the underlying process is the same for all versions of the operating system that support network booting:

1. The processor-specific remote boot command is issued at the client console prompt.

2. The client processor firmware sends a BOOTP packet over the Ethernet contining the client's hardware Ethernet address.
3. The BOOTP server daemon compares the Ethernet hardware address in the packet with the client registration information stored in its /etc/bootptab file to determine if the client requesting the remote boot is registered to the RIS server.
4. If a matching address is found in the /etc/bootptab file, the BOOTP daemon sends the client an information packet that includes the server's Internet address, the client's Internet address, and the name of the file to be loaded from the server. This information was placed in the bootptab file by the ris utility when the client was registered on the RIS server.

   Internet addresses are used to download the /var/adm/ris*N*.alpha/vmunix file specified in the bootptab file to the client processor, where ris*N*.alpha corresponds to the RIS area to which the client is registered. This file contains the standalone operating system used to start the installation.
5. The client system requests the file from the server system.
6. The client and server system use the TFTP protocol to transfer the vmunix file to the client.
7. Once vmunix is loaded, the client system begins to execute the vmunix file, and the operating system standalone system messages are displayed on the client console terminal.

After the operating system is installed, the client is a self-supporting system. Follow the normal procedures documented in the *Installation Guide* to boot the system from its own local disk.

6

Managing RIS Clients and Environments

This chapter describes how to use the `ris` utility to manage RIS environments and clients. Topics include:

- Preregistration tasks
- Adding a client with the `ris` utility or from the command line
- Modifying a client
- Removing a client
- Listing registered clients
- Listing products in the server's RIS areas
- Deleting software products from the server's RIS areas
- Correcting entries in the RIS `gateways` file

6.1 Preregistration Tasks

Before you register RIS clients, gather the information required for each one. The RIS Client Configuration Worksheet in Appendix A will help you organize your information as you register clients. Fill out a worksheet for each client you want to register.

Perform the following tasks to prepare to register clients:

1. Obtain information about each client and fill out a copy of the RIS Client Configuration Worksheet from Appendix A.
2. Register each client's host name and Internet Protocol (IP) address with the appropriate naming service Berkeley Internet Name Domain (BIND) Service and Network Information Service (NIS).

6.1.1 Obtaining Information About Each Client

You need the following information about each processor you plan to register as a client:

- Host name (see Section 6.2 for restrictions on host names)
- The RIS environments you want to make available to the client

- The hardware network address of the client
- The address of the gateway from the client to the server is required if the server and client are on different networks
- The type of network on which the client resides (Ethernet, FDDI, or Token Ring)
- Whether you want to use a profile set during installation

6.1.2 Registering Client Host Names and IP Addresses with Servers

If the host system is served by any of the following naming services, check with your site administrator to be sure that your clients are registered with the appropriate naming service servers:

- The server's `/etc/hosts` file
- Berkeley Internet Name Domain (BIND)
- Network Information Services (NIS), formerly called Yellow Pages (YP)

By using the Network Configuration Application, you can place each client processor's host name and IP (Internet Protocol) address in the `/etc/hosts` file when you initially set up your LAN. The Network Configuration Application is described in the *Network Administration* guide.

You also can place the host name and IP address in the `/etc/hosts` file by using a text editor such as `vi`. The host name and IP address for each client processor must be unique.

Refer to the *Network Administration* guide for information about setting up NIS and the BIND Configuration Application.

6.2 Adding a RIS Client with the ris Utility

To add a client processor to RIS, follow these procedures:

1. Invoke the `ris` utility by entering the following command at the root system prompt:

   ```
   # /usr/sbin/ris
   ```

   The RIS Utility Main Menu is displayed.

```
Checking accessibility of RIS areas.... done

*** RIS Utility Main Menu ***

    a) ADD a client
    d) DELETE software products
    i) INSTALL software products
     ) LIST registered clients
     ) MODIFY a client
     ) REMOVE a client
    s) SHOW software products in remote installation environments
    x) EXIT

Enter your choice: a
```

2. Enter `a` to select `ADD a client`. The following message is displayed:

```
You have chosen to add a client for remote installation services.

The following conditions must be met to add a client:

  1. You must know the client processor's hostname.
  2. The client's hostname must be in your system's host
     database(s).
  3. You must know whether the client is on an Ethernet, FDDI,
     or Token Ring network.
  4. You must know the client's hardware Ethernet, FDDI, or
     Token Ring address if the client is registering to install
     operating system software.
  5. If the client and the server reside on different subnets,
     you will need the address of the gateway(s)
     that the client can use to communicate with the server.

Do you want to continue? (y/n) [y]:
```

   If you enter `n`, the utility returns to the RIS Utility Main Menu. If you enter `y`, a prompt asks for the client's host name.

3. Enter the client's host name at the prompt.

```
Enter the client processor's hostname: client1
```

   Only lowercase letters (`a-z`), numbers and the period (`.`) and dash (`-`) are permitted in host names, and a host name must begin with a letter. Invalid host names can corrupt the RIS database. Additionally, the client must not be registered on another RIS or DMS server as a client.

   The client processor must be registered with the appropriate naming service or you cannot register the client with RIS. If the client is not registered with the appropriate naming service, the utility displays an error message and repeats the prompt.

4. Enter the environment to which you want to add the client. The utility displays the available environments (and the products installed in those environments) to which you can add the new client.

Your output will be similar to the following example (which shows five environments):

```
Select the remote installation environment:

1)  /usr/var/adm/ris/ris0.alpha
      'Sort Runtime Library'
      'Free Software Foundation GNU Source (Rev 214)'
      'DEC Pascal RTLB V5.4 for Tru64 UNIX Systems'
      'DEC C++ Class Libraries Version 5.0 for Tru64 UNIX'
      'DEC Ada Runtime Library'

2)  /usr/var/adm/ris/ris1.alpha
      'POLYCENTER advanced File System'
      'DECsafe Available Server Environment (ASE)'
      'System V Environment'

3)  /usr/var/adm/ris/ris2.alpha
      'Tru64 UNIX V5.0 Operating System (Rev nnn)'
      'DEC Runtime Library'

4)  /usr/var/adm/ris/ris3.alpha
      'Tru64 UNIX V5.0 Operating System (Rev nnn)'

5)  /usr/var/adm/ris/ris5.alpha
      'Sort Runtime Library'
      'Free Software Foundation GNU Source (Rev nnn)'
      'DEC Pascal RTL V5.4 for Tru64 UNIX Systems'
      'DEC C++ Class Libraries Version 5.0 for Tru64 UNIX'
      'DEC Ada Runtime Library'

Enter your choice or press RETURN to quit: 4
```

5. Enter the number of the product you want this client to be able to install. When the utility asks you to confirm your choices, you can accept them or specify the information again. In the following example, the environment has only one product installed:

```
Select one or more products for the client to install
from /usr/var/adm/ris/ris3.alpha:

Product    Description
  1    'Tru64 UNIX V5.0 Operating System (Rev nnn)'

Enter one or more choices as a space-separated list

(for example, 1 2 3) or all for all products [all]: 1

You chose the following products:

  1    'Tru64 UNIX V5.0 Operating System (Rev nnn)'

Is that correct? (y/n) [y]:
```

6. If profile sets containing configuration description files (CDFs) exist on the RIS server during the registration of a client, you see the following message:

```
Do you want to specify an Installation Profile Set for use
during the installation of this client? [y/n] [n]: y
```

If you do not want to specify a profile set for installation cloning, chose n. If you enter y, RIS displays a list of the profile sets on the RIS server:

```
This RIS server has the following Installation Profile Sets available:

alphastation400 alphastation400a rz26

Enter a set name or press <Return> to exit set selection: rz26
```

The profile set is checked to determine if it includes a CDF. RIS then verifies the CDF to determine if the products in the RIS environment to which the client is registered and the products specified in the CDF are the same. The CDF is also validated as suitable for installation cloning.

If you decide not to register a client for a cloned installation or cannot determine a CDF to use, continue with the client registration by pressing Return.

7. Enter the type of network upon which this client resides:

```
Network type:

     1) Ethernet or FDDI
     2) Token Ring

Enter your choice: 1
```

8. The following message is displayed when the server and client are on different networks. The gateway information needed for the client to connect to the server is stored in the /var/adm/ris/gateways file. RIS displays the default network information if the gateway information is known, as shown in this example:

```
Using nn.nn.nnn.nnn for gateway address between client and server subnet.
If this gateway address is incorrect, please refer to the Sharing Software
on a Local Area Network book for information on how to correct it.
```

If the displayed gateway address is incorrect, follow the instructions in Section 6.9.

9. Enter the client's hardware network address as shown in the following example:

```
Enter the client processor's hardware network address.
For example, 08-00-2b-02-67-e1: nn-nn-nn-nn-nn-nn
```

If you do not know the client's hardware network address, you can obtain it in one of the following ways:

- On a client that is not currently running (you are at the boot prompt), issue the appropriate console command or commands for that type of client. Console commands are processor-specific, so you must refer to your hardware documentation for the correct commands. With the correct console commands, you can display the

current environment variables or show the client's devices. The hardware address associated with the network interface or interfaces is displayed.

- On a client running the operating system, log in as `root` and execute the `uerf –r 300` command. In the output, find the string `hardware address`. Either that line or the next one contains the hardware address. For example:

```
# uerf -r 300 | grep -i "hardware address" | uniq
_hardware address: nn-nn-nn-nn-nn-nn
```

  If the hardware address is not on the line that contains the string `hardware address`, you must search the output from the `uerf` command to find the correct hardware address. For example:

```
# uerf -r 300 | more
        .
        .
 _Interface, hardware address:
 _nn-nn-nn-nn-nn-nn
        .
        .
```

- From the RIS server, you can determine the hardware address of a running client by using the `ping` and `arp` commands. To determine the hardware address of the RIS client `atlanta`, enter a command similar to the following example:

```
# /usr/sbin/ping -q -c1 atlanta; arp atlanta
PING atlanta.cities.xsamplex.com (nn.nn.nnn.nnn): 56 data bytes
----atlanta.cities.xsamplex.com PING Statistics----
1 packets transmitted, 1 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 0/0/0 ms
atlanta (nn.nn.nnn.nnn) at nn-nn-nn-nn-nn-nn
```

  The hardware address in this case is *nn-nn-nn-nn-nn-nn*.

If you do not enter the address in the correct format, the utility displays an error message and repeats the prompt.

Note

Except for checking the format of the number you enter, the `ris` utility does not verify its validity.

When you enter the hardware network address in the correct format, the following message is displayed:

```
Client client1 has been added.
```

6.3 Adding a RIS Client from the Command Line

You can add a single RIS client from the command line by invoking the `ris` utility with its –`a` option. Other options supply the network address, path, and product list. Use the following syntax for the `ris` utility:

/usr/sbin/ris -a *clientname* -h *network-address* -p *path,product* [*,product...*]

For example:

```
# /usr/sbin/ris -a fargo -h nn-nn-nn-nn-nn-nn -p ris0.alpha,product_001
```

6.4 Modifying RIS Clients

You can modify a RIS client's network type, hardware network address, its RIS environment information, and the list of products it can install. You cannot modify a client's IP or routing information. To modify a client's entry, follow these steps:

1. Invoke the `ris` utility and choose the `m` option to modify a client.
2. Choose the client you want to modify from the list displayed.

The remainder of the modification procedure is similar to the procedure for registering a client, as described in Section 6.1.

Note

To modify a RIS client's IP or routing information, remove the client and add it with the modified information.

6.5 Removing RIS Clients

Follow these steps to remove a client:

1. Invoke the `ris` utility and choose the `r` option to remove a client processor.
2. Enter the name of the client processor to remove when prompted by the utility.
3. Verify that you want to remove the client processor.

After you confirm your choice, the utility deletes the client's registration.

When the RIS client is removed, the utility returns you to the RIS Utility Main Menu.

You also can use a `ris` command line to remove several clients at once. The following example removes the clients `boston` and `tulsa`:

```
# /usr/sbin/ris -r boston tulsa
```

6.6 Listing Registered RIS Clients

To view the registered clients, invoke the `ris` utility and choose the `List Registered Clients` option. The utility tells you if there are no registered clients.

6.7 Listing Products in RIS Server Areas

To view the current products in a server's area, invoke the `ris` utility and choose the option to show products. You also can use a `ris` command line to show the products installed in a server's area. For example:

```
# /usr/sbin/ris -s

Show Products in RIS Server Areas:

     1  /var/adm/ris/ris0.alpha
           Tru64 UNIX V5.0 Operating System (Rev nnn)
```

6.8 Deleting Products from RIS Server Areas

To delete one or more of the current products in a RIS area, invoke the `ris` utility and choose the option to delete products. The utility asks you to choose a RIS area and then guides you through the procedure to delete products.

6.9 Correcting RIS Gateways File Entries

The `/var/adm/ris/gateways` file contains information about the address of the gateway between the client system and the RIS server. When you register a new client, the `ris` utility queries this file to determine if a gateway is already specified for the client's network subnet. If not, you are prompted for the necessary information.

If the gateway address is entered incorrectly when it is first specified, you must edit the `/var/adm/ris/gateways` file manually to correct the entry. Entries in this file have the following format:

subnet_addr:*gateway_addr*

The following example shows a typical /var/adm/ris/gateways file:

```
16.168.64:16.168.64.1
16.69.240:16.69.224.199
16.140.144:16.140.144.2
16.69.144:16.69.144.199
```

After you correct the entries in this file, you must use the ris utility to remove all clients using the bad gateway address and register them again.

7

Managing RIS Profile Sets

A **profile set** is a subdirectory of the `/var/adm/ris/clients/sets` directory on a RIS server. It contains **configuration description files** (CDFs) and user-supplied files that can be invoked during a full installation. This chapter discusses the following topics:

- Creating profile set directories
- Registering RIS clients for profile sets
- Converting old configuration description files
- Determining a RIS client's profile set registration
- Removing a RIS client's profile set registration
- Deleting profile sets from the RIS server

A profile set can contain one or more of the following files:

- The `install.cdf` file is used for installation cloning.
- The `config.cdf` is used for configuration cloning.
- User-defined files that perform customizations on the target system. These may include some or all of the following files:
  - `preinstall`
  - `update_preinstall`
  - `postload`
  - `update_postload`
  - `postreboot`
- Any files called by the user-defined files.

If a client system is registered for a profile set, the full installation process searches the client system's registered profile set and takes action if it finds any of these files.

You can organize CDFs and user-supplied files into profile sets to support different functions or types of systems within your processing environment.

For example:

- If you install and configure engineering systems differently from accounting department systems, you might create two profile set directories: `engineering` and `accounting`. Those profile sets would contain the CDFs and files you create to suit the configuration needs of both departments.
- If you maintain separate CDFs and files for servers and workstations, you might create profile set directories named `server` and `workstation`.

Refer to the *Installation Guide — Advanced Topics* for information about installation cloning, configuration cloning, modifying CDFs, and creating user-supplied files.

7.1 Creating Profile Sets

The `/var/adm/ris/clients/sets` directory can contain many profile sets. Each of the profile set directories may contain CDFs and user-supplied files, as well as any files called by them.

Use the following procedure to create profile sets:

1. Log in to the RIS server as `root` or use the `su` command to gain `root` privileges.
2. Go to the profile sets directory where you will create the profile set:

   ```
   # cd /var/adm/ris/clients/sets
   ```

3. Create the profile set directory. For example, to create a profile set named `engineering`:

   ```
   # mkdir engineering
   ```

4. Change to the newly created directory to ensure that the necessary files are copied to the correct destination. For example:

   ```
   # cd engineering
   ```

5. Copy the CDFs, any user-supplied files, and all other related files from your working area to the new `engineering` profile set directory using a copy tool such as `cp`, `ftp`, or `rcp`.

For example, if your CDFs and user-supplied files are in the /users/development/working directory on the same system:

```
# cp /users/development/working/install.cdf .
# cp /users/development/working/config.cdf .
# cp /users/development/working/preinstall .
# cp /users/development/working/update_preinstall .
# cp /users/development/working/postload .
# cp /users/development/working/update_postload .
# cp /users/development/working/postreboot .
```

6. Use the chmod command to ensure that all files have execute permission:

```
# chmod 755 *
```

7.2 Registering Clients for Profile Sets

After you copy CDFs and other files to the profile set directory, you can register RIS clients for cloning or for user-supplied file invocation during a full RIS installation. You do this by registering new clients to a profile set as well as to a RIS environment.

In the following sample session, you have established profile sets for client workstations in different departments. You are registering the client pubs08 for the operating system in the RIS area ris0.alpha, and for the profile set techpubs.

Example 7–1: Sample RIS Client Profile Set Registration

```
# /usr/sbin/ris

Checking accessibility of RIS areas.... done

*** RIS Utility Main Menu ***

    a) ADD a client
    d) DELETE software products
    i) INSTALL software products
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
    s) SHOW software products in remote installation environments
    x) EXIT

Enter your choice: a
```

Example 7–1: Sample RIS Client Profile Set Registration (cont.)

```
You have chosen to add a client for remote installation services.

The following conditions must be met to add a client:

        1. You must know the client processor's host name
        2. The client's host name must be in your system's host database(s).
        3. You must know whether the client is on an Ethernet, FDDI, or Token
           Ring network.
        4. You must know the client's hardware Ethernet, FDDI, or Token
           Ring address if the client is registering to install operating
           system software.
        5. If the client and the server reside on different subnets, you will
           need the address of the gateway(s) that the client can use to
           communicate with the server.


Do you want to continue? (y/n) [y]: y

Enter the client processor's hostname or press RETURN to quit: pubs08

Select the remote installation environment:

    1)  /var/adm/ris/ris0.alpha
          'Operating System Release N ( Rev nnn )'
          'OS Worldwide Language Support Version N ( Rev nnn )'

    2)  /var/adm/ris/ris1.alpha
          'Something else in this RIS area'

Enter your choice or press RETURN to quit: 1

Select one or more products for the client to install
from /var/adm/ris/ris0.alpha:

Product    Description
   1    'Operating System Release N ( Rev nnn )'
   2    'OS Worldwide Language Support Version N ( Rev nnn )'

Enter one or more choices as a space-separated list
(for example, 1 2 3) or "all" for all products [all]: 1

You chose the following products:

   1    'Operating System Release N ( Rev nnn )'

Is that correct? (y/n) [y]: y

Do you want to specify an Installation Profile Set for use
during the installation of this client? [y/n] [n]: y

This RIS server has the following Installation Profile Sets available:

sys_admin engineering support techpubs accounting

Enter a set name or press <Return> to exit set selection: techpubs

You have selected the techpubs installation profile set.
This set contains the following files:
pubs_wksta
```

Example 7–1: Sample RIS Client Profile Set Registration (cont.)

```
Network type:
        1) Ethernet or FDDI
        2) Token Ring

Enter your choice: 1

Enter the client processor's hardware network address.  For
example, 08-00-2b-02-67-e1: nn-nn-nn-nn-nn-nn

Client pubs08 has been added.

*** RIS Utility Main Menu ***

    a) ADD a client
    d) DELETE software products
    i) INSTALL software products
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
    s) SHOW software products in remote installation environments
    x) EXIT

Enter your choice: x

#
```

If the CDF in the profile set you select requires software subsets that do not exist in the selected RIS environment, you see the following message:

```
The selected CDF, /var/adm/ris/clients/sets/techpubs/install.cdf, specifies
software subsets that are not present in the selected RIS environment.  The
missing software subsets are:  subsetname1 subsetname2 subsetname3
subsetname4 subsetname5 subsetname6

Please select a different set.

This RIS server has the following Installation Profile Sets available:

sys_admin engineering support techpubs accounting

Enter a set name or press <Return> to exit set selection:
```

Either choose a different profile set or exit without selecting a profile set. If necessary, you can modify the RIS client to select a different RIS environment or add the product containing the required subsets to the RIS area.

7.3 Converting Old Configuration Description Files

If you had existing CDFs in the `/var/adm/ris/clients/cdf` directory, RIS must convert the old CDFs into profile sets. The first time you invoke RIS after you install this version of the operating system, new profile set directories are created in the `/var/adm/ris/clients/sets` directory,

and the old CDFs are copied into these profile sets (and renamed if necessary). You may see conversion messages similar to the following:

```
Converting old cdf directory to new sets directory format...
CDF File acctng moved to set acctng and renamed install.cdf
CDF File acctng.cdf moved to set acctng1 and renamed install.cdf
CDF File acctng1.cdf moved to set acctng11 and renamed install.cdf
CDF File acctng.cdf2 moved to set acctng12 and renamed install.cdf
done
```

After the old CDFs are converted to profile sets, these messages are not displayed again.

7.4 Determining RIS Client Profile Set Registration

To determine if a RIS client is registered to a profile set, examine the RIS database file, `/var/adm/ris/clients/risdb`, on the RIS server. The name of the profile set is specified in the fourth field; fields are separated by a colon. In the following sample entry in the `risdb` file, the client system `portland` is registered to the `engineering` profile set:

```
portland:nn-nn-nn-nn-nn-nn:ris2.alpha,product_1:engineering
```

7.5 Removing RIS Client Profile Set Registration

You can remove a client from profile set registration by using the `Modify` option from the RIS Utility Main Menu. When you are prompted to specify a profile set for the client, enter `n` or press Return to register the client without specifying a profile set.

7.6 Deleting Profile Sets from the RIS Server

If a profile set is no longer needed, you can delete it by removing the appropriate *profile_set* directory from the directory `/var/adm/ris/clients/sets`.

Examine the RIS database file on the RIS server, `/var/adm/ris/clients/risdb`, before deleting a profile set to ensure that no clients are registered to it. The name of the profile set is specified in the fourth field; fields are separated by a colon (`:`). In the following sample entry in the `risdb` file, the client `vallejo` is registered to the `accounting` profile set:

```
vallejo:nn-nn-nn-nn-nn-nn:ris2.alpha,product_1:accounting
```

8

Troubleshooting RIS

This chapter contains information to help you troubleshoot problems with your RIS system. These problems are grouped into the following categories:

- RIS lock files
- Client password expiration
- Root file system mounting
- RIS client registration
- RIS server response

8.1 RIS Lock Files

To prevent multiple users from performing operations on RIS areas simultaneously, the `ris` utility creates two lock files in the `/tmp` directory, `rislock` and `ris.tty.lock`. when a user is installing or deleting software from a RIS area. If the `ris` utility is run by another user or the same user on a different terminal, selecting `INSTALL software products` or `DELETE software products` from the RIS Utility Main Menu generates a message similar to the following:

```
The ris utility is currently locked while j_smith on /dev/ttyp3
is installing software.  Try again later.
```

If the `ris` utility is stopped prematurely, these lock files may not be removed. If the lock files are not removed, the message displays even though no other user is using RIS.

If this occurs, you must delete the lock files from the `/tmp` directory.

Caution

Before deleting the lock files, ensure that no other user is using the `ris` utility.

8.2 Client Password Expiration

If the RIS server is using C2 security and the RIS password has been set to allow expiration, it is possible for the RIS clients to be denied service. If the RIS client receives a message similar to the following, the RIS password on the server probably has expired:

```
Cannot find the name for client using bin/getname. Check with the system
manager of your RIS server
```

To fix this problem, refer to Section 3.6.

8.3 Root File System Mounting

RIS uses NFS to mount the `root` (`/`) file system on the client when booting the client from the RIS server. If you see a message on the RIS client indicating that the `root` file system cannot be mounted, use the **`ps -aef | grep mountd`** command line to see if the NFS mount daemon `mountd` is running on the server. If `mountd` is running, your output is similar to this:

```
root        308      1  0.0 17:24:28 ??           0:00.02 /usr/sbin/mountd -i -n -n
root         3154   1053  0.0 12:52:55 ttyp3        0:00.00 grep mountd
```

If `mountd` is not running, use the SysMan Menu to restart the NFS daemons. If you are running an earlier version of the operating system, use the `nfssetup` command. Refer to the `sysman`(8) and `nfssetup`(8) reference pages for additional information.

The installation media is mounted as the `root` file system for both CD-ROM and RIS installations, so it is important that the installation media is mounted locally on the server. Due to NFS limitations, RIS cannot provide client access to files that are mounted remotely from another system. The distribution media or extracted RIS area must be available through a local mount point on the RIS server.

8.4 RIS Client Registration

Problems with RIS client registration that are discussed in this section include the following topics:

- No prompt for client hardware address
- Duplicate client hardware addresses
- Cloned client registration
- Client registered on multiple RIS servers
- Client not in RIS database

8.4.1 No Prompt for Client Hardware Address

The server requires a client's hardware address in order to boot the client over the network. The `ris` utility prompts you for the client's address during the registration process. If it does not, check the following:

- If the RIS area is linked to a CD–ROM

  Check that the CD–ROM that is the target of the links is mounted.

- If the RIS area is serving a release prior to Version 3.0

  Check that the mandatory update subsets for the release the server is serving are installed in the server's RIS area. Install the mandatory update subsets from the */local_mnt* /ALPHA/UPDATE directory on the distribution CD–ROM. For example, if the CD–ROM is installed on /mnt, install the mandatory update subsets from the /mnt/ALPHA/UPDATE directory.

- If the RIS area is serving Version 3.0 and later

  Check that the mandatory operating system subsets are installed into the RIS area. Install the mandatory subsets from the */local_mnt* /ALPHA/BASE directory on the distribution CD–ROM. For example, if the CD–ROM is installed on /mnt, install the mandatory update subsets from the /mnt/ALPHA/BASE directory.

8.4.2 Duplicate Client Hardware Addresses

RIS checks to ensure that no other client has the same hardware address. This can happen if a client's name has changed but has not been removed from the server. If a duplicate hardware address is found, a message is displayed like the one in the following example:

```
The hardware address provided, nn-nn-nn-nn-nn-nn, has already been
specified for another client, albany. Please check the hardware address
to ensure it is correct. If it is correct, then you will need to
deregister the client albany before continuing. If this client is not
currently registered, please contact your RIS system administrator.
```

If you see this message, follow the instructions provided and verify the new hardware address that you entered.

- If the hardware address you entered is not correct, reregister the new client with the correct hardware address.
- If the hardware address you entered is correct, deregister and reregister the existing client (in this example, `albany`).
- If the existing client is not registered, contact your RIS system administrator.

8.4.3 Cloned Client Registration

A CDF is created during a full installation. To use the CDF for installation cloning, the hardware configuration and the software subsets to load must be substantially similar. Before specifying a CDF for client installation cloning, RIS attempts to verify that the subsets specified in the CDF exist in the RIS area that the user has selected. If they do not match, the CDF is rejected. This error can occur if the version numbers of the subset do not match (for example, OSFBASE400 and OSFBASE500).

- The CDF can be used for installation cloning of a system that is registered to a different RIS area. In this first case, it is possible that the subsets contained in these RIS areas are different.
- The version of the operating system served by the RIS area can be different from the version specified in the CDF. In this second case, there would be many missing subsets because none of the subsets specified in the CDF would be present in the RIS area.

In the event that a CDF is specified that contains the name of a software subset that is not present in the selected RIS area, the following message is displayed:

```
Enter a set name or press <Return> to exit set selection: rz26.cdf

The selected CDF, rz26.cdf, specifies software subsets that are not
present in the selected RIS environment. The missing software subsets are:
OSFSERPC500

Please select a different set.
```

8.4.4 Client Registered on Multiple RIS Servers

If the system will not boot or the system boots but is not able to mount the root file system, you should check to ensure that the RIS client is not registered for BOOTP service on multiple RIS or DMS servers. In order for the BOOTP protocol to work properly, it is important that the client be registered for BOOTP service on only one server. The client is registered for BOOTP service when they are registered for an operating system base product or when the client is registered as a DMS client.

It is possible for a RIS client to be registered to two RIS servers at the same time, given they are not both registered for the operating system base product on both servers and attempt to boot their systems using BOOTP.

8.4.5 Client Not in RIS Database

If a message appears on the client's console while you are performing a RIS installation that states that the client is not in the RIS database, check the following on the server:

- As shown in Section 8.5, check `/var/adm/ris/clients/risdb` to ensure the client's name is properly entered. If it is not, use the `ris` utility to add or modify the client's registration. Do not edit the `risdb` file directly; use the `ris` utility.
- If `/var/adm/ris/clients/risdb` contains the correct client name, you must determine the client's name as recognized by the name servers (for example, BIND or NIS). If no name servers are in use, check the `/etc/hosts` file. The client name must appear in the `/etc/hosts` file exactly as it appears in `/var/adm/ris/clients/risdb`. The `/etc/hosts` file contains the name by which the client is known at the server. The `/var/adm/ris/clients/risdb` database contains the name by which the client is known to RIS. The two names must match. If you are using the BIND or NIS name servers, use the `nslookup` command to find the name by which the client is known to the server.

  If the `/etc/hosts` file or the name server and `/var/adm/ris/clients/risdb` both include the client, but one file uses the short client name and the other file uses the fully qualified domain name, you will have a problem. You may be able to solve the problem by editing the `/etc/hosts` file to include both the short and fully qualified domain name.

  If you found a discrepancy between the files where `/etc/hosts` used the short name and `/var/adm/ris/clients/risdb` used the fully qualified domain name, you most likely have an error in your network configuration. It is recommended that you review the procedures used to configure your network and name servers and correct them before continuing with RIS installations.

8.5 RIS Server Response

Problems with RIS server response comprise several categories. The following topics are discussed in this section:

- Servers using the `bootpd` daemon
- Servers using the `joind` daemon
- Loading an incorrect kernel file

Boot failures often occur because the RIS server has invalid information. The risdb and bootptab files are involved in handling RIS clients, and you should check them in the order listed:

- /var/adm/ris/clients/risdb

  This file is created and managed by the ris utility; it contains the utility's view of the environment. Run the ris utility to show the configuration for the client in question. Verify that the client is registered and that its registration information is correct. If not, use the ris utility to add or modify the client's registration.

- /etc/bootptab (only on servers running this operating system)

  This file is not used exclusively by RIS, so it can be edited for other purposes (such as Dataless Management Services). The entry for your client may be corrupted. Examine the client's bootptab entry to ensure that the entry agrees with both the risdb entry and the addresses and parameters of the equipment in your environment. The contents of the /etc/bootptab file are described in the bootptab(4) and dhcptags(4) reference pages and in Section 5.1.3.

Caution

A RIS server should run either the bootpd or the joind daemon. A RIS server running both of these daemons is not supported, and results are unpredictable.

8.5.1 Servers Using the bootpd Daemon

A server can respond to BOOTP requests from clients. If the server's information is correct for the client but the server still fails to respond, enable BOOTP message logging on the server :

1. Edit the server's /etc/inetd.conf file.
2. Modify the line for bootps to include the –d option as a bootpd command argument. For example:

```
bootps  dgram   udp   wait   root   /usr/sbin/bootpd   bootpd -d
```

3. Use the following command to find the process IDs for the Internet daemons:

```
# ps x | grep -E "inetd|bootpd"
  228 ??  I      0:00.93 /usr/sbin/inetd
  243 ??  I      0:00.91 /usr/sbin/bootpd
 9134 p2  S      0:00.23 grep -E inetd|bootpd
```

4. Send a HUP (hangup) signal to the inetd daemon so it will reread the /etc/inetd.conf configuration file and kill the bootpd daemon. You must kill the inetd daemon before you kill the bootpd daemon:

```
# kill -HUP 228
# kill -KILL 243
```

It is not necessary to restart the bootpd daemon manually; the inetd daemon starts it automatically.

To track boot requests as they occur, run the tail –f command on the /var/adm/syslog.dated/*today's-date* /daemon.log file and boot the client. Many daemons other than the bootpd daemon log information to the daemon.log file; however, the log file shows a hardware address that matches the address in the /etc/bootptab file for the client.

If the client's boot requests are not logged, you can enable additional logging by editing the /etc/inetd.conf file, and add a second –d option to the bootpd command. Each additional instance (up to three) of the –d option increases reporting; the second instance enables the server to report all boot requests, even for client systems it does not recognize. This level of reporting should help you determine where in the system the request is being lost.

If you modify the /etc/inetd.conf file, restart the inetd daemon by sending it a HUP signal. Example 8–1 shows a section of a daemon.log file. It shows the data logged by various system daemons, including the bootpd daemon when run with two –d flags set.

Example 8–1: Sample daemon.log File

```
Jul 28 14:56:36 stlouis mountd[191]: startup
Jul 28 14:56:38 stlouis xntpd[235]: xntpd version 1.3 [1]
Jul 28 14:56:43 stlouis mold[269]: mold (V1.10) initialization complete
Jul 28 14:56:44 stlouis evd[272]: E003-evd (V1.10) initialization complete
Jul 28 14:56:45 stlouis internet_mom[275]: internet_mom - Initialization
                complete...
Jul 28 14:56:45 stlouis snmp_pe[278]: M004 - snmp_pe (V1.10) initialization
                complete
Jul 28 16:34:55 stlouis inetd[282]: /usr/sbin/bootpd: exit status 0x9 [2]
Jul 28 16:35:47 stlouis bootpd[1228]: bootpd 2.1a #0: \ [3]
                Fri Feb 05 00:32:28 EST 1999
Jul 28 16:35:47 stlouis bootpd[1228]: reading "/etc/bootptab"
Jul 28 16:35:47 stlouis bootpd[1228]: read 3 entries from "/etc/bootptab"
Jul 28 16:35:47 stlouis bootpd[1228]: request from hardware address \ [4]
```

Example 8–1: Sample daemon.log File (cont.)

```
                nnnnnnnnnnnn
Jul 28 16:36:08 stlouis bootpd[1228]: request from hardware address \ 5
                nnnnnnnnnnnn
Jul 28 16:36:08 stlouis bootpd[1228]: found: host1.xsamplex.com (nnnnnnnnnnnn)
                at (nn.nn.nnn.nnn)
Jul 28 16:36:08 stlouis bootpd[1228]: file /var/adm/ris/ris0.alpha/\
                vmunix.host1.xsamplex.com
Jul 28 16:36:08 stlouis bootpd[1228]: vendor magic field is 0.0.0.0
Jul 28 16:36:08 stlouis bootpd[1228]: sending RFC1048-style reply
```

1 Many daemons log information to this file.

2 Result of sending a HUP signal to the inetd daemon and killing the bootpd daemon.

3 A new bootpd daemon starts up in response to a boot request. The bootpd daemon reads the /etc/bootptab file as a part of its startup.

4 A bootpd request by a system with hardware address *nnnnnnnnnnnn*. Because the system is not a client of this RIS server, its hardware address is not in the server's /etc/bootptab file.

5 A bootpd request by a system with hardware address *nnnnnnnnnnnn*. The system is a client of this RIS server.

8.5.2 Servers Using the joind Daemon

To serve BOOTP requests from clients, the joind daemon, which also services Dynamic Host Configuration Protocol (DHCP) requests, should be running. DCHP enables the automatic assignment of IP address to clients on networks from a pool of addresses. The IP address assignment and configuration occurs automatically whenever appropriate client systems (workstations and portable computers) attach to a network. The current implementation of DHCP is based on the JOIN product by Competitive Automation. Ensure that the server's information on the client is correct, namely information contained in the bootptab file of the server as shown in Section 5.1.3. If the server still fails to respond, enable logging of bootp messages on the server by using the following procedure:

1. Check that the joind daemon is servicing your bootp request. This can be done by issuing the following command:

```
# ps -x | grep -E "joind"
393 ??       I        0:05.82 /usr/sbin/joind
26446 ttyp0     S +     0:00.01 grep -e joind
```

2. Determine the current setting of JOIND_FLAGS by issuing the following:

```
# rcmgr get JOIND.FLAGS
```

3. Stop the joind daemon by issuing the following command:

```
# /sbin/init.d/dhcp stop
```

4. Restart the daemon with debugging turned on by doing the following. Set the JOIND_FLAGS to indicate debugging is turned on.

```
# rcmgr set JOIND_FLAGS y -dx
   Where x is the level of debugging. A value from 0 to 9 is valid.
   Where y is the previously determined setting of the JOIND_FLAGS.
# /sbin/init.d dhcp start -dx
```

   Example 8–1 shows a section of a daemon.log file. It shows the data logged by various system daemons, including the joind daemon.

5. To turn off debugging, do the following:

```
# /sbin/init.d/dhcp stop
# rcmgr set JOIND_FLAGS y
    Where y is the previous determined setting of the JOIND_FLAGS.
@    determined.
# /sbin/init.d dhcp start
```

8.5.3 Loading an Incorrect Kernel File

If the server responds but an incorrect kernel is loaded, it is possible that the server's RIS area is configured incorrectly. You can observe the loading process by editing the /etc/inetd.conf file and restarting the Internet daemon as described in the previous section. To do this, add the –d option to the line containing the tftpd command:

```
tftp dgram udp wait root /usr/sbin/tftpd tftpd -d /tmp /var/adm/ris
```

Logging the server's tftp traffic shows you the file being transferred and the time that the transfer starts and finishes. Ensure that the proper vmunix file is being loaded and that the loading operations are completed correctly.

9

Dataless Management Services

This chapter introduces Dataless Management Services (DMS), the dataless management utility (dmu), and the DMS environment. Topics include:

- Defining the DMS environment
- Listing the benefits of DMS
- Explaining the relationship between DMS servers and clients

9.1 What is the DMS Environment?

In a Dataless Management Services (DMS) environment, a server system maintains the root, /usr, and /var file systems for all client systems. The server maintains one copy of root for each client. The /usr file system is exported read only and is shared by all clients registered to the environment. Client systems have their own /var file system. All swapping and dumping is done on the client's local disk.

The dataless management utility (dmu) creates a root file system based on the software subsets installed in the DMS environment area on the server. This root file system is accessed by client systems over a local area network (LAN). DMS lets system administrators customize the root and /usr file systems before client systems access them.

You must have superuser privileges to perform many of the dmu functions.

9.2 DMS Benefits

The advantages of installing DMS include the following:

- Less disk space is required on client systems. By sharing the /usr area, you eliminate the need for disk space to hold a separate /usr area for each client. For Alpha systems, you can save more than 425 megabytes (Mb) for each client.
- Installation and setup of servers and clients are done by automated scripts, thereby simplifying the task of the server system administrator. Maintenance of the DMS areas is similarly straightforward.

- Because the DMS files reside on the server, the server's system administrator can perform most system management tasks. The involvement of individual users with the complexities of system management is reduced.

9.3 Relationship Between DMS Servers and Clients

The DMS utility, `dmu`, manages the sharing of installed operating system software between servers and clients in a LAN. In addition to the server's normal disk area, one or more disk partitions are reserved as the DMS area, made up of one or more product environments and client areas. Topics in this section include:

- Describing the DMS server
- Explaining the environment portion of a DMS area
- Explaining the client portion of a DMS area
- Describing DMS client characteristics

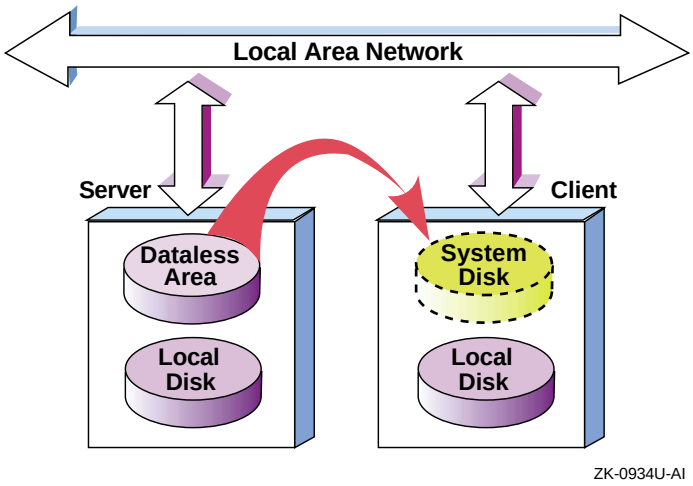
9.3.1 DMS Server

The DMS server maintains multiple copies of the `root` area, one for each client. Each copy is in a client `root` directory in the DMS area and is customized for the client in order to provide for differences between hardware platforms or environmental requirements. Each of the client `root` directories is private; this means that there is a directory for each client so that no conflict or confusion exists between clients. The server's DMS `root` and `/usr` areas are made available to clients by means of the Network File System (NFS). For more information about the NFS used by the operating system, refer to the *Network Administration* guide.

Beyond verifying clients' identities, vectoring their boot requests, and providing their system disk space, the server does not interact directly with the clients. The server can support local timesharing users and need not be dedicated to DMS.

A DMS client's system disk space (`root` and `/usr` areas) is physically connected to the server instead of to the client. The client accesses that disk area through a LAN connection with the server. Each DMS client is booted across the network from its private `root` area on the server. Once booted, the client continues to use its `root` files and `/usr` files from the server's DMS area. These files appear to the client as if they were on local disks, as shown in Figure 9–1.

Figure 9–1: File Sharing Between the DMS Server and Client



As indicated in Figure 9–1, clients must have local disks. In addition to local disks, clients can import file systems from any other computer to which they have network access. Clients use swap and dump space on their local disks.

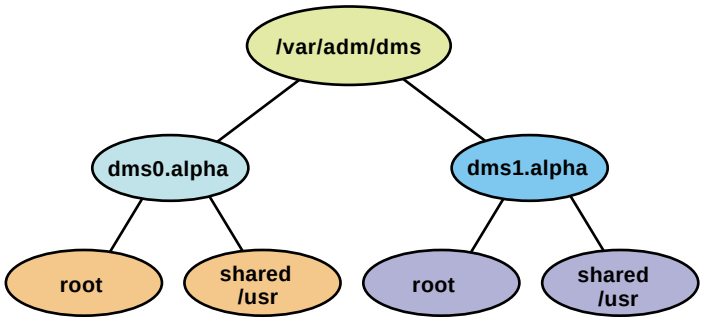
9.3.2 Environment Portion of DMS Area

One or more **DMS environments** can reside in a partition. If you want to prevent the `dmu` utility from putting all DMS environments in the same disk partition, indicate a unique mount point for each DMS environment. The DMS environment disk space requirements should be calculated using the worksheets in Appendix B. Then the mount point of `./dmsn.alpha` should be added to `/etc/fstab`.

Each DMS environment contains a customized directory and file system, consisting of `root`, `/usr`, and `/var`. The `dmu` utility copies the `root` area to the client area when a client is added to the dataless environment.

Figure 9–2 shows the `/var/adm/dms` portion of a DMS area, it contains two DMS environments, `dms0.alpha` and `dms1.alpha`. Each DMS environment contains a `root` and `/usr` file system. The `root` file system is copied to each client system. The `/usr` file system is read only and is shared among all client systems registered to the environment.

Figure 9–2: Environment Portion of DMS Area



The `root` file system contains copies of the kernel, `.vmunix`, `vmunix` and other primary system files. These primary files can be in either **new** form (files supplied in the operating system distribution kit and prefixed with `.new..`) or in **prototype** form (files prefixed with `.proto..`).

The `.new..` version of a file should never be customized.

The `.proto..` files have special significance for DMS environments. By modifying the `.proto..` files, the DMS server system administrators can customize the system to meet their specific needs. These customized `.proto..` files are used during the configuration of the server's DMS client environments. Standard files (such as `/etc/hosts` and `/etc/fstab` for example) can be modified so that clients do not have to modify them.

The `/usr` file system contains common files that can be used without being tailored by clients registered to the DMS environment.

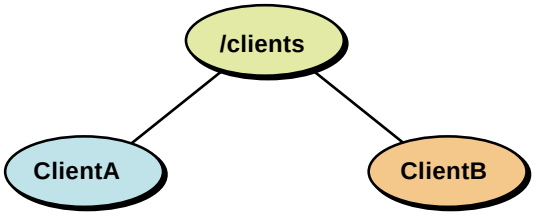
DMS environments can be created with different combinations of products to allow servers to provide diversified service based on client's software product needs. For example, you could have a DMS environment with only the base operating system. Another DMS environment could have the base operating system plus any number of additional products installed (such as DECLadebug orDEC Fortran). Multiple environment areas can be established in separate partitions to support a variety of environments, or to improve performance, or to support more clients than allowed by the disk space available in `/var/adm/dms`.

The server does not use any of the DMS area. System administrators can access the DMS area as required for maintenance and for installation or removal of layered products, but the area is not used by the server itself.

9.3.3 Client Portion of DMS Area

A DMS **client area** for individual client systems also resides in a DMS area. Figure 9–3 shows a DMS client area, named `/clients`. The `/clients` area most likely should be located on its own partition after the size of the area is calculated using the worksheets in Appendix B. Then, the mount point of `/clients` should be added to the `/etc/fstab` file.

Figure 9–3: DMS Client Area



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Multiple copies of the `root` file system reside in the client area, one for each client, tailored from the appropriate generic `root` file system. Each client builds a customized kernel, which resides in the client's `root` area if the client has a partial or full build environment. This customized kernel supports the client's actual system configuration, including central processor, system memory, and peripheral devices. Figure 9–3 shows two client `root` areas, named `ClientA` and `ClientB`. Each client sees its private `root` area and the shared `/usr` area from the appropriate `/var/adm/dms` environment as local, although these areas are actually on the server and are accessed through NFS. Figure 9–4 shows how clients share `/usr` and have their own `root` file system.

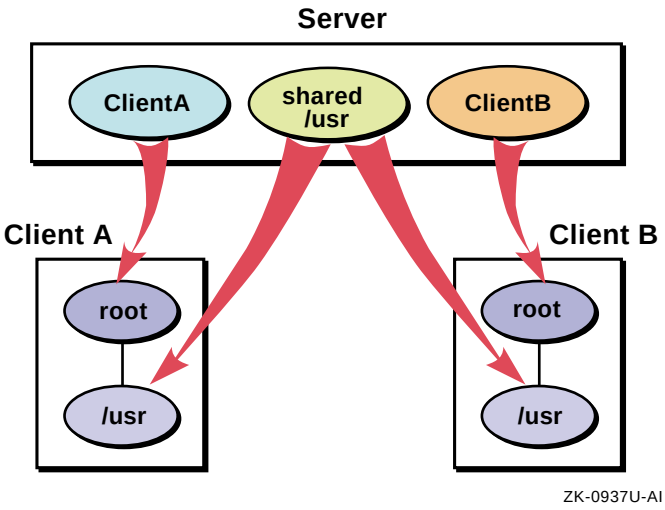
Multiple client areas can be established but must reside in different partitions.

9.3.4 Characteristics of DMS Clients

Clients do not have access to the entire DMS area. Each DMS client has access to the `root` area assigned to it on the server.

Common system files residing in the `/usr` area are shared among all the clients registered to that particular `/var/adm/dms` environment. Mounted with read-only access for the clients, this shared area is protected from erroneous client activity. Figure 9–4 illustrates this concept.

Figure 9–4: Client Views of the DMS Area



In Figure 9–4, the small boxes represent what the clients think they see; the arrows show how the real disk areas on the server are mounted by the client to produce this view.

Clients can be timesharing systems or workstations. Because each client's `root` area is tailored specifically to the client's needs and would contain the software the client can run, there is no interference between clients attempting to use identical resources that could, for example, have licensing restrictions based on the number of concurrent users.

10

Preparing DMS Servers and Clients

This chapter describes the tasks that you must perform to set up a DMS server. Information includes:

- Requirements for DMS servers and clients
- Allocating disk partitions for DMS
- Setting up a local area network (LAN) and a Network File System (NFS)
- Planning and calculating disk space requirements for DMS
- Installing the operating system software on the DMS server
- Registering DMS clients
- DMS Security issues

10.1 Requirements for DMS Servers

Setting up a dataless environment requires that the following conditions be met for DMS servers:

- For client systems running this version of the operating system, the server must have Version 3.0 or higher of the operating system installed. The server can be any Alpha processor, with the exception of those noted in Section 1.3. A single server can serve both RIS and DMS clients, however, a client cannot be registered to both RIS and DMS at the same time. DMS servers can serve only clients running Version 3.0 or higher of the operating system.
- The DMS server must have the following software subsets installed:
  - Additional Networking Services (`OSFINET`)
  - Dataless Management Services (`OSFDMS`)
- The DMS server must have the `OSF-SVR` or `UNIX-SERVER` Product Authorization Key (PAK) loaded and registered. The OSF-SVR or UNIX-SERVER license allows an Alpha system to be a server.

Note

Software licensing lets you run software in a shared environment. As a minimum, the `OSF-SVR` or `UNIX-SERVER` software license must be installed for a system to be a server. See *Software License Management* for more information about software licensing.

- The DMS server must be able to install software into the DMS area:
  - The DMS server can have a CD–ROM optical disk drive to install software subsets for one or more specific products from the CD–ROM to the DMS area on the server.
  - The DMS server can use a Network File System (NFS) mount point to install software from a Remote Installation Services (RIS) area or an operating system distribution CD–ROM from another processor. See Section 4.3 for more information about using an NFS mounted RIS area.
- The DMS server must have at least one separate disk partition where the DMS environment and client areas reside. The `root` would not be large enough for many `client` areas and `var` likely would fill up after one environment was added. Smaller disks may not hold an entire DMS area.
- NFS must be set up on the DMS server.
- The DMS server and all DMS clients must be connected to an Ethernet or FDDI local area network (LAN).

10.2 Requirements for DMS Clients

Setting up a dataless environment requires that the following conditions be met for DMS clients:

- DMS clients must have a disk drive large enough to accommodate dump and swap file systems (approximately 200 Mb).
- DMS clients must be registered with the server in one of the following ways:
  - Register the DMS client through either the NIS naming service using `Network Information Service (NIS)` or the BIND naming service using `BIND Configuration Application`.
  - Create an entry for the DMS client in the server's `/etc/hosts` file either by using `Network Configuration Application` or by manual entry using a text editor.

- DMS clients must be capable of booting over Ethernet or FDDI using the `bootp` and `tftp` protocols. This is the same requirement to be able to install the operating system from a RIS server. Most Alpha workstations and deskside servers have this capability, but most data center servers would not be configured as DMS clients. Consult your system's hardware documentation to determine whether it supports `bootp` and `tftp` over Ethernet or FDDI.
- The client must not be registered on another RIS or DMS server.

10.3 Allocating Disk Partitions on the DMS Server

The DMS server must have at least one separate disk partition to contain the DMS environment and client areas. Otherwise, the `root` file system is not be large enough for many `client` areas and the `var` file system would fill up after one environment was added. Deciding how to allocate disk partitions is critical to the performance of dataless management. Consider the following factors when allocating disk partitions for the DMS environment (`/var/adm/dms/dms`*N*`.alpha`) and client (`/clients`) area:

- The number of physical blocks available compared to the number of blocks required by the environments you expect to create on the disk.
- Spreading environments with large numbers of registered clients among different disks to reduce disk contention.
- Protecting against disk failures by using the Logical Storage Manager (LSM).
- Using the Advanced File System (AdvFS) on certain disks for faster system recovery. Refer to the *AdvFS Administration*, *System Configuration and Tuning* and *System Administration* documentation and the `advfs`(4) reference page for more information about the Advanced File System.

Refer to the *System Administration* guide for more information about disk partitioning.

10.4 Setting Up a Local Area Network (LAN)

You must connect the DMS server and all of the client processors to an Ethernet or FDDI LAN. For instructions on setting up a LAN, refer to the *Network Administration* guide.

10.5 Setting Up a Network File System

The Network File System (NFS) must be set up before you install DMS. For instructions on setting up NFS, refer to the *Network Administration* guide. After you install NFS, ensure the `portmap`, `mountd`, `nfsd`, and `nfsiod` daemons are running by entering the following command:

```
# ps ax | grep -E "portmap|mountd|nfsd|nfsiod"
```

If these daemons are not all running, start the inoperative ones. Refer to the appropriate reference pages for information about starting these daemons. Enter the following command to display reference pages (this example shows how to display the reference page for the `portmap` daemon):

```
# man portmap
```

10.6 Planning Disk Space for DMS

You must calculate the amount of disk space required to ensure that you have enough space in the DMS areas in which the `dmu` utility will be created. DMS clients' system disk space is located on the server in a DMS area. See Section 9.3.2 for a description of the DMS area's contents. A server can have multiple DMS areas in which some of the files (for example the contents of the `/usr` area) are duplicated. This necessary duplication imposes additional space requirements on the server.

This section discusses the following topics:

- Disk space required for DMS environments
- Estimating disk space for DMS clients
- The types of kernel builds

Throughout this guide, the server's environment file systems are designated as `/var/adm/dms/dms`*N*`.alpha` and `/clients/`*hostname* where *hostname* is the name of the client. The `root` areas are designated `dms`*N*`.alpha` where the letter *N* represents the number assigned to the specific file system or common `root` area when it is installed. The client's private portion of the common `root` area is designated `/clients/`*hostname*.

Disk space is required on the server for each DMS server area file system. The following sections provide guidelines for estimating the disk space required by the DMS area.

Appendix B contains worksheets to help you calculate your space requirements.

10.6.1 Disk Space Required for DMS Environments

Each `dms`*N* `.alpha` environment must have the following software subsets installed:

- Additional Networking Services (OSFINET)
- Dataless Management Services (OSFDMS)

Each `dms`*N* `.alpha` environment also can contain additional software for the clients registered to access that environment. Section 11.2 describes how to install software in DMS environments.

Reserve the following space in addition to space needed for the mandatory subsets and the subsets required by DMS:

- Enough space for any layered products that you plan to install at any time in the future
- An additional 10 percent of the required disk space to allow for file system administration tasks and file system information

Appendix B contains worksheets for calculating the amount of space you need for a single DMS environment. Refer to the first worksheet as you read the calculation illustrated in Table 10–1.

Caution

Subset sizes in this example are for illustration only. The actual sizes for standard operating system subsets are listed in the *Release Notes*. Subset size information for layered products is included in the product installation documentation.

To determine the names of the subsets you want to install, refer to the descriptions listed in the *Installation Guide*.

Assume that you want to install all of the mandatory and optional subsets plus one layered product. You need at least one DMS environment, `/var/adm/dms/dms`*N* `.alpha`.

After referring to the *Release Notes*, you determine the following:

Table 10–1: Estimated Subset Sizes for DMS

Subsets	Size in Mb
Mandatory subsets	250
All optional subsets	400
One layered product subset	50
SUBTOTAL	700
+10 percent for overhead	70
TOTAL	770

The subset sizes add up to 700 Mb. Allowing another 10 percent of this space (70 Mb) for file system administration and information, you arrive at a total size of 770 Mb for the `/var/adm/dms/dms`*N*`.alpha` environment. Reserve additional space for any other software products you plan to install later. These products' space requirements must be factored into the 10 percent overhead allocation.

10.6.2 Estimating Disk Space for Clients

You must reserve disk space in the `/clients` file system on the server for clients' `root` areas. The amount of disk space required depends upon the type of kernel build you choose for the client.

Refer to the second DMS worksheet in Appendix B to calculate the amount of space needed for a `/clients` area.

10.6.3 Types of Kernel Builds

When you are adding clients to a DMS environment, you have the option to choose: no build, full build, or partial build kernel support. When determining the amount of space required by a client, you must keep in mind the type of build support you choose for the client.

Clients' volatile files, such as those in the `/tmp`, `/var/spool`, `/var/sys`, and `/var/adm` directories are located in the individual client's `root` area. The client's `root` area requires a minimum of 40 Mb of disk space. Use the following guidelines for estimating disk space requirements, in addition to the 30 Mb minimum required by the client:

- No build support

  This type of kernel build is not recommended. Providing no build area means that the clients cannot build kernels and must run the Generic

DATALESS kernel supplied by the system administrator. No build support is available only when the server and client are on the same version of the operating system. Additionally, no build support kernel build type does not allow the client to build a customized kernel. If you choose no build support, you do not need to allow for extra disk space other than the required minimum 30 Mb.

- Full build support

  A full build area creates an entire /sys area for the client and consumes the most disk space. You should select this option if the client modifies kernel objects and performs kernel builds. If you choose a full build, allow an additional 100 Mb for each client's root area.

- Partial build support - Default for clients running Version 3.2C or higher of the operating system

  A partial build area creates a build area that contains only configuration data. All kernel objects are obtained from the server. You should select this type of build if the client performs kernel builds but does not modify kernel objects. If you choose a partial build, allow an additional 15 Mb for each client's root area.

The space required by individual clients will not be the same, but you can add all the needed spaces together to arrive at the total requirement for the /clients area. You must also remember to reserve additional space for clients that add files to their root areas.

10.7 Installing the Operating System on the DMS Server

The *Installation Guide* describes how to install the operating system and describes all the standard operating system software sets. The *Release Notes* document lists subset sizes. You need this information to install the operating system itself as well as to install DMS.

The following optional software subsets must be installed on the server to successfully use the DMS utilities to set up a DMS environment:

- Additional Networking Services (OSFINET)
- Dataless Management Services (OSFDMS)

To install these software subsets, you can follow either one of these steps:

- Perform a full installation and choose the OSFINET and OSFDMS subsets along with any other subsets you choose to install.
- Perform a full installation with mandatory subsets only. After the installation is complete, use the SysMan Menu to install the subsets listed previously and any additional software subsets.

For information about using the SysMan Menu to load software subsets, refer to the *Installation Guide — Advanced Topics* or the `sysman`(8) reference page.

10.8 DMS Client Registration

Before you can use DMS to serve a client, you must register the client with a network naming service and with the DMS server. You must perform the following tasks to prepare to register clients:

1. Obtain information about each client.
2. Fill out a copy of the DMS Client Setup Worksheet in Appendix B for each client.
3. Register each client's host name and IP (Internet Protocol) address with the appropriate naming service, either by using the `NIS` or `BIND Configuration Application` or by placing an entry for the client in the server's `/etc/hosts` file.

10.8.1 Obtaining Information About Each DMS Client

You need to know the following information about each processor you plan to add as a client to a `/var/adm/dms/dms`*N* `.alpha` environment and to register the client with the appropriate naming service:

- The host name

  Only lowercase letters (`a-z`) and numbers are permitted in host names. The host name must begin with a letter.

- The DMS environment and client areas to which you want to register the client
- The client's network interface type, subnet mask and gateway address for this network interface

  The gateway address is required when the server and client are on different networks.

  Refer to the *Network Administration* guide for information about network interfaces, subnet masks and route for network.

- The client's Ethernet or FDDI hardware address

  Refer to the *Network Programmer's Guide* or Section 6.2 for information about how to obtain hardware addresses.

- The swap device and partition and swap device drive type (swapping is done on the client's local disk)

  Refer to the *Installation Guide* for guidelines on planning swap space on the client's local disk. However, keep in mind that because the `/usr`

file system is not on the client's local disk, you have much more space on the client to allocate for swap space.

- The type of kernel build to be supported (full, partial, or none). Refer to Section 10.6.3 for a description of the types of kernel build support for the client.

10.8.2 Registering Clients' Host Names and IP Addresses with DMS Servers

If the host system is served by any of the following naming services, check with your site administrator to be sure that your clients are registered with the appropriate naming service servers:

- The server's `/etc/hosts` file
- Berkeley Internet Name Domain (BIND)
- Network Information Services (NIS), formerly called Yellow Pages (YP)

By using the Network Configuration Application, you can place each client processor's host name and IP (Internet Protocol) address in the `/etc/hosts` file when you initially set up your LAN. The Network Configuration Application is described in the *Network Administration* guide.

You also can place the host name and IP address in the `/etc/hosts` file by using a text editor such as `vi`. The host name and IP address for each client processor must be unique.

Refer to the *Network Administration* guide for information about setting up NIS and the BIND Configuration Application.

10.9 Security Considerations

C2 security may be installed on the server and the clients. However, Dataless Management Services uses the `bootp` protocol, which is not a secure protocol. Therefore, your dataless environments may not be secure.

11

Creating DMS Environments on the DMS Server

This chapter describes how to use the dmu utility to add software to a DMS environment and how to configure the environment. The following topics are discussed:

- Ensuring version compatibility between DMS servers and clients
- Installing software into a new DMS environment
- Adding software into an existing DMS environment
- Customizing and configuring a DMS environment
- Setting up a worldwide DMS server

11.1 Ensuring DMS Server and Client Compatibility

If you are installing this version (or higher) of the operating system into a DMS environment and the DMS server is running a previous version of the operating system, you must perform the following procedure:

1. Log in to the DMS server as root or use the su command to gain superuser privileges.
2. If your distribution media is CD-ROM, enter a mount command similar to the following example:

   ```
   # mount -rd /dev/rz4c /mnt
   ```

   This example uses a CD-ROM drive that is unit 4 and specifies /mnt as the mount point; if your drive is a different unit, substitute the device special file name for that unit. If you are uncertain of your CD-ROM's unit number, use the file command, specifying the raw device, as follows:

   ```
   # file /dev/rrz*c

   /dev/rrz1c: char special (8/1026) SCSI #0 RZ25  disk #8  (SCSI ID #1)
   /dev/rrz2c: char special (8/2050) SCSI #0 RZ25  disk #16 (SCSI ID #2)
   /dev/rrz3c: char special (8/3074) SCSI #0 RZ25  disk #32 (SCSI ID #3)
   /dev/rrz4c: char special (8/4098) SCSI #0 RRD43 disk #64 (SCSI ID #4)
   ```

The CD-ROM device corresponds to an RRD device, in this example RRD43.

3. Assuming that the distribution media is mounted at /mnt, enter the following command to update DMS on the server:

```
# /mnt/isl/utilupdate -d -m /mnt
```

   - In this example, the -d copies several files from the distribution CD to the server's /usr/sbin directory. This ensures DMU compatibility with the operating system.
   - The -m *directory* is the mount point of the distribution media. In this example, *directory* is /mnt, and is a required parameter.

   This procedure copies any files in /usr/sbin that would be overwritten to files with a *.pre-V5.0 suffix, for example: /usr/sbin/setld is copied to /usr/sbin/setld.pre-V5.0.

When the utilupdate script completes, this RIS server can serve the current version of the operating system to a DMU client. Refer to Appendix C for information about the utilupdate utility.

If the utility finds existing *.pre-V operating system files on your system, no copies are made. If the server is already running the current version of the operating system (or higher), a confirmation is displayed and no copies are made.

11.2 Installing Software in a New DMS Environment

You must install and configure all the software you plan to use in a DMS environment before you can add clients to share the environment.

Perform the procedures described in this section to install the software into a new dms*N*.alpha environment. Repeat the installation procedures for each dms*N*.alpha environment you plan to set up.

1. Insert the *Operating System Volume 1* CD-ROM into the drive, then mount the CD-ROM.
   - If your DMS server is running the current version of the operating system, use a command similar to the following example:

```
# mount -rd /dev/disk/cdrom0c /mnt
```

     This example mounts a CD-ROM drive that is device 0 on the mount point /mnt. If your drive is a different device, substitute the correct device name. The mount point does not have to be /mnt.

If you do not know CD-ROM drive's unit number, use the `ls` command as follows:

```
# ls -l /dev/disk/cdrom*
brw-------   1 root     system    19, 69 Nov 18 06:11 /dev/disk/cdrom0a
brw-------   1 root     system    19, 71 Nov 18 06:11 /dev/disk/cdrom0c
#
```

- If your DMS server is running an earlier version of the operating system, use a command similar to the following example:

  ```
  # mount -rd /dev/rz4c /mnt
  ```

  This example uses a CD-ROM drive that is unit 4 and specifies `/mnt` as the mount point. If your drive is a different unit, substitute the device special file name for that unit. If you do not know your CD-ROM's unit number, use the `file` command, specifying the raw device, as follows:

  ```
  # file /dev/rrz*c

  /dev/rrz1c: char special (8/1026) SCSI #0 RZ25  disk #8  (SCSI ID #1)
  /dev/rrz2c: char special (8/2050) SCSI #0 RZ25  disk #16 (SCSI ID #2)
  /dev/rrz3c: char special (8/3074) SCSI #0 RZ25  disk #32 (SCSI ID #3)
  /dev/rrz4c: char special (8/4098) SCSI #0 RRD43 disk #64 (SCSI ID #4)
  ```

  The CD-ROM device corresponds to an RRD device, in this example RRD43.

You can use a Network File System (NFS) mount point to install software from a Remote Installation Services (RIS) area or *Operating System Volume 1* CD-ROM from another processor. See Section 4.3 for more information about using an NFS mounted RIS area.

2. Invoke the `dmu` utility by entering the following command at the root system prompt:

   ```
   # /usr/sbin/dmu
   ```

   The DMU Main Menu is displayed:

   ```
   *** DMU Main Menu ***

   Choices without key letters are not available.

        ) ADD a client
        ) CONFIGURE software environments
        ) DELETE software environments
       i) INSTALL software environments
        ) LIST registered clients
        ) MODIFY a client
        ) REMOVE a client
        ) SHOW software environments
       x) EXIT
   ```

   If this is the first time you have accessed `dmu`, there are no DMS software environments installed. The only option you have is to install software into an environment or to exit from the utility.

3. Enter **i** at the prompt to choose the INSTALL software environments option.

```
Enter your choice: i
```

4. The INSTALL software environments option displays an installation menu which lists the installation options that are available. Choose option 1, Install software into a new area:

```
DMU Software Installation Menu:

        1) Install software into a new area
        2) Add software to an existing area
        3) Perform configuration phase on an existing area
        4) Return to previous menu

Enter your choice: 1
You have chosen to establish a new remote dataless environment.
```

5. A prompt asks for the full pathname of the device special file name or the path of the directory where the software is located.

```
Enter the device special file name or the path of the directory where
the software is located (for example, /mnt/ALPHA/BASE):
/mnt/ALPHA/BASE
```

6. The dmu utility lists the mandatory software subsets that are installed automatically. The mandatory subsets displayed may vary depending upon the type of hardware you are using.

7. The system displays the first screen of optional software subsets. The optional subsets displayed vary depending upon the type of hardware you are using. At each screen of subsets you can enter the number that corresponds to the subset you want, or you can press the Return key to display the next screen. At the bottom of each subset screen, you see the following prompt:

```
---MORE TO FOLLOW---
Enter your choices or press RETURN to display the next screen.
```

   The utility is flexible; it lets you enter your subset selections at the bottom of each screen or all at once at the end of the subset list (which may be several screens later).

   You can enter subset numbers separately (separated by a space) or in ranges (with a hyphen between the first number in the range and the last number in the range).

   The following subsets must be installed in the DMS environment:

   - Additional Networking Services
   - Dataless Management Services

The first screen of optional subsets is displayed along with the following instructions:

```
The subsets listed below are optional:

     There may be more optional subsets than can be presented on a single
     screen. If this is the case, you can choose subsets screen by screen
     or all at once on the last screen. All of the choices you make will
     be collected for your confirmation before any subsets are extracted.

               .
               .
     {optional subset list}
               .
               .

Or you may choose one of the following options:

    94) ALL mandatory and all optional subsets
    95) MANDATORY subsets only
    96) CANCEL selections and redisplay menus
    97) EXIT without extracting any subsets

Enter your choices or press RETURN to redisplay menus.

Choices (for example, 1 2 4-6): 95
```

If you choose the option `ALL mandatory and all optional subsets`, all available software subsets are installed.

If you choose the option `MANDATORY subsets only`, only the mandatory software subsets are installed in the environment even if you have entered optional subset numbers on previous screens. If you choose this option, you must go back and install the subsets required for DMS from the optional subset list. Use the instructions in Section 11.3 of this manual to install the subsets required for DMS.

If you choose the option `CANCEL selections and redisplay menus`, the utility returns to the first screen of software subsets and you are able to start your subset selection process again.

If you choose the option `EXIT without installing any subsets`, the utility prompts you to confirm your choice. If you enter `y`, the utility returns to the DMU Main Menu. If you enter `n`, the utility returns to the first screen of software subsets to let you begin your subset selection again.

8. Once you have entered your subset selections, the screen displays the subsets you have chosen to install and then asks you to confirm your choice:

```
You are extracting the following mandatory subsets:

                .
                .
     {mandatory subset list}
                .
                .

Is this correct? (y/n): y
```

If the subsets listed are the subsets that you want to install into the environment, enter y. If you enter n, the list of optional software subsets is displayed again and you can restart your subset selection process.

9. Before software installation begins, the dmu utility checks to make sure there is enough disk space to accommodate the software subsets you have chosen to install in the environment. The following message appears if there is sufficient disk space available:

```
Checking file system space required to install selected
subsets:

File system space checked OK.
```

If there is not enough disk space to perform the installation, a message similar to this is displayed:

```
fitset:
file system /usr needs 74683 Kbytes more to install the software specified.
setld:
There is not enough file system space to install the mandatory subsets.
setld failed.

Error(s) have occurred during subset load. The subset(s) that failed
are listed above and have not been installed into the environment.
Possible causes for failure include subset dependencies that have
not been met or the lack of disk space.

You will now be asked if you wish to keep this environment.
If you elect to keep the environment, you may install the subsets that failed
by choosing INSTALL from the DMS main menu and select an existing environment.
If you elect not to keep the environment, it will be completely removed.

Keep this environment (y/n) [y]:
```

- If you want to keep the new DMU environment, enter **y**.
- If not, enter **n**, and the dmu utility terminates the installation and returns to the DMU Main Menu. At this point, you have to resize your disk partitions or choose fewer optional software subsets.

10. If there was enough disk space to install the subsets, messages will appear as each subset is selected, installed, and verified. Depending on the number of subsets you have chosen and their sizes, this process can take an hour or more.

    The new environment is located in `/var/adm/dms/dms`*N*`.alpha`.

After the installation of software subsets is complete, the utility displays the name of the new DMS environment. If this is the first DMS environment, it automatically is named `dms0.alpha`. Subsequent DMS environments are numbered sequentially: the next environment is named `dms1.alpha`, the one after that is named `dms2.alpha`, and so on.

If you delete an environment, for example `dms4.alpha`, the next time you install a DMS environment, the `dmu` utility reuses the number `4` to name the environment. The utility fills the holes left in the numbering sequence by environments that have been deleted.

After you install software into the DMS environments, you must configure and build the kernel for that environment. Refer to Section 11.4 for instructions on how to begin the kernel configuration phase. However, if you want to add additional software to the environment before configuring the kernel, refer to Section 11.3.

11.3 Adding Software to an Existing DMS Environment

Use the `shutdown` command to shut down the clients registered to the DMS environment before you add new software. Use the SysMan Menu to install any additional software subsets and layered products that are compatible with the operating system into the DMS client area on the server.

To install additional software into an existing environment, invoke the `dmu` utility and choose the `INSTALL software environments` option from the DMU Main Menu. Ensure that DMS clients that mount the `usr` area of the target `/var/adm/dms/dms`*N*`.alpha` area are not running when you install an additional software product, or their `usr` area may change unpredictably and cause destruction of software or data or both.

To give DMS clients access to the new software subsets, delete the clients from the DMS environment and then add them again after the DMS environment is reconfigured. When clients are removed and added to the reconfigured environment, customized information in the `root` (/) directory is lost.

The following sample session illustrates the installation of optional subsets into /var/adm/dms/dms0.alpha.

1. Mount the CD-ROM that contains the software you want to install as shown in Section 11.2, or mount the file system area that contains the software kits.
2. Invoke the dmu utility from the root system prompt by entering:

```
# /usr/sbin/dmu
```

   Choose the INSTALL software environments option from the DMU Main Menu by entering i at the prompt.

```
*** DMU Main Menu ***

    a) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
     ) LIST registered clients
     ) MODIFY a client
     ) REMOVE a client
    s) SHOW software environments
    x) EXIT

Enter your choice: i
```

3. The DMU Software Installation Menu is displayed. Choose the option, Add software into an existing area. A message confirms that you have chosen to add a product to an existing area.

```
DMU Software Installation Menu:

    1)  Install software into a new area
    2)  Add software into an existing area
    3)  Perform configuration phase on an existing area
    4)  Return to previous menu

Enter your choice: 2

You have chosen to add a product to an existing environment.

The existing environment is /var/adm/dms/dms0.alpha.
```

   In the previous example, only one environment, dms0.alpha, exists. If you have more than one DMS environment, a list of the environments is displayed and a prompt asks you to select the environment to which you want to add software:

```
Select the remote dataless environment:

1) /var/adm/dms/dms0.alpha
   'Tru64 UNIX Operating System (Rev nnn)'

2) /var/adm/dms/dms1.alpha
   'Tru64 UNIX Operating System (Rev nnn)'
   'Sort Runtime Library'

Enter your choice: 1
```

4. After you select an environment, you are prompted for the location of the directory where the software is located:

```
Enter the device special file name or the path of the directory where
the software is located (for example, /mnt/ALPHA/BASE):
/mnt/ALPHA/COMPILERS
```

5. As shown in Section 11.2 the utility lists the subsets that are available. Select the optional subsets that you want from the list. Subsets that are already installed will not display on the list.
6. The utility lists the subsets that you have chosen to install and asks you to confirm your choice. If the subsets listed are the ones that you want, enter `y`. If you enter `N`, the list of optional software subsets is displayed again, and you can reselect the subsets that you want.

Messages appear as each subset that you selected is installed and verified. Depending on the number and size of subsets you have chosen, this process can take an hour or more.

11.4 Configuring DMS Environments

After you install software into a new or existing DMS environment, you must configure the environment. Configuring the environment includes the following steps:

1. Customizing system files (the `.proto..` files). This step is optional; you do not have to customize these files for the environment. This step is performed outside of the `dmu` utility.
2. Building the environment's kernel. This step is mandatory and is performed through the `CONFIGURE software environments` option of the DMU Main Menu.

11.4.1 Customizing .proto.. Files

If you already have configured the DMS environment and later decide to modify `.proto..` files, you must delete the files created by the configuration process. In the following example the `fstab` is modified to include a server name:

```
1. delete the $DMS_ROOT/hosts file
2. modify the $DMS_ROOT/.proto..hosts file
3. configure the DMS area
```

Customize each environment to suit the clients that will be added to a DMS environment by modifying the `.proto..` files. Performing this customization before you add clients to the environment reduces the amount of customization required at each client. You perform the customization before configuring and building the kernel.

There are several .proto.. files located in the DMS environment /var/adm/dms/dms*N* .alpha in the /etc, /bin, /var/adm/X11, and root directories that you may want to modify. As an example, the /etc/.proto..hosts file is a file that you could modify in advance. Table 11–1 lists the .proto.. files found in the /etc directory that you can customize.

Table 11–1: List of .proto.. Files in /etc

.proto..TIMEZONE	.proto..acucap	.proto..autopush.conf
.proto..binlog.conf	.proto..ddr.db	.proto.ddr.dbase
.proto..dhcptab	.proto.disktab	.proto.dvrdevtab
.proto..exports	.proto..fstab	.proto..ftpusers
.proto..gen_databases	.proto..gettydefs	.proto..group
.proto..hosts	.proto..hosts.equiv	.proto..ifaccess.conf
.proto..inet.local	.proto..inetd.conf	.proto..inittab
.proto..lprsetup.dat	.proto..magic	.proto..motd
.proto..networks	.proto..ntp.conf	.proto..passwd
.proto..phones	.proto..profile	.proto..protocols
.proto..rc.config	.proto..remote	.proto..rpc
.proto..securettys	.proto..services	.proto..shells
.proto..slhosts	.proto..stresetup.conf	.proto..svc.conf
.proto..sysconfigtab	.proto..syslog.conf	

For example, the /etc/.proto..hosts file contains no host names. At a minimum, edit this file to include the network addresses, names, and aliases of well-known systems in your environment. Server information should be listed, so that you do not have to enter this information for each client when setting up the network services. Entries in this file look similar to the following:

```
nnn.n.n.n localhost
nn.nn.nnn.nnn dmsserver.myorg.com dmsserver
nn.nn.nnn.nnn nfsserver.myorg.com nfsserver
```

You should list commonly mounted NFS file systems, as well as the /proc file system if the clients will be using it. When you add NFS file systems to the etc/.proto..fstab file, you also should add the hosts to the etc/.proto..hosts file. If the NFS mount points are in the client root partition, make the directory mount points in the DMS root area as well. If they are in the shared usr directory structure, make the directory mount points in the DMS usr directory area.

After you modify the .proto.. files in the DMS environment, configure the DMS environment by following the steps in Section 11.4.2.

11.4.2 Configuring the DMS Environment

If you want to customize the DMS environment, you already should have modified the .proto.. files. After you have modified the .proto.. files, use the following procedures to configure the DMS environment:

1. Log in to the DMS server as root or use the su command to gain superuser privileges.
2. Invoke the dmu utility by entering the following command at the root system prompt:

```
# /usr/sbin/dmu

*** DMU Main Menu ***

     ) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
     ) LIST registered clients
     ) MODIFY a client
     ) REMOVE a client
    s) SHOW software environments
    x) EXIT

Enter your choice:
```

3. Invoke the dmu utility by entering the following command at the root system prompt:

```
# /usr/sbin/dmu
```

   Enter **c** to select CONFIGURE software environments. You see the following message:

```
You have chosen to configure an existing dataless
environment.
```

   You also can configure the DMS enviroment by entering **i** to select INSTALL software environments from the DMU Main Menu to display the DMU Software Installation Menu:

```
DMU Software Installation Menu:

        1) Install software into a new area
        2) Add software to an existing area
        3) Perform configuration phase on an existing area
        4) Return to previous menu

Enter your choice: 3
```

Enter **3** to select `Perform configuration phase on an existing area`. The configuration phase proceeds as shown in the following steps.

4. You are prompted to select the dataless environment to configure. For example:

```
Select the remote dataless environment:

1)  /var/adm/dms/dms0.alpha
    'Tru64 UNIX V5.0 Operating System (Rev nnn)'

2)  /var/adm/dms/dms1.alpha
    'Tru64 UNIX V5.0 Operating System (Rev nnn)'
    'DEC Pascal for DEC OSF/1 AXP Runtime Support'
    'DEC Fortran for OSF/1 AXP Runtime Support'
    'DEC Cobol RTL V2.2 for DEC OSF/1 Systems'
    'DEC C++ RTL Version 3.0 for DEC OSF/1 SYSTEMS'

Enter your choice: 1
```

   If there is only one environment with software installed then you do not see this prompt, and the utility proceeds to the next step.

5. You see the following message:

```
There are several files prefixed by .proto.. within the
environment area that should be modified before performing
a configuration of the area.  Performing this customization
of the environment before you register clients will reduce the
amount of customization required at each client.

You may now choose to continue with the configuration or return
to the main menu and exit to perform customization of the
environment.
Do you want to (c)ontinue or (r)eturn to the main menu? (c/r)
[c]: c
```

   - If you enter **r**, the utility returns to the DMU Main Menu to let you exit the `dmu` utility and modify the `/etc/.proto..` files.
   - If you enter **c** to continue, the utility displays messages as it configures each software subset. Your output will be similar to the following:

```
Configuring "Base System " (OSFBASE500)
Configuring "Base System - Hardware Support " (OSFHWBASE500)

                .
                .
                .
        {subset list}
                .
                .
                .

Configuring "Remote Installation Service " (OSFRIS500)
Configuring "Dataless Management Services " (OSFDMS500)
```

After you have created at least one DMS environment, installed software, customized the `.proto..` files, and configured the DMS environment, you can add clients to the environment. Adding clients to DMS environments is discussed in Chapter 12.

11.5 Setting Up a Worldwide DMS Server

The following sections provide information for setting up a worldwide DMS server. This includes the following topics:

- Setting up a worldwide DMS server
- Setting up a worldwide DMS client
- Building an Asian kernel for worldwide DMS clients

11.5.1 Worldwide DMS Server Setup

Use the following procedures to create a new `dms`*N* `.alpha` environment and install worldwide software into it:

1. Install the operating system into a DMS area before installing the Worldwide Language Support (WLS) software.
2. Enter a `mount` command similar to the following before starting the utility if you are using the operating system CD-ROM as the distribution media:

   ```
   # mount -dr -t cdfs -o rrip /dev/disk/cdrom0c /mnt
   ```

   This example uses a CD-ROM drive that is unit 0 on the mount point `/mnt`. If your drive is a different unit, substitute the correct unit number.
3. Enter the following command to invoke the `dmu` utility:

   ```
   # /usr/sbin/dmu
   ```
4. Choose the option `INSTALL software environments` from the DMS Main Menu.
5. Choose `Add software to an existing area` when the DMU Software Installation Menu displays. If you have more than one DMS environment, a list of the environments is displayed and you are prompted to select the environment for adding software. Select the DMS area where the operating system is installed.
6. At the prompt, enter the full pathname of the device special file or mount points for the distribution media. Enter `/mnt/ALPHA/WORLDWIDE` to install worldwide support subsets. The installation procedure displays a menu listing the countries for which you can install worldwide language support.
7. Select the countries that you want to install. A list of subsets is displayed. Worldwide subsets are described in the *Installation Guide*.

The steps for installing subsets are the same as installing subsets from a RIS server. See Section 4.1 for detailed instructions. After installing the subsets, the DMU Main Menu displays.

8. Choose `CONFIGURE software environments` at the DMU Main Menu prompt to configure newly installed subsets into the DMS environment. Questions about configuring `Wnn` display during the configuration phase.

11.5.2 Worldwide DMS Client Setup

Once you have set up the DMS areas and registered the clients, they can access the configured areas. See Section 10.8 on how to register the client with a network naming service. You must register the client with the full or partial (default) kernel option for them to use the Asian kernel functionality.

11.5.3 Building an Asian Kernel for DMS Clients

When the DMS client boots for the first time from a newly configured DMS area, an Asian kernel is built. Reboot the system if you want to use the Asian terminal driver functions. You also can reconfigure the Asian kernel on the client machine by using the `wwconfig` command as follows:

```
# /usr/sbin/wwconfig -a
```

Refer to the *Installation Guide — Advanced Topics* and the `wwconfig`(8) reference page for more information about using the `wwconfig` command.

12

Managing DMS Clients and Environments

This chapter describes how to use the `dmu` utility to manage Dataless Management Services (DMS) environments and clients. The information in this chapter includes the following topics:

- Locating and interpreting the DMS client database file
- Adding a client to a DMS environment
- Booting a DMS client
- Deleting a DMS environment
- Modifying a DMS client
- Removing a DMS client
- Listing registered DMS clients
- Showing software environments in the server's DMS area
- Maintaining the server's DMS areas

12.1 DMS Client Database File

The DMS client database file is located in `/var/adm/dms/clients/dmsdb`. Entries in this file are similar to the following:

```
client1:nn-nn-nn-nn-nn-nn:/var/adm/dms/dms0.alpha:/clients/client1:
sk0b:RZ26:None:ln0:255.255.255.0
```

In this example:

- `client1` is the client's host name
- *nn-nn-nn-nn-nn-nn* is the client's hardware network address
- `/var/adm/dms/dms0.alpha` is the DMS environment being served to the client
- `/clients/client1` is the location of the client's root area
- `rz0b` is the client's swap device and partition
- `RZ26` is the swap disk

- None specifies the client has no kernel build area
- ln0 is the network interface type
- 255.255.255.0 is the subnet mask

When you use the ADD a client, MODIFY a client, or REMOVE a client option from the DMU Main Menu, the client's entry is in the dmsdb file is respectively added, modified, or deleted.

12.2 Adding a DMS Client

The information you need to add a DMS client is shown in the Client Setup Worksheet in Appendix B. You should fill out a worksheet for each client you want to add before you use dmu to add clients to a DMS environment.

Before you can add a client, you already must have followed the procedures in Chapter 11 to install software in at least one DMS environment, and optionally customize the .proto.. files.

The client system must be connected to a local area network (LAN) and must be registered with the server through one of the network naming services (see Section 10.8) or must have an entry in the server's /etc/hosts file.

When a client is added to a DMS environment, the root directory from the server's DMS environment gets copied to the client area.

Use the following procedure to add a client to a DMS environment:

1. Invoke the dmu utility by entering the following command at the root system prompt:

```
# /usr/sbin/dmu
```

2. Choose the ADD a client option by entering a at the DMU Main Menu prompt:

```
*** DMU Main Menu ***

    a) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
    s) SHOW software environments
    x) EXIT

Enter your choice: a
```

3. The following confirmation message is displayed along with the information you are asked to provide about the client:

```
You have chosen to add a client for dataless service.

The following conditions must be met to add a client:

   1. You must know the client processor's hostname.
   2. The client's hostname must be in your system's host
      database(s).
   3. You must know the client's interface type, subnet
      mask.
   4. You must know the type of kernel build area.
   5. You must know the swap device and partition on the
      client.
   6. You must know the client's hardware Ethernet or FDDI
      address.
   7. If the client and the server reside on different subnets,
      you will need the address of the gateway(s) that the
      client can sue to communicate with the server.

Do you want to continue? (y/n) [y]:
```

If you enter `n`, the `dmu` utility returns to the DMU Main Menu. If you enter `y` or press the Return key (to accept the default), the utility prompts you to enter the client's host name.

4. Enter a host name that has an entry in the server system's host database by using the Network Information Service (NIS) or Berkeley Internet Name Domain (BIND) naming services or by making an entry in the server's `/etc/hosts` file.

```
Enter the client processor's hostname or press RETURN to quit:
client1
```

If you press the Return key, the utility returns to the DMU Main Menu. If you enter a host name that is not in the server's host database, the following message is displayed:

```
arp failed on hostname "client_name"
```

In the above message, `arp` is the address resolution protocol. If you receive this message, check the server's host database, the `/etc/hosts` file, to determine the correct client name. If the client was never registered with a network naming service (such as BIND or NIS) or was never entered in the `/etc/hosts` file, exit the utility by pressing Ctrl/C and add the client to the `/etc/hosts` file.

Note

For the remaining examples, assume the Return key is pressed to accept the default response.

5. After you enter the client name, you are prompted to enter the location of the client's `root` directory. If you specify a path other than the default, which is `/clients/`*`hostname`*, you already must have created the directories in that path. The path you specify must begin with `/clients`. If you wanted to differentiate between client systems in different departments at your site, you could specify `/clients/`*`department_name/hostname`* as the location of `root`. The *`department_name`* directory must have been created already under the `/clients` directory for you to do this. Do not use more than 25 characters for the client's `root` directory's total path name.

   Enter the path to the client's root file system at the prompt:

   ```
   Enter the path to contain the root file system. [/clients/client1]:
   ```

6. Next, the utility prompts you to enter the swap information for the client.

   ```
   Enter the swap device and partition on client1. [dsk0b]:
   Enter the swap device drive type for dsk0b. [RZ26]:
   ```

7. The utility prompts you to enter some basic network information about the client. The `dmu` utility enters this information into the client's `rc.config` file to allow the client to boot over the network. You will be asked to enter the default route for network information if the server and client are on different networks. Refer to the *Network Administration* guide if you need more information about obtaining the client's network information:

   ```
   Enter the network interface for client1 (nn.nn.nnn.nnn) [ln0]:

   Enter the subnet mask for ln0. [255.255.255.0]:

   Enter the default route for network nn.nn.nnn [nn.nn.nnn.nnn]:
   ```

   Note

   The default network interface is `ln0` for the DEC 3000 series and other systems that use the Lance Ethernet module. Some systems such as the EB64+ use the Tulip Ethernet module, which may be identified as `tu0`. Be sure to enter the correct network device identifier for the Ethernet or FDDI interface on the client system.

   - If no entry for the client's subnet is found in the `/var/adm/dms/gateways` file on the server, the following message is displayed:

     ```
     Enter the IP address of the gateway[s] between the client subnet and
     server subnet. (For example, nn.nn.nnn.???). :
     ```

- If an entry for the client's subnet is found in the /var/adm/dms/gateways file on the server, the following message is displayed:

```
The following are the known gateway[s] between the client subnet and
server subnet. If these value[s] are not correct, please enter the
proper address[s]. If these value[s] are correct, press Return. (For
example, nn.nn.nnn.???) [nn.nn.nnn.nnn]:
```

8. The utility prompts you to enter the type of kernel build support you want to provide for the client. Refer to Section 10.6.3 for more information about kernel build support. If you are not sure what type of kernel build support you want, enter H for help.

```
Enter the type of kernel build area for client1.
You may select one of [F]ull, [P]artial, [N]one or
[H]elp for more information. [P]:
```

9. The following message confirms the choices you made:

```
You have specified the following configuration for client1:

        ROOT:  /clients/client1
 SWAP_DEVICE:  /dev/disk/dsk0b
   SWAP_TYPE:  RZ26
  BUILD_TYPE:  Partial
   INTERFACE:  ln0 (nn.nn.nnn.nnn)
 SUBNET_MASK:  255.255.255.0
       ROUTE:  network: nn.nn.nnn gateway: nn.nn.nnn.nnn
Is this correct (y/n) [y]:
```

If you enter n, the utility returns to the DMU Main Menu and you will have to add your client information again. If you enter y, you are prompted to select the dataless environment to which you want to add the client. The directory /clients/client1 is overwritten if it currently exists.

10. If there is only one /var/adm/dms/dms*N* .alpha area, the following message is displayed:

```
The existing environment is /var/adm/dms/dms0.alpha.

The following environment will be installed from
/var/adm/dms/dms0.alpha:

Description
   1    'Tru64 UNIX 5.0 Operating System (Rev nnn)'

Is that correct? (y/n) [y]:
```

If there are multiple /var/adm/dms/dms*N* .alpha areas, or if more than one dms*N* .alpha environment is installed in this DMS server area, a list of the environments into which you can add the new client is displayed. As shown in the following example, each environment may contain different software subsets or may have been customized which may influence the environment you choose.

```
Select the remote dataless environment:

 1)  /var/adm/dms/dms0.alpha
     'Tru64 UNIX 5.0 Operating System (Rev nnn)'

 2)  /var/adm/dms/dms1.alpha
     'Tru64 UNIX 5.0 Operating System (Rev nnn)'
     'DEC Pascal for DEC OSF/1 AXP Runtime Support'
     'DEC Fortran for OSF/1 AXP Runtime Support'
     'DEC Cobol RTL V2.2 for DEC OSF/1 Systems'
     'DEC C++ RTL Version 3.0 for DEC OSF/1 SYSTEMS'

Enter your choice: 2

The following environment will be installed for the client
from /var/adm/dms/dms1.alpha:

Description
        'Tru64 UNIX 5.0 Operating System (Rev nnn)'
        'DEC Pascal for DEC OSF/1 AXP Runtime Support'
        'DEC Fortran for OSF/1 AXP Runtime Support'
        'DEC Cobol RTL V2.2 for DEC OSF/1 Systems'
        'DEC C++ RTL Version 3.0 for DEC OSF/1 SYSTEMS'

Is that correct? (y/n) [y]:
```

11. If you enter `n`, the utility returns to the DMU Main Menu and the client is not added to any DMS environment. If you enter `y`, you are prompted to enter the client's Ethernet or FDDI address:

```
Enter the client processor's hardware network
address. For example, 08-00-2b-02-67-e1: nn-nn-nn-nn-nn-nn
```

Refer to the *Network Programmer's Guide* or Section 6.2 for information about how to obtain a network hardware address. If you do not enter the hardware address in the correct format (for example, too many numbers), the utility displays an error message and repeats the prompt as shown in the following example:

```
nn-nn-nn-nn-nn-nnnn is an invalid Ethernet or FDDI address.

Enter the client processor's hardware network address.
For example, 08-00-2b-02-67-e1:
```

Note

The `dms` utility does not check the validity of the address you enter, but it does check to make sure the address you enter is in the correct format.

12. After you enter a valid hardware network address, the utility checks to see is there is enough free space in /clients to create the root and /var file systems for the client. The following message is displayed:

```
Checking file system space required for client
root and var file systems.
```

- If there is not enough free space available to create the file system, the following message is displayed:

```
There is not enough free space in /clients
to create the root and var file systems
for client1. client1 has not been added.
```

  The DMU Main Menu is displayed.

- If there is enough space to create the root and /var file systems, the dmu utility copies the DMS environment root area to the /clients/*clientname* area, creates the /var file system for the client, and displays the following message:

```
Creating the root and var file systems for client1

Client client1 has been added.
```

Notify the client's system administrator when client registration is complete, and inform them that they can now boot the client across the network. See Section 12.3 for basic information about booting a client. Detailed booting information is in the *Installation Guide — Advanced Topics*.

12.3 Booting a DMS Client

After a DMS client is added to the appropriate environment, the client's system administrator can boot the client over the network. When the client starts to boot, the kernel that boots over the network is: /clients/*hostname* /.vmunix

The following occurs when the client boots:

- /clients/*hostname* is NFS mounted as / (root)
- /var/adm/dms/dms*N*.alpha/root/usr is NFS mounted as /usr

The network information you entered about the client when the client was added to the environment is sufficient to boot successfully across the LAN.

DMS clients must be able to boot over Ethernet or FDDI LAN. The basic procedure for booting a processor over the network from a server is to shut down the client system to console mode and then issue a boot command from the client.

Refer to the *Installation Guide — Advanced Topics* for information about booting specific processors.

When the client boots, the client system administrator is prompted to enter a superuser password. The superuser password must contain between 6 and 16 characters and should use a combination of upper and lower case letters. You should use special characters such as the dollar sign ($), percent sign (%), asterisk (*), and numbers in the password. The password is not displayed on the screen for security reasons. A second prompt asks for the new password again as validation. The screen display is similar to the following:

```
*** SUPERUSER PASSWORD SPECIFICATION **

Changing password for root.

Enter root password:
Retype root password:
```

System information is displayed while the client system is coming up. When the Common Desktop Environment (CDE) login window or the `login` prompt appears, enter `root` as the login name. At the prompt for a password, enter the superuser password that was specified previously.

12.4 Deleting a Software Environment

When you delete a software environment, the environment itself and all clients registered to that environment are deleted in a destructive manner. That is, once you confirm your choice, there is no opportunity to undo the deletion.

Caution

Make sure that the clients registered to the environment have been notified and shut down before you delete the environment. Failure to do so will cause a running client to lose its operating system.

To delete a software environment, follow these steps:

1. Invoke the `dmu` utility by entering `/usr/sbin/dmu` at the `root` system prompt, and choose the `DELETE software environments` option by entering `d` at the prompt:

```
*** DMU Main Menu ***

    a) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
```

```
    s) SHOW software environments
    x) EXIT

Enter your choice: d
```

2. The utility displays a list of the existing dataless environments and prompts you to choose the environment you want to delete:

```
Select the remote dataless environment:

 1)  /var/adm/dms/dms0.alpha
       'Tru64 UNIX V5.0 Operating System (Rev nnn)'

 2)  /var/adm/dms/dms1.alpha
       'Tru64 UNIX V5.0 Operating System (Rev nnn)'
       'Sort Runtime Library'

 3)  /var/adm/dms/dms2.alpha
       'Tru64 UNIX V5.0 Operating System (Rev nnn)'
       'System V Environment'

Enter your choice: 1
```

3. After you select the dataless environment to delete, a confirmation displays your choice:

```
The following environment will be deleted from
/var/adm/dms/dms0.alpha:

Description
   'Tru64 UNIX V5.0 Operating System (Rev nnn)'

Is that correct? (y/n) [y]:
```

   If you enter `n`, the utility returns to the DMU Main Menu. If you enter `y`, the following message displays:

```
After this deletion, the area /var/adm/dms/dms0.alpha will
be empty.  The following clients are registered for
/var/adm/dms/dms0.alpha:
client1 client2 client3

This procedure will completely remove /var/adm/dms/dms0.alpha.
Do you want to continue? (y/n) [n]:
```

   If you enter `n` or press the Return key (to accept the default), the utility returns to the DMU Main Menu and does not delete the environment or the clients registered to it. If you enter `y`, the utility deletes the DMS environment and all the clients registered to that environment and displays the following message:

```
Do you want to remove the client's root file system
[/clients/client1]? (y/n) [n]:
```

   The utility prompts you to answer whether or not you want to remove the `root` and `/var` file systems for each client registered to the environment. This is your opportunity to save customized data in the `root` directory. If you enter `n`, all customized data in `root` will be lost.

After the deletion is complete, the utility returns to the DMU Main Menu.

12.5 Modifying Client Information

The dmu utility lets you modify the network hardware address of a client. Refer to the *Network Programmer's Guide* or Section 6.2 in this manual for instructions about how to obtain the hardware address of a client.

To modify a client's information perform the following procedure:

1. To modify a client's hardware address, invoke the dmu utility (by entering /usr/sbin/dmu at the root system prompt), and choose the MODIFY a client option by entering m at the prompt:

```
*** DMU Main Menu ***

    a) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
    s) SHOW software environments
    x) EXIT

Enter your choice: m
```

2. The dmu utility displays a list of the registered clients. It does not display the DMS environment to which the client is registered.

```
The following clients are available to modify:

client4 client5 client6

Enter the client processor's hostname or press RETURN to quit:
client4
```

   If you do not enter a client name and press the Return key, the utility returns to the DMU Main Menu.

3. If you enter a valid client name, you are prompted to enter the client's new Ethernet or FDDI address. The client's current hardware address is the default response.

```
Enter the client processor's hardware network address. For example,
08-00-2b-02-67-e1 [nn-nn-nn-nn-nn-nn]:
nn-nn-nn-nn-nn-nn4

Client client4 has been modified.
```

Note

The dms utility does not check the validity of the address you enter; however, it does check to make sure the address you enter is in the correct format.

If you press the Return key instead of entering a new Ethernet or FDDI address, the address will not change. When the modification is complete, the utility returns to the DMU Main Menu.

Caution

If you want to change the client's IP address or the environment to which the client is registered, you must first shut down the client, (by using the shutdown command) and then remove the client from the current environment (by choosing REMOVE a client from the DMU Main Menu). Then, add the client to another environment (by choosing ADD a client from the DMU Main Menu).

12.6 Removing a Client

You must make sure the client has been shut down (using the shutdown command) before it is removed from an environment. A client will lose its operating system if it is removed while it is up and running. Follow these steps to remove (delete) a client from a DMS environment:

1. Invoke dmu by entering /usr/sbin/dmu at the root system prompt and choose the REMOVE a client option by entering r at the prompt. You may want to execute the LIST registered clients option first to determine the exact client processor host name.

```
*** DMU Main Menu ***

    a) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
    s) SHOW software environments
    x) EXIT

Enter your choice: r
```

2. A message appears that confirms that you have chosen to remove a client processor. You are prompted to enter the client processor's host

name and then to confirm the removal of the client (the default confirmation is no).

```
You have chosen to remove a client from the remote
dataless service.

Enter the client processor's hostname or press RETURN to quit:
client5
```

If you press the Return key, the utility returns to the DMU Main Menu. If you enter a client name that is not in the DMS client database, /var/adm/dms/clients/dmsdb, the following message is displayed:

```
There is no entry for client_name in the dmsdb file.
```

If you enter a valid client name, the following prompt displays:

```
Remove client5? (y/n) [n]:
```

- If you press the Return key, the utility returns to the DMU Main Menu.
- If you enter n, the utility displays the following message and returns to the DMU Main Menu:

  ```
  client5 was not removed.
  ```

- If you enter y, the utility displays a message similar to the following:

  ```
  Working....Mon Jul 10 15:20:34
  ```

  The client's registration to the DMS environment is deleted, along with the following additional items:

  – The client's root directory (including any customized files that may have been added to that directory)
  – The entries from /etc/exports (described in Chapter 13)
  – The entries from /etc/bootptab
  – The client's entry in the DMS client database file (described in Section 12.1).

Note

If you remove a client but choose to save the root (/) file system, you cannot reuse that root file system if you subsequently add a client with the same client name.

When the DMS client is removed, the dmu utility returns to the DMU Main Menu.

12.7 Listing DMS Clients

Choose the LIST Registered Clients option on the DMU Main Menu to see a list of the clients registered in all dataless environments:

1. Enter /usr/sbin/dmu to invoke the dmu utility:

```
*** DMU Main Menu ***

    a) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
    s) SHOW software environments
    x) EXIT

Enter your choice: l
```

2. Enter **l** to select LIST registered clients. You see output similar to the following:

```
The following clients are registered for /var/adm/dms/dms0.alpha:
client1 client2 client3

The following clients are registered for /var/adm/dms/dms1.alpha:
client4 client5 client6

The following clients are registered for /var/adm/dms/dms2.alpha:
client7 client8 client9
```

12.8 Showing Software Environments

The dmu utility lets you display a list of the current DMS environments:

1. Invoke the dmu utility by entering /usr/sbin/dmu at the root system prompt and choose the SHOW software environments option from the menu by entering s at the prompt:

```
*** DMU Main Menu ***

    a) ADD a client
    c) CONFIGURE software environments
    d) DELETE software environments
    i) INSTALL software environments
    l) LIST registered clients
    m) MODIFY a client
    r) REMOVE a client
    s) SHOW software environments
    x) EXIT

Enter your choice: s
```

2. Your screen display will look similar to the following (depending upon the software subsets installed in each DMS environment):

```
1)  /var/adm/dms/dms0.alpha
    'Tru64 UNIX 5.0 Operating System (Rev nnn)'

2)  /var/adm/dms/dms1.alpha
    'Tru64 UNIX 5.0 Operating System (Rev nnn)'
    'System V Environment '

3)  /var/adm/dms/dms2.alpha
    'Tru64 UNIX 5.0 Operating System (Rev nnn)'
    'Sort Runtime Support'
```

After displaying the list of DMS environments, the utility returns to the DMU Main Menu.

12.9 Maintaining the DMS Environment

This section contains information about maintaining the DMU server area. Topics include:

- Controlling `root` file system growth
- Listing installated software subsets
- Removing software subsets

12.9.1 Controlling Root File System Growth

The `du` command displays a summary of disk usage for file systems. Use this command to monitor the file growth in each client's `root` directory. If clients use too much space, performance is adversely affected. Users must then be told to delete all unnecessary files from their file systems. Monitor disk usage periodically depending upon the systems' use. Refer to `du`(1) for more information about monitoring file system growth.

The `df` command displays statistics about the amount of free space on a specified file system or on a file system that contains a specified file. Refer to `df`(1) for more information about monitoring file system growth.

12.9.2 Listing Installed Software Subsets

Use the `setld` utility to determine which software subsets are installed into a particular `dms`*N* `.alpha` area. For example, the following command produces a list of the subsets installed into the client `root` area of `/var/adm/dms/dms0.alpha`:

```
# setld -D /var/adm/dms/dms0.alpha/root -i
```

Refer to the `setld`(8) reference page for more information.

12.9.3 Removing Subsets

Use the `setld` utility to remove software subsets from a `dms`*N* `.alpha` area. For example, if you installed the Online Reference Pages subset, OSFMAN500, and now want to remove it, use a command similar to the following:

```
# setld -D /var/adm/dms/dms0.alpha/root -d OSFMAN500
```

This command removes the subset from `/var/adm/dms/dms0.alpha`. The *Installation Guide* contains a list of all software subsets.

Caution

If the `setld` utility placed files in `root` during the installation, the product may not be fully removed from the client's `root` file system. Be careful about removing any subset that may be used by client systems. For example:

- If you remove a subset that contains kernel build files, the clients may not be able to build new kernels.
- If you remove a subset that contains NFS components, the clients may not be able to reboot.

You should understand client dependencies before you remove a software component. You may need to delete and reregister all clients before you can reload a subset.

13

Troubleshooting DMS

This chapter contains information to assist you in troubleshooting problems with your DMS server and lists the server files and processes to check if a client is having trouble booting.

If a DMS client has trouble booting, you can check several aspects of server operation to ensure that the server's end of the network connection is functioning properly:

- The server may not be a Network File System (NFS) server. To check whether or not a server is an NFS server, enter the following command on the server:

  ```
  # rcmgr get NFSSERVING
  ```

  If the response is a `1`, the system is an NFS server. If the response is a `0`, the system is not an NFS server. Run `nfsconfig` to configure the server to be an NFS server.

- The network daemons may not be running on the server. This condition is reported by the client with a message like the following:

  ```
  panic: vfs_mountroot: cannot mount root
  ```

  If this message appears on the client, check to make sure that the following daemons are running on the server:

  – `portmap`
  – `mountd`
  – `nfsd`
  – `nfsiod`

  Enter the following command on the server to see if the daemons are running:

  ```
  # ps ax | grep -E "portmap|mountd|nfsd|nfsiod"
  ```

  Process status will appear for any of those daemons that are running, as well as a line showing your `grep` command. If the daemons are not all running, you must start the inoperative ones.

- The client's directories may be exported improperly. Determine if this is the case by examining entries in the server's `/etc/exports` file. If the

client boots to single-user mode but will not boot to multiuser mode, make sure that the appropriate /usr file system and dms*N* root area have entries in /etc/exports. Proper /etc/exports entries should look similar to the entry shown below. In this example, the client name is client1.

```
/clients/client1 -r=0 client1
/var/adm/dms/dms0.alpha/root/usr -r=0 -ro
```

The contents of these entries are described in the exports(5) reference page.

- If you cannot execute commands on the client and the server and client are running different versions of the software, check to see if you copied the client's dmu version to the server. Refer to Section 11.1 for more information.
- If you encounter the following warning when booting a DMS client, there is a problem with the disk or disk partition that was designated as the swap device when the client was registered.

```
WARNING: /dev/rz6c swap partition has unused fstype, failed to add swap.
       : Swap is being set to lazy (over commitment) mode. The system will
       : come up to single-user mode. Set fstype for swap partition to
       : "swap" using "disklabel -s  swap" command and reboot.
```

Follow this procedure on the client system to correct this problem.

1. As superuser, change directory to /dev.

   ```
   # cd /dev/rdisk
   ```

2. Execute the MAKEDEV utility on the disk or disk partition designated as the swap device.

   ```
   # ./MAKEDEV swapdev
   ```

3. Set the file system type for *swapdev* by executing the disklabel utility. Remember to specify *swapdev* as a raw device.

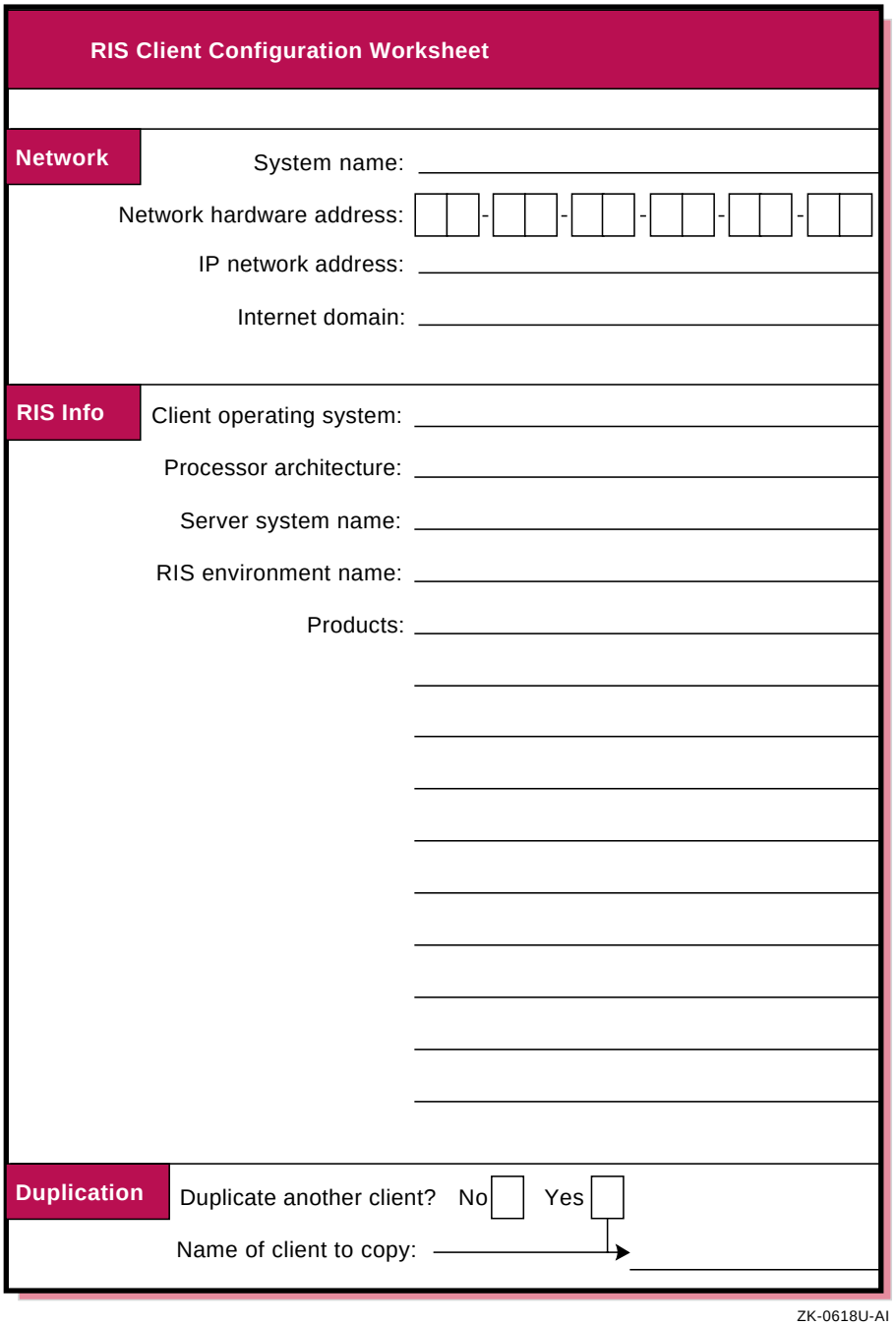
   ```
   # disklabel -sF /dev/rdisk/swapdev swap
   ```

4. Reboot the client system.

A

RIS Worksheet

This appendix contains a worksheet for recording setup information for the RIS client. Make as many copies of this worksheet as you need.


RIS Client Configuration Worksheet
Network
System name:
Network hardware address:
IP network address:
Internet domain:
RIS Info
Client operating system:
Processor architecture:
Server system name:
RIS environment name:
Products:
Duplication
Duplicate another client?
No
Yes
Name of client to copy:

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B

DMS Worksheets

This appendix contains three DMS worksheets. Two of the worksheets are used to calculate the amount of disk space required for the DMS environments and `/clients` area. The third worksheet is used to record individual DMS client information. Make as many copies of these worksheets as you need. The worksheets are printed on only one side of the page so you can easily photocopy them. To keep all your calculations together, use the back side of each worksheet for additional notes or for calculating the numbers you insert into fields on the worksheet.

The following worksheets are included:

- Disk space allocation for the `/var/adm/dms/dms`*N* `.alpha` environments
- Disk space allocation for the `/clients` area
- Individual DMS client information

Disk Space Required for Dataless Environments

Use this worksheet to calculate the amount of space required for a single `/var/adm/dms` file system. If you want multiple `/var/adm/dms` environments, you must prepare a separate sheet for each environment. Each environment has a number: the first is `/var/adm/dms/dms0.alpha`, the second is `/var/adm/dms/dms1.alpha`, and so on. Fill in the number of this `/var/adm/dms/dms`*n*`.alpha` environment on the top line.

Disk Space for the `/var/adm/dms/dms_____.alpha` File System

Using the appropriate subset size information, follow these steps to find how much space you need for a `/var/adm/dms/dms`*n*`.alpha` environment:

Step 1

Decide which subsets and layered products you want to install, add up their total sizes in megabytes, and enter the sums here. Subset names and descriptions are located in the *Installation Guide*; subset sizes are located in the *Release Notes*.
Layered product information is located in the products' Software Product Descriptions (SPDs).

MANDATORY subset space: _____ MB

OPTIONAL subset space: _____ MB

Layered product space: _____ MB

Step 2

Add up the sizes from step 1 to arrive at the amount of space your dataless environment will require.

Subtotal: _____ MB

Step 3

Allocate an additional 10% of the space from step 2 for file system administration and other information. Enter that number here:

10% overhead space: _____ MB

Step 4

Add together the amounts of space from steps 2 and 3. The total is the amount of space you should allocate for this environment.

Total space for `/var/adm/dms/dms___.alpha`: _____ MB

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Disk Space for the /clients File System

Using the appropriate memory size information for your clients, follow these steps to find how much space you need for the `/clients` area.

Step 1

To allow at least 30 megabytes(MB) for an individual client's root area, multiply the number of clients in the `/clients` area by 30.

Number of clients ( ) x 30 = _____ MB

Step 2

Allocate an additional 15 MB per client for files added by users. Multiply the number of clients by 15 and enter that value here.

Number of clients ( ) x 15 = _____ MB

Step 3

Allocate an additional 15 MB for clients that have partial kernel build areas. Multiply the number of clients with partial kernel build areas by 15 and enter that value here.

Number of clients ( ) x 15 = _____ MB

Step 4

Allocate an additional 100 MB for clients that have full kernel build areas. Multiply the number of clients with full kernel build areas by 100 and enter that value here.

Number of clients ( ) x 100 = _____ MB

Step 5

Add the above figures. The total is the amount of space you should allocate for the `/clients` area.

Total space for `/clients` file system: _____ MB

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DMS Client Setup Worksheet

This worksheet is used for recording the information you need to know when adding a client to a DMS environment using the `ADD a client` menu option. If you are adding multiple clients, you must prepare a separate sheet for each client. Fill in the client's system name (host name) on the next line.

Registration Information for DMS Client _____

Network

The client's Ethernet or FDDI hardware address in the form of six two-character groups separated by minus signs.

For example, 08-00-2f-03-f5-08 ☐☐-☐☐-☐☐-☐☐-☐☐-☐☐

The client's network interface type. _____
For example, ln0 or tu0, etc.

The client's subnet mask. _____
For example, 255.255.255.0

The client's route address. _____
(gateway FROM the client TO the server)
For example, 16.69.144.199
The route address is only required if the server and client are on different networks.

DMS Information

The name of the dataless environment to which this client will be added. For example, `/var/adm/dms/dms`*N*`.alpha` _____

The name of the `/clients` area.
For example, `/clients/`*hostname* _____

The client's swap device and partition.
For example, `/dev/disk/dsk0b` _____

The client's swap device type.
For example, RZ26 _____

The kernel build type (Full, Partial, or None) _____

ZK-1520U-AI

C

Using the utilupdate Utility

Use the `utilupdate` utility provided on your distribution media to update the versions of the `ris` and `dmu` utilities on a server that is not running the latest version of the operating system. This enables you to serve the latest version of the operating system to client systems.

Syntax for the `utilupdate` utility is as follows:

utilupdate [-r] [-d] -m *directory*

There are three parameters for the `utilupdate` utility:

`-r` This optional flag indicates that the `ris` utility and associated programs should be updated.

`-d` This optional flag indicates that the `dmu` utility and associated programs should be updated.

`-m` This required flag is used to specify the *directory* where the operating system distribution is mounted.

Note

If you do not specify the `-r` or `-d` parameter, the `utilupdate` utility only updates the components of the `setld` utility needed to support the `ris` and `dmu` utilities on the server. This updates the version of the `setld` utility in the `/var/adm/ris/bin` directory, but does not change the server's version of the `setld` utility. Refer to the `setld`(8) reference page for more information.

Glossary

This glossary defines terms and concepts related to software sharing.

B

BIND
The Berkeley Internet Name Domain. A distributed database lookup service that allows you to distribute the `hosts` database network-wide.

C

CDF
Configuration description file. The process of installing a new version of the operating system automatically generates a configuration description file (CDF) that contains the results of the questions answered during the installation. This CDF is saved to the file `/var/adm/smlogs/install.cdf`. The CDF contains all the configuration information required to perform an initial system installation on a client system. CDFs can be copied and modified to use for installation cloning.

client
A computer system that uses resources provided by another computer, called a **server**.

client area
In DMS, an area containing a single client's custom-tailored root files including the operating system kernel.

configuration description file
See *CDF*

D

Dataless Management Services
See *DMS*

DHCP
Dynamic Host Configuration Protocol. Enables the automatic assignment of an IP address to clients on networks from a pool of addresses. The IP

address assignment and configuration occurs automatically whenever appropriate client systems (workstations and portable computers) attach to a network. The current implementation of DHCP is based on the JOIN product by Competitive Automation.

DMS

Dataless Management Services. A service where a server maintains the `root`, `/usr`, and `/var` file systems for client computer systems connected to the server by means of a local area network (LAN).

DMS area

A reserved disk area physically connected to a DMS server, which contains multiple copies of the `root` area, one for each DMS client.

DMS client

A computer system whose system disk area is physically connected to a DMS server rather than to the client itself, and is accessed across the network by the client.

DMS client area

A DMS client area resides in each DMS area and is called `/clients`. Multiple copies of the root area reside in the client area, each tailored from the appropriate generic root for an individual client.

DMS environment

A portion of a DMS area, containing software to support one or more clients. A DMS environment contains one or more DMS root areas. DMS environments are located in `/var/adm/dms`.

DMS root area

One root area is required for each client that is to be supported in the DMS environment. DMS root areas are located in `/var/adm/dms/dms`*N*`.alpha`. Each root area contains a generic root directory and a shared `/usr` file system.

DMS server

A computer system that maintains the `root`, `/usr`, and `/var` file systems for DMS client systems. The DMS servers can contain multiple DMS environments to which clients are added. DMS clients are booted over a local area network (LAN). Swapping and dumping is not supported over the network and must be done on the clients' local disks.

dmu

Dataless management utility, located at `/usr/sbin/dmu`. A text-based interface used to manage the sharing of installed operating software between DMS servers and clients. The `dmu` utility allows users to install,

configure, show, and delete DMS environments and add, list, modify, and remove DMS clients.

Dynamic Host Configuration Protocol
See *DHCP*

G

generic root
In DMS, a portion of the DMS environment that contains system software in a generic form, ready to be copied for tailoring to fit an individual client's requirements.

N

Network File System
See *NFS*

NFS
Network File System, an open operating system that allows all network users to access shared files stored on computers of different types. Users can manipulate shared files as if they were stored locally on the user's own hard disk.

NIS
Network Information Service. A distributed data lookup service for sharing information on a local area network (LAN). NIS allows you to coordinate the distribution of database information throughout your networked environment.

new files
In DMS, refers to files that are exactly as supplied in the software distribution kit and have not been customized. These files are used by the update installation process and allow the files to be delivered onto the system without overwriting the existing, and possibly customized version of the file. New files have a `.new.` prefix, and should never be modified.

See also *prototype files*

P

private area
In DMS, a portion of the DMS area that is reserved for the exclusive use of a single client. The private area contains the client's custom-tailored copy of certain operating system software files, including the kernel.

product environment
In RIS, a portion of the RIS area containing a set of software kits that are intended for installation on a particular client type, such as RISC processors.

prototype files
In DMS, refers to files that can be modified by the server's system administrator so that they can be customized for a particular client site, such as `/etc/hosts` entries. Prototype files are prefixed with `.proto..` and can be customized before the DMS environment is configured.

See also *new files*

R

Remote Installation Services
See *RIS*

RIS
Remote Installation Services. A remote software distribution method where a server is set up to allow installation of software products over a local area network (LAN). RIS clients are registered on the RIS server to allow them access to specific software products.

RIS area
A reserved disk area physically connected to a RIS server, containing one or more product environments. These contain software kits that can be installed on registered clients. Kits are organized so that a software product can supply several different versions for multiple hardware platforms.

RIS client
A computer system that has permission to install software across the network by accessing kits stored in the server's RIS area.

RIS server
A computer system that serves other computers by providing operating system software for them to install; the software is stored on disks belonging to the server and is accessed across the network by the clients.

ris
Remote Installation Services utility, located at `/usr/sbin/ris`. A text-based interface used to set up the RIS server and maintain RIS areas, the software products within the RIS areas, and RIS client registrations.

S

server

A computer system that serves one or more other computers, called clients, by providing a resource to them.

subset

An installable software kit module that is compatible with the operating system's `setld` software installation utility.

T

TFTP

Trivial File Transfer Protocol. TFTP is used during the RIS startup procedure to transfer the network kernel and supporting files from the RIS server to the RIS client. For more information on TFTP, refer to the `tftp`(1) and `tftpd`(8) reference pages.

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You can order documentation for the Tru64 UNIX operating system and related products at the following Web site:

http://www.businesslink.digital.com/

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