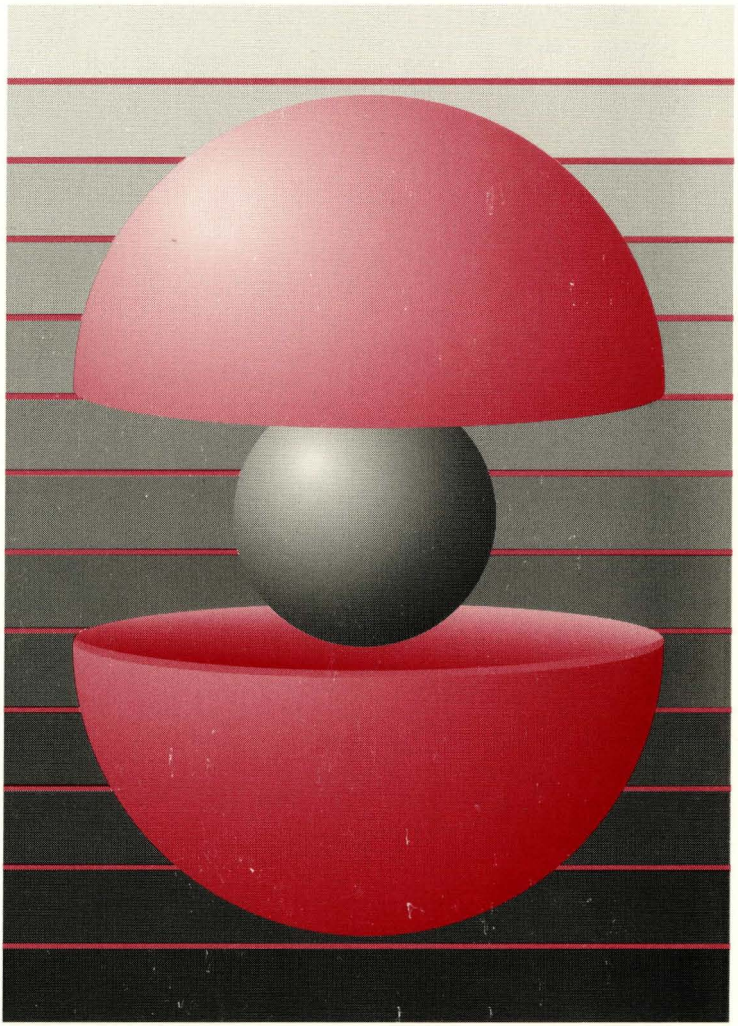
DEC OSF/1

digital

Sharing Software on a Local Area Network



Part Number: AA-PS3LB-TE

DEC OSF/1

Sharing Software on a Local Area Network

Order Number: AA-PS3LB-TE

February 1994

Product Version: DEC OSF/1 Version 2.0 or higher

This manual describes the Remote Installation Service (RIS) utility and environment. RIS is a utility for installing software kits across a network instead of using locally mounted distribution media.

digital equipment corporation
Maynard, Massachusetts

Contents

About This Manual

Audience vii

Organization vii

Related Documents viii

Reader's Comments ix

Conventions ix

1 Introduction to Sharing Software

1.1 The Software Sharing Environment 1–1

1.2 The RIS Server and Client 1–2

1.2.1 The RIS Disk Area 1–3

1.2.2 Multiple RIS Areas on a Server 1–4

1.2.3 Characteristics of a RIS Client 1–5

2 Preparing for Server Setup

2.1 Server/Client Compatibility 2–1

2.2 Prerequisite Server Setup Tasks 2–3

2.2.1 Installing the DEC OSF/1 Operating System on the Server ... 2–3

2.2.2 Setting up a Local Area Network 2–3

2.2.3 Loading and Registering the Server Extensions License 2–4

2.3 Distribution Media and Device Special File Names 2–5

2.4 Planning Disk Space for RIS 2–5

3 Setting Up a RIS Server

3.1 Using the Remote Installation Services Utility 3–1
3.2 Installing Software into a New RIS Area 3–1
3.2.1 Editing the /etc/exports File 3–3
3.3 Installing Software into an Existing RIS Area 3–4
3.4 Using an NFS-Mounted RIS Area 3–4

4 Managing and Maintaining RIS

4.1 Preregistration Tasks 4–1
4.1.1 Obtaining Information About Each Client 4–1
4.1.2 Registering Clients' Host Names and IP Addresses with Servers 4–2
4.2 Registering a Client 4–2
4.3 Modifying Clients 4–4
4.4 Removing Clients 4–4
4.5 Listing Registered Clients 4–5
4.6 Listing Products in Server Areas 4–5
4.7 Deleting Products from RIS Server Areas 4–5

5 Booting a RIS Client

5.1 Remote Boot Files and Daemons 5–1
5.1.1 The Internet Daemon and Its Configuration File 5–1
5.1.2 The bootpd Daemon 5–2
5.1.3 The /etc/bootptab File 5–2
5.1.4 The tftpd Daemon 5–3
5.2 Remote Boot Flow 5–3

6 Troubleshooting RIS

6.1 Problems with the ris Utility Lock Files 6–1

6.2 Problems with Client Registration 6–1

6.3 Problems with RIS Server Response 6–2

6.3.1 Diagnosing Response Failures on Servers Using bootp 6–3

6.3.2 Diagnosing Response Failures on Servers Using MOP 6–4

6.4 Problems with Loading the Correct Software 6–5

A Installing DEC OSF/1 for Alpha AXP Subsets on an ULTRIX Server

B Worksheet

Glossary

Index

Examples

5-1: Sample /etc/bootptab File 5–2

6-1: Sample daemon.log File 6–4

Figures

1-1: RIS Server and Client 1–2

1-2: Generalized Illustration of the RIS Area 1–4

2-1: System Compatibility 2–2

Tables

5-1: Remote Boot Files and Daemons 5–1

About This Manual

This manual describes the Remote Installation Service (RIS) utility and environment. RIS is a utility for installing software kits across a network instead of using locally mounted distribution media.

Audience

This manual is written for anyone using the RIS utility, typically the system administrator. The manual was written with the following assumptions:

- Your hardware has been checked by you or by a Digital field service representative to ensure that it 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 DEC OSF/1 operating system software.

All the examples in this manual assume that you are logged in as the superuser on the server system.

Organization

This manual contains six chapters, two appendixes, a glossary, and an index. A brief description of the contents follows:

Chapter 1	Introduces the concept of servers and clients. This chapter explains 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	Lists the formats in which distribution media are available and describes the preliminary setup procedures for RIS.
Chapter 3	Describes the procedure for setting up a RIS server, including installing and updating software.
Chapter 4	Describes processes and procedures for maintaining and managing a RIS system, including adding, deleting, and modifying clients and clients' setups.

Chapter 5	Describes networking-related files and daemons that `ris` uses, and the process that a client goes through when it boots over the network.
Chapter 6	Provides information on troubleshooting problems with RIS clients.
Appendix A	Explains how to install the DEC OSF/1 for Alpha AXP software subsets on an ULTRIX RIS server.
Appendix B	Contains a worksheet for your use in the installation process.

Related Documents

You should have the following documentation available:

- The hardware documentation for your system
- The DEC OSF/1 *Release Notes*
- The DEC OSF/1 Reference Pages, Section 8
- The *Installation Guide*
- DEC OSF/1 *Network Configuration*

The printed version of the DEC OSF/1 documentation set is color coded to help specific audiences quickly find the books that meet their needs. (You can order the printed documentation from Digital.) This color coding is reinforced with the use of an icon on the spines of books. The following list describes this convention:

Audience	Icon	Color Code
General Users	G	Teal
System Administrators	S	Red
Network Administrators	N	Yellow
Programmers	P	Blue
Reference Page Users	R	Black

Some books in the documentation set 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 DEC OSF/1 documentation set.

Reader's Comments

Digital welcomes your comments on this or any other DEC OSF/1 manual. You can send your comments in the following ways:

- Internet electronic mail:
  `readers_comment@ravine.zk3.dec.com`
- Fax: 603-881-0120 Attn: USG Documentation, ZK03-3/Y32
- A completed Reader's Comments form (postage paid, if mailed in the United States). Two Reader's Comments forms are located at the back of each printed DEC OSF/1 manual.

If you have suggestions for improving particular sections or find any errors, please indicate the title, order number, and section numbers. Digital also welcomes general comments.

Conventions

The following typographical conventions are used in this manual:

`#`	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.
. . .	In syntax definitions, a horizontal ellipsis indicates that the preceding item can be repeated one or more times.
`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.

Introduction to Sharing Software 1

You can reduce your software and hardware costs by sharing software between computers. When you share software, 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 and reduces the disk space required for software storage.

You are not limited to sharing one piece of software; you can share virtually all of your DEC OSF/1 system software. With certain limitations, you can also share software for operating systems other than DEC OSF/1.

A **server** is a computer system that serves another system by providing something that the other system wants or needs. The other system 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.

1.1 The Software Sharing Environment

The following components make up the environment for software sharing:

- A server

  A DEC OSF/1 server can be any Digital-supported processor running Version 1.2 or higher of the DEC OSF/1 operating system. See Appendix A for information about setting up an ULTRIX system to serve the DEC OSF/1 operating system.

  The server's system administrator prepares the server for Remote Installation Services (RIS) use by installing the DEC OSF/1 operating system and ensuring that the server is connected to a LAN. The system administrator must also ensure that there is adequate disk space in the `/var/adm/ris` directory for the subsets that the server will serve. The individual tasks required to set up a RIS server are described in Chapter 3.

- A distribution device on the server

  For DEC OSF/1 servers, the distribution device is a CD-ROM optical disk drive. You transfer the software subsets for one or more specific products and architectures from the distribution media to the RIS area on the server. Registered clients can then access the software.

- An Ethernet local area network (LAN)

  You must set up the server and all client processors as hosts on the Ethernet. Clients use the Ethernet to access the server's RIS areas.

- Clients

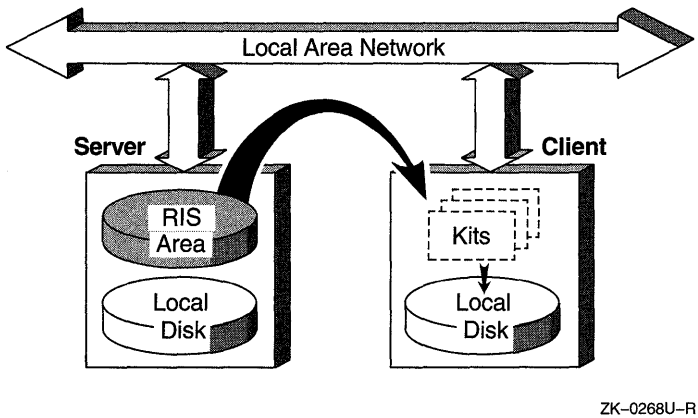
  The RIS clients are systems that can run the operating system for which the server provides kits. Typically, clients are systems that run the DEC OSF/1 operating system; only these processors can install the base operating system from a DEC OSF/1 server. Other processor families can install layered products after the client's operating system is running.

1.2 The RIS Server and Client

Remote Installation Services (RIS) is a utility for installing software kits stored on a central computer system onto multiple computer systems in a local area network.

With RIS, the server has a disk area set aside as the RIS area. The RIS area contains copies of software kits to be made available for installation onto clients. Figure 1-1 illustrates how the RIS system works.

Figure 1-1: RIS Server and Client



In the RIS area, the server also maintains information about each client system so that the client's administrator can install software kits without information from the server's administrator. Kits are organized so that a given product can use multiple kits which reflect the differences between multiple hardware platforms. The server's RIS area is made available for read-only access to clients by means of a network file sharing system.

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 can also support local timesharing users.

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

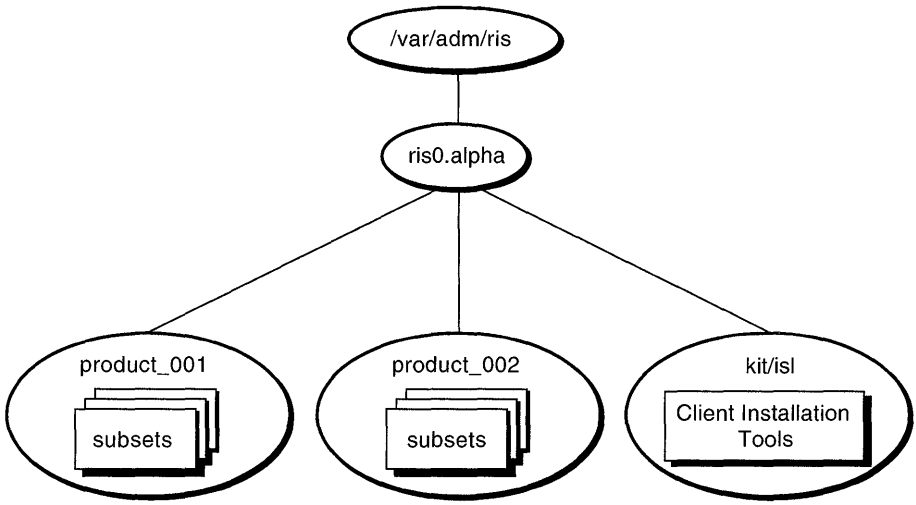
The following are some of the features and benefits of RIS:

- Installation and set up 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 the RIS software supports both different hardware platforms and different software versions, it is adaptable to a wide variety of customer systems and requirements. Servers running a given version of the DEC OSF/1 system can serve clients running the same version or an earlier version of the system.
- RIS uses a single set of kit files for all clients having the same architecture. Disk space requirements on the server are greatly reduced.

1.2.1 The RIS Disk Area

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/software platform. See Figure 1-2 for a generalized illustration of the RIS area.

Figure 1-2: Generalized Illustration of the RIS Area



In Figure 1-2, the RIS area, `/var/adm/ris`, contains one product environment, `ris0.alpha`. A given environment is designated to contain products for a specific target platform; in Figure 1-2, the target platform is Alpha AXP processors. Multiple product environments can exist in a single RIS area. Each environment contains one or more product directories, each of which in turn contains several product kit archives, called **subsets**. For example, an area named `ris0.alpha` could contain directories called `product_001`, `product_002`, `product_003`, and so on. Figure 1-2 shows two product directories.

Figure 1-2 also shows the `kit/isl` area, which is created when you register the first RIS client on the server. The `kit/isl` directory contains installation tools required by clients when they install software over the network.

The server itself does not normally use any of the RIS area. System administrators can access the product area as required for maintenance and for installation or removal of product kits, but the area is not considered part of the server's own disk area.

1.2.2 Multiple RIS Areas on a Server

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 sets of clients. *Network Configuration* describes how to export and import file systems.

1.2.3 Characteristics of a RIS Client

A RIS installation uses the local area network as its installation media. 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 DEC OSF/1 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 generic minimal kernel and file system, both of which are part of the software kit. The special kernel and file system become resident in the client's memory. Once booted, the client runs the same installation utility, called `setld`, that is used to install kits on an already-running, configured platform. For more information about the `setld` utility, see the `setld`(8) reference page. After the installation is complete, the system is rebooted using the newly installed software.

Note

A client should be registered with one server only for the base operating system. If you register a client with more than one server for the base operating system, each server with which the client is registered trys to respond to the client's network boot request.

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 4 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 `setld` command, you specify the name of the server from whom to copy the kits.

Preparing for Server Setup 2

This chapter provides the information you need before you begin setting up a DEC OSF/1 RIS server. The topics discussed include:

- Server/client compatibility
- Tasks you must complete before installing RIS
- Names of distribution media and device special files
- Disk space requirements for RIS

2.1 Server/Client Compatibility

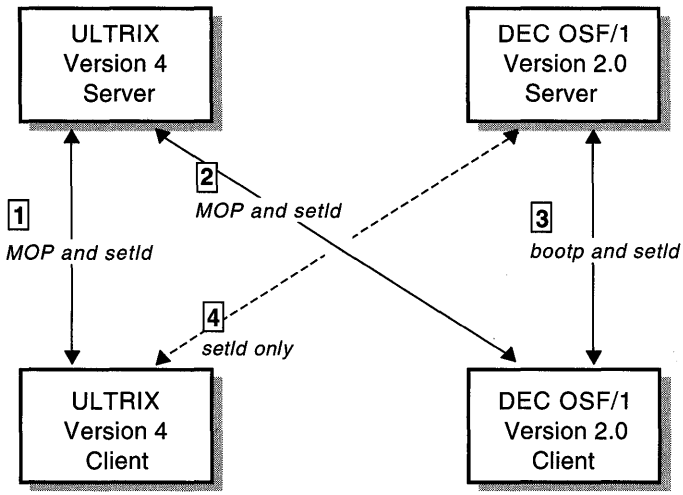
Support for differing bootstrap protocols constrains the use of the DEC OSF/1 and ULTRIX operating systems together in RIS environments. Whereas DEC OSF/1 RIS servers respond to client `bootp` requests, ULTRIX RIS servers respond to client MOP requests.

DEC OSF/1 clients can broadcast either `bootp` or MOP requests. Practically, this means that DEC OSF/1 clients can boot from either an ULTRIX RIS server or a DEC OSF/1 RIS server. ULTRIX clients only broadcast MOP requests, which means they can only boot from ULTRIX RIS servers.

Once a client's operating system is installed and running, a server running either ULTRIX or DEC OSF/1 can serve additional product subsets to a client running the other operating system. The client loads the additional subsets using the `setld` utility.

Figure 2-1 illustrates these relationships:

Figure 2-1: System Compatibility



1 An ULTRIX RIS client can be booted by an ULTRIX RIS server using the MOP protocol. This means that an ULTRIX server can serve both the ULTRIX base operating system as well as additional product subsets to an ULTRIX client over the network. The ULTRIX client loads additional product subsets using the `setld` utility.

2 A DEC OSF/1 RIS client can be booted by an ULTRIX RIS server using the MOP protocol. This means that an ULTRIX server can serve both the DEC OSF/1 base operating system as well as additional product subsets to the DEC OSF/1 client over the network. The DEC OSF/1 client loads additional product subsets using the `setld` utility.

3 A DEC OSF/1 RIS client can be booted by a DEC OSF/1 RIS server using the `bootp` protocol. This means that a DEC OSF/1 server can serve both the DEC OSF/1 base operating system as well as additional product subsets to the DEC OSF/1 client over the network. The DEC OSF/1 client loads additional product subsets using the `setld` utility.

4 ULTRIX RIS clients cannot be booted by DEC OSF/1 RIS servers. This means that a DEC OSF/1 server cannot serve the ULTRIX base operating system over the network. However, after the ULTRIX operating system is up and running on the client, the DEC OSF/1 server can serve an ULTRIX client additional product subsets. The ULTRIX client loads additional product subsets using the `setld` utility.

2.2 Prerequisite Server Setup Tasks

Before you begin to configure and install the RIS areas and software on the server, you must perform the following tasks:

1. Install the DEC OSF/1 operating system.
2. Set up your Ethernet local area network (LAN).
3. Load and register the DEC OSF/1 Server Extensions (OSF-SRV) license.

2.2.1 Installing the DEC OSF/1 Operating System on the Server

The *Installation Guide* describes how to install the DEC OSF/1 operating system on the server. It also lists all of the standard DEC OSF/1 supported software subsets with subset names and descriptions of subset contents. Subset sizes are listed in the *Release Notes*. You need this information to install the operating system, as well as to install RIS software.

To be a RIS server a system must have the `Remote Installation Service` and `Additional Networking Services` subsets, which contain the `tftp` networking utility and the `bootpd` bootstrap daemon, installed.

To see whether these subsets are installed, enter the following command:

```
# /usr/sbin/setld -i | egrep "RIS|INET"
```

Information similar to the following should be displayed:

```
OSFCLINET200    installed       Basic Networking Services
OSFINET200      installed       Additional Networking Services
OSFRIS200       installed       Remote Installation Service
```

The `Basic Networking Services` subset is mandatory and is installed automatically. If the `Additional Networking Services` and `Remote Installation Service` subsets are not installed, you must install them using the `setld` utility.

See the *Installation Guide* for more information about using `setld` to install subsets.

2.2.2 Setting up a Local Area Network

You must connect the RIS server and all of the client processors to Ethernet local area networks. Note that the server and clients must all 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 *Network Configuration*.

2.2.3 Loading and Registering the Server Extensions License

The DEC OSF/1 Server Extensions license (OSF-SRV) provides the right to use the RIS software on DEC OSF/1 systems. 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 `lmf`(8) utility.

To load and register your license, complete the following steps:

1. Log in as root and run the `lmf register` utility as follows:

```
# lmf register
                Licensed Software Product
                Product Authorization Key

 Enter data on lines terminated with :

                  Issuer:
   Authorization Number:

           Product Name:
               Producer:

        Number of units:

                 Version:
   Product Release Date:

   Key Termination Date:

Availability Table Code:
    Activity Table Code:

             Key Options:
           Product Token:
             Hardware-Id:
                Checksum:

Comment:
```

   Complete the template using the information provided in the OSF-SVR PAK.

2. Run the `lmf reset` utility as follows:

```
# lmf reset
```

   The `lmf reset` command adds the OSF-SRV license to the kernel license cache, which is where the system checks to determine whether your system is authorized to act as a server.

3. Check whether the PAK is registered correctly by running the `lmf`

`list` utility as follows:

```
# lmf list | grep OSF-SVR
OSF-SVR       active          unlimited
```

The `lmf list` utility displays the products registered with LMF, their status, and the number of users authorized to use each product.

See *Software License Management* and the `lmf`(8) reference page for more information about registering license PAKs.

After you enter the data, complete the server setup tasks described in Chapter 3.

2.3 Distribution Media and Device Special File Names

The DEC OSF/1 distribution kit contains a CD-ROM for RRD40 or RDD42 CD-ROM readers. The device special file name for a CD-ROM reader is `/dev/rzn`c, where the character *n* represents the unit number.

2.4 Planning Disk Space for RIS

As with any installation, you must calculate the amount of disk storage required for the software subsets in the RIS areas on the server before beginning. If space on the server's system disk is an issue and your server's distribution medium is a CD-ROM, you might want to create symbolic links from the RIS server area to the software on the CD-ROM. Section 3.2 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. Note that 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 into which they are to be installed.
3. Use the subset size information in the *Release Notes* to ensure that you have adequate disk space.

Setting Up a RIS Server 3

This chapter describes how to use the `ris` utility to configure a DEC OSF/1 RIS server. Topics discussed include:

- Establishing a new RIS server environment using `ris`
- Installing software kits in existing RIS environments

Chapter 4 provides information about using the `ris` utility to perform the day-to-day tasks associated with managing a RIS server.

3.1 Using the Remote Installation Services Utility

The RIS utility offers two usage styles: You can use it interactively through a menu-driven interface, or you can issue commands to perform the various tasks one at a time. This chapter describes how to use the utility's menu interface; Chapter 4 describes how to use individual `ris` commands.

3.2 Installing Software into a New RIS Area

After you create a RIS environment and install the first software kits there, you can install more kits into that environment or create other environments as you need them. (Section 3.3 describes how to install additional software into an existing RIS environment.)

Note

If your network includes ULTRIX systems, you can use those systems as RIS servers to provide the DEC OSF/1 software. See Appendix A for additional information about installing the DEC OSF/1 software on an ULTRIX server.

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

1. If your distribution media is CD-ROM, enter a `mount` command similar

to the following before starting the utility:

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

This example uses a CD-ROM drive that is unit 4; 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 enter the `file` command, specifying the raw device, as follows:

```
# file /dev/rrz*c
/dev/rrz1c:  character special (8/1026) SCSI #0 RZ25 disk #8 (SCSI ID #1)
/dev/rrz2c:  character special (8/2050) SCSI #0 RZ25 disk #16 (SCSI ID #2)
/dev/rrz3c:  character special (8/3074) SCSI #0 RZ25 disk #24 (SCSI ID #3)
/dev/rrz4c:  character special (8/4098) SCSI #0 RRD42 disk #32 (SCSI ID #4)
/dev/rrz9c:  character special (8/17410) SCSI #1 RZ57 disk #72 (SCSI ID #1)
```

Your CD-ROM device corresponds to an RRD device, in this case RRD42.

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

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

The Remote Installation Services menu is displayed.

Each menu item is preceded by a letter. The first time you invoke the utility, the display looks similar to the following:

```
*** 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 utility's menu does not display option letters for menu items that cannot currently be performed.

As you add environments, software, and clients to the system, options that were not available become available, and the menu displays their option letters.

3. Choose the ''Install software products'' item.

A menu offers the installation options available.

4. Choose item 1 to establish a new RIS area.
5. Enter the full pathname of the device special file name or mount point for the distribution media.

   If your distribution media is CD-ROM, the device special name for RIS is `/mnt/ALPHA/BASE`.

   The utility allows you to choose whether you want to create symbolic links to the software or to extract the software into the RIS area.

   If you choose to extract subsets, the subsets you select are copied from the CD-ROM into the RIS area. You must know which specific subsets to extract and the amount of disk space required. See Section 2.4 for information about planning disk space for RIS. Clients can only install the subsets that were extracted into RIS product areas for which they are registered.

   If you choose to link to the CD-ROM, symbolic links are created in the RIS area that points to the subset directories on the CD-ROM. No disk space planning is required because the subsets reside on the CD-ROM. However, the CD-ROM 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 links to the CD-ROM can access all subsets.
6. If you chose to extract subsets, the utility lists the mandatory and optional software subsets that you can install. Choose the subsets that you want from the list. The utility displays your list for confirmation.

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

Once you set up the RIS areas and registered clients, the clients can access the areas they need. Client registration is discussed in Chapter 4.

3.2.1 Editing the /etc/exports File

Client RIS installations rely on files located in the server's `/var/adm/ris/risn.arch/kit` directory, and therefore require that the server export that directory. In this directory path, *n* is the number of the RIS area and *arch* is the architecture of the client systems that the area will serve. When you create the RIS area, `risn.arch` , the `ris` utility supplies you with a name based on the choices you make during the area's creation.

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.

The RIS area entries in the /etc/exports file of a system that acts as a RIS server for two alpha environments and one RISC environment look similar to the following:

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

Note

When you register the first client on your RIS server, the ris utility creates the kit/isl directory, which contains tools that clients require to install software subsets.

3.3 Installing Software into an Existing RIS Area

You can install software subsets that are compatible with the DEC OSF/1 setld utility into an existing RIS environment by using the ris command. From the installation menu, choose the option to add software to an existing area.

The utility displays a list of the existing areas.

1. Choose the area that you want to use, and then proceed as before to mount the distribution media and choose subsets.
2. Repeat this procedure for each additional group of subsets you want to install.

3.4 Using an NFS-Mounted RIS Area

You can use an NFS mount point to install software from a RIS area that you import from another machine. For example, if a system named salaam has a CD-ROM containing the DEC OSF/1 subsets mounted on /mnt and listed in its /etc/exports file, the system administrator on aladdin can NFS mount that CD-ROM with the following command:

```
aladdin_root# mount salaam:/mnt/ALPHA/BASE /mnt
```

Once the CD-ROM is mounted, aladdin's system administrator can use the ris utility to install software from it as if it were local to aladdin.

Managing and Maintaining RIS 4

This chapter describes how to use the `ris` utility to manage DEC OSF/1 RIS environments and clients. Topics discussed include:

- Preregistration tasks
- Registering a client
- 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

4.1 Preregistration Tasks

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

Perform the following tasks to prepare to register clients:

- Obtain information about each client and fill out a copy of the RIS Client Configuration Worksheet from Appendix B.
- Register each client's host name and Internet Protocol (IP) address with the appropriate naming service server or servers.

4.1.1 Obtaining Information About Each Client

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

- Host name (see Section 4.2 for restrictions on host names)
- The RIS environments you want to make available to the client
- The hardware platform type of the client

- Hardware Ethernet address of the client

4.1.2 Registering Clients' 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:

- `/etc/hosts`
- Berkeley Internet Name Domain (BIND)
- Network Information Service (NIS), formerly called Yellow Pages (YP)

See *Network Configuration* for information about configuring naming services on a local area network and registering clients with them.

4.2 Registering a Client

To register a client processor using the menu, follow this procedure:

1. Invoke the `ris` utility by entering the following command:

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

2. Choose the option to add a client processor from the Remote Installation Services menu.

   A message indicating that you have chosen to add a client processor displays, and a prompt asks if you want to continue with the procedure for adding a client processor. After you confirm that you want to continue, a prompt asks for the client's host name.

   Caution

   Only lowercase letters (`a-z`) and numbers are permitted in host names, and a host name must begin with a letter, not a number. Invalid host names can corrupt the RIS database.

3. Enter the client's host name.

   The client processor must be registered with the appropriate naming service or you can not 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. Select an environment for the client.

   The utility lists the available environments for which you can register the new client. Choose the appropriate environment.

5. Select the products within the environment that you want to be available to the client.

   The utility lists the products available in the chosen environment. Enter the numbers of the products you want this client to be able to install. When the utility asks you to confirm your choices, you can accept them or respecify the information.

6. Enter the client's hardware Ethernet address. For example:

```
Enter the client processor's hardware Ethernet
or FDDI address, for example,
08-00-2f-03-f5-08: 08-00-2B-07-aa-eb
```

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

   - On a client that is not currently up and 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 running DEC OSF/1 client, issue the `uerf -r 300` command as superuser. Search the output for the string `hardware address`. Either the line containing this string or the one following it contains the hardware address. For example:

```
# uerf -r 300 | grep -i "hardware address" | uniq
_hardware address: 08-00-2f-ef-1f-10
```

     If the hardware address is on the line following the one that contains the string `hardware address`, you must manually search the output from the `uerf` command to find the correct hardware address.

   - From the RIS server, you can determine the hardware address of a running DEC OSF/1 client using the `ping` and `arp` commands. To determine the hardware address of the RIS client `spike` do the following:

```
# /usr/sbin/ping -q -c1 spike; arp spike
PING spike.cities.dec.com (152.90.224.30): 56 data bytes


----spike.cities.dec.com PING Statistics----
1 packets transmitted, 1 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 0/0/0 ms
spike (152.90.224.30) at 08-00-2B-03-09-BF
```

     The hardware address in this case is `08-00-2B-03-09-BF`.

   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.

You can add a single RIS client by invoking the `ris` utility with its –a option. Further options supply the Ethernet address, path, and product list. The syntax of the command is:

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

For example:

```
# /usr/sbin/ris -a minaret -h 08-00-2B-03-05-8B -p \
   ris0.alpha,product_001
```

4.3 Modifying Clients

You can modify a RIS client's Ethernet address, its RIS environment information, and the list of products it can install. To modify a client's entry, follow these steps:

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

The remainder of the modification procedure is much like the procedure for adding a client, as described in Section 4.1.

4.4 Removing Clients

You can remove clients by using the `ris` utility's menu interface or by issuing commands from the command line. To remove a client by using the menu, follow these steps:

1. Invoke the `ris` utility and choose the 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 removal is complete, the utility returns you to its main menu.

You can also use a `ris` command line to remove several clients at once. For example:

```
# /usr/sbin/ris -r houri scimitar
```

4.5 Listing Registered Clients

You can view a list of the registered clients by invoking the `ris` utility and choosing the ''List Registered Clients'' option. If there are no registered clients, the utility indicates this fact; if there are registered clients, the utility displays the list.

4.6 Listing Products in Server Areas

You can view a list of the current products in a given server area by invoking the `ris` utility and choosing the option to show products.

You can also use a `ris` command line to show the products installed in each server area. For example:

```
# /usr/sbin/ris -s
Show Products in RIS Server Areas:

     1  /var/adm/ris/ris0.alpha
           DEC OSF/1 Worksystem Software V2.0
```

4.7 Deleting Products from RIS Server Areas

You can delete one or more of the current products in a given RIS area by invoking the `ris` utility and choosing the option to delete products. The utility asks you to choose a RIS area and then guides you through the procedure to delete products.

Booting a RIS Client 5

If you use RIS to install the DEC OSF/1 operating system on a client, the client must boot across the network. This chapter describes the network files and daemons that the `ris` utility uses, and the sequence of events from when a client broadcasts a `bootp` request to when it boots.

Note

The client must be registered on the RIS server before you can install the operating system.

5.1 Remote Boot Files and Daemons

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
`/etc/inetd.conf`	Contains start-up information for various internet daemons
`/usr/sbin/bootpd`	`bootp` server daemon (handles `bootp` requests)
`/usr/sbin/tftpd`	`tftpd` server daemon
`/usr/sbin/inetd`	Internet server daemon

5.1.1 The Internet Daemon and Its Configuration File

The `inetd` daemon starts networking-related daemons on a DEC OSF/1 system. Some of these daemons, such as `bootpd` are related to remote installation; others, such as `fingerd`, are not used by RIS. On request, the `inetd` daemon starts any of the daemons listed in its configuration file, `/etc/inetd.conf`.

When the `inetd` daemon starts, it reads the `/etc/inetd.conf` file. It rereads the `/etc/inetd.conf` file when it receives the hangup signal

HUP or -1.

When a RIS server is configured, the ris utility adds a bootpd entry to the end of the server's /etc/inetd.conf file. This enables the server to use bootp to boot a remote client. See the inetd(8) and the inetd.conf(8) reference pages for more information.

5.1.2 The bootpd Daemon

The bootpd daemon handles remote boot requests. It starts when the RIS server system senses a bootp request on the network. As it starts up, the bootpd daemon reads its /etc/bootptab file to determine the systems from which it will recognize remote boot requests. Whenever the /etc/bootptab file is modified, bootpd rereads it.

Section 5.1.3 describes the content and format of the /etc/bootptab file. See the bootpd(8) reference page for more information.

5.1.3 The /etc/bootptab File

The /etc/bootptab file is a text file that contains 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 also place entries in the /etc/bootptab file.

The general format for entries in the bootptab is as follows:

tag: **tg=***value...*: **tg=***value...*: **tg=***value...*

Example 5-1 shows sample /etc/bootptab file entries for a RIS client.

For additional information about the contents of the bootptab file, see the bootpd(8) reference page.

Example 5-1: Sample /etc/bootptab File

```
ris.dec:hn:ht=ethernet:vm=rfc1048                              1
ris0.alpha:tc=ris.dec:bf=/var/adm/ris/ris0.alpha/vmunix:       2
spike:tc=ris0.alpha:ha=08002b08002b:ip=16.30.0.143:            3
```

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.
- ht: Client's hardware type
- 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 allows you to 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 `spike,` defines characteristics for a specific client. The fields specify the following:

- `tc`: Table continuation

  You should understand the host `spike`'s entry as follows: its `tc` entry points to `ris0.alpha`, which contains its boot file information. `ris0.alpha`, 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:ha=08002babface:ip=16.140.64.249:
```

- `ha`: Client's Ethernet hardware address
- `ip`: Client's IP address

5.1.4 The tftpd Daemon

The `tftpd` daemon handles the transfer of the boot file during a remote boot. This daemon starts when there is a file to be transferred. See the `tftpd`(8) reference page for more information.

5.2 Remote Boot Flow

DEC OSF/1 client systems use the `bootp` protocol to perform the remote bootstrap operation. The command used to initiate a remote boot is processor specific. However, once the remote boot operation has started, the underlying process is the same for all DEC OSF/1 systems:

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. This packet contains the hardware Ethernet address of the client.
3. The `bootp` server daemon (`bootpd`) 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 server.

4. If the address matches one in its `/etc/bootptab` file, the `bootpd` daemon sends to the client a packet of information that includes the server's Internet address, client's Internet address, and the name of the file to be loaded from the server. This information was placed in the `bootptab` file when the client was registered on the server.

   The Internet addresses are used to set up a network that is used to download to the client processor the file specified in the `bootptab` file. For DEC OSF/1 RIS clients, this file is `/var/adm/risn.alpha/vmunix`, where `risn.alpha` corresponds to the RIS area to which the client is registered. This file is the DEC OSF/1 standalone 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 `vmunix` to the client.
7. Once `vmunix` is loaded, the client system begins to execute `vmunix` and the DEC OSF/1 standalone system messages display on the client console terminal.

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

Troubleshooting RIS 6

This chapter contains information to assist you in troubleshooting problems with your RIS system. Topics discussed include:

- Problems with the `ris` utility
- Problems with client registration
- Problems with RIS server response during booting
- Problems in loading the correct kernel file once booting has commenced

6.1 Problems with the ris Utility Lock Files

To prevent multiple users from performing operations on RIS areas simultaneously, when a user selects a `ris` menu item, the `ris` utility creates two lock files in the `/tmp` directory, `rislock` and `ris.tty.lock`. If the `ris` utility is run by another user, or the same user on a different terminal, all menu selections generate 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.

6.2 Problems with Client Registration

The server requires a client's Ethernet 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 pre-2.0 version of DEC OSF/1

  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 DEC OSF/1 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 2.0 of DEC OSF/1

  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 DEC OSF/1 distribution CD-ROM. For example, if the CD-ROM is installed on `/mnt`, install the mandatory update subsets from the `/mnt/ALPHA/BASE` directory.

Note

If you do not intend to boot the client over the network, the server does not require the client's Ethernet hardware address. The client can use the `setld` utility to load optional subsets or layered product subsets over the network. See *System Administration* for more information about loading subsets with the `setld` utility.

6.3 Problems with RIS Server Response

Typically, booting failures occur because the information possessed by the server is invalid. The following two server files are involved in handling RIS clients. 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` (DEC OSF/1 servers only)

  This file is not exclusively used by RIS which means that it can be edited for other purposes, and the entry for your client could have been 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 `bootpd`(8) reference page.

6.3.1 Diagnosing Response Failures on Servers Using bootp

DEC OSF/1 servers respond to `bootp` requests from DEC OSF/1 clients. If the DEC OSF/1 server's information is correct for the client but the server still fails to respond, enable logging of `bootp` messages on the server by editing the server's `/etc/inetd.conf` file and modifying 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
```

Then, find the process IDs for the Internet daemons. Send a `HUP` signal to the `inetd` daemon so it will reread the `/etc/inetd.conf` configuration file, and kill the `bootpd` daemon. For example:

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

Caution

You must kill the `inetd` daemon before killing the `bootpd` daemon.

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 then try to boot the client. Many daemons other than the `bootpd` daemon log information to the `daemon.log` file; however, the log file clearly shows the client's boot requests, indicating a hardware address that matches the address in the `/etc/bootptab` file.

If the client's boot requests are not logged, you can enable more thorough logging by editing the `/etc/inetd.conf` file again, adding a second –d option to the `bootpd` command. Each additional instance of the –d option (up to three) enables increased reporting; the second instance enables the server to report all boot requests, even those 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 remember to restart the `inetd` daemon by sending it a HUP signal. Example 6-1 shows a sample section of a `daemon.log` file. It illustrates the kind of information logged by various system daemons, and, more specifically, by the `bootpd` daemon when it is run with two –d flags set.

Example 6-1: Sample daemon.log File

```
Jul 28 14:56:36 ludwig mountd[191]: startup
Jul 28 14:56:38 ludwig xntpd[235]: xntpd version 1.3                    1
Jul 28 14:56:43 ludwig mold[269]: mold (V1.10) initialization complete
Jul 28 14:56:44 ludwig evd[272]: E003 - evd (V1.10) initialization complete
Jul 28 14:56:45 ludwig internet_mom[275]: internet_mom - Initialization
                complete...
Jul 28 14:56:45 ludwig snmp_pe[278]: M004 - snmp_pe (V1.10) initialization
                complete
Jul 28 16:34:55 ludwig inetd[282]: /usr/sbin/bootpd: exit status 0x9    2
Jul 28 16:35:47 ludwig bootpd[1228]: bootpd 2.1a #0: \                  3
                Fri Feb 05 00:32:28 EST 1993
Jul 28 16:35:47 ludwig bootpd[1228]: reading "/etc/bootptab"
Jul 28 16:35:47 ludwig bootpd[1228]: read 3 entries from "/etc/bootptab"
Jul 28 16:35:47 ludwig bootpd[1228]: request from hardware address \    4
                08002B2C9C6F
Jul 28 16:35:47 ludwig bootpd[1228]: hardware address not found: 08002B2C9C6F
Jul 28 16:36:08 ludwig bootpd[1228]: request from hardware address \    5
                08002B2FFACE
Jul 28 16:36:08 ludwig bootpd[1228]: found: host1.dec.com (08002B2FFACE) at
               (16.69.224.83)
Jul 28 16:36:08 ludwig bootpd[1228]: file /var/adm/ris/ris0.alpha/\
                vmunix.host1.dec.com
Jul 28 16:36:08 ludwig bootpd[1228]: vendor magic field is 0.0.0.0
Jul 28 16:36:08 ludwig 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 `bootp` request by a system with hardware address 08002B2C9C6F. 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 `bootp` request by system with hardware address 08002B2FFACE. The system is a client of this RIS server.

6.3.2 Diagnosing Response Failures on Servers Using MOP

If an ULTRIX server's information is correct for a DEC OSF/1 client but the server still fails to respond, enable display of verbose MOP protocol messages on the client by adding an argument consisting of the letter `V` (in

quotation marks) to the boot command. For example, on a DEC 3000, enter the following `boot` command at the console prompt:

```
>>> boot -fl "V" esa0
```

6.4 Problems with Loading the Correct Software

If the DEC OSF/1 server responds but an incorrect kernel (`vmunix`) 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, but in this case you add the `–d` option to the line containing the `tftpd` command, as follows:

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

Logging the server's `tftp` traffic shows you what file is being transferred and what time the transfer is started and finished. Observe that the proper `vmunix` file is being loaded and that the loading operations are completed correctly.

Installing DEC OSF/1 for Alpha AXP Subsets on an ULTRIX Server A

This appendix explains how to install the DEC OSF/1 for Alpha AXP software subsets into an ULTRIX RIS server area.

See Chapter 2 for information about calculating the disk space required to install the desired software subsets.

Note

You must have the `Maintenance Operations Protocol` subset installed on the RIS server.

To install the DEC OSF/1 for Alpha AXP subsets into the ULTRIX server's RIS area, perform the following steps on the ULTRIX system:

1. Log in as `root` or become superuser.
2. Create a symbolic link from `sh5` to `sh` by entering the following commands:

   ```
   # mkdir /sbin
   # ln -s /usr/bin/sh5 /sbin/sh
   ```

   This link directs DEC OSF/1 clients' accesses of `/sbin/sh` to the correct version of the Bourne shell, which is named `/usr/bin/sh5` on ULTRIX systems.
3. Mount the appropriate media.

   You must either use a CD-ROM device or be able to NFS mount the `/mnt/ALPHA/BASE` directory from a DEC OSF/1 system to a local mount point in order to extract the DEC OSF/1 subsets.

   If your distribution media is a CD-ROM, enter a command similar to the following:

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

   This example uses a CD-ROM drive that is unit 4; if your drive is a different unit, substitute the correct device special file name for that unit.

   If you are uncertain which device special file corresponds to your CD-ROM device, enter the `file` command, specifying the raw device, as

follows:

```
# file /dev/rrz*c
/dev/rrz1c:     character special (8/1026) SCSI #0 RZ25 disk #8 (SCSI ID #1)
/dev/rrz2c:     character special (8/2050) SCSI #0 RZ25 disk #16 (SCSI ID #2)
/dev/rrz3c:     character special (8/3074) SCSI #0 RZ25 disk #24 (SCSI ID #3)
/dev/rrz4c:     character special (8/4098) SCSI #0 RRD42 disk #32 (SCSI ID #4)
/dev/rrz9c:     character special (8/17410) SCSI #1 RZ57 disk #72 (SCSI ID #1)
```

Your CD-ROM device corresponds to an RRD device, in this case RRD42.

If you are mounting the `/mnt/ALPHA/BASE` file system from a DEC OSF/1 server, enter a command similar to the following:

```
# mount /mnt/ALPHA/BASE /mnt
```

Replace `/mnt` with your local mount point, if you are not using `/mnt`.

4. Run the `/etc/ris` command and select the `Install Software` option.
5. Choose option 1 to establish a new RIS area.
6. Enter the device special file name or the path of the directory where the software is located.

   If your distribution media is CD-ROM, the appropriate device special file name is `/mnt/ALPHA/BASE`.

   If you have NFS-mounted the `/mnt/ALPHA/BASE` directory from a DEC OSF/1 system to a local mount point, enter the name of the local mount point.
7. Choose whether you want to create symbolic links to the software or to extract the software into the RIS area.
8. Select the subsets that you want to make available from this RIS area and confirm your choice.
9. Enter the architecture of clients that your system will serve at the following prompt:

   ```
   Enter the identifier for the architecture of clients to be
   served from the environment, either mips or vax:
   ```

   Because the ULTRIX system does not explicitly support the Alpha AXP architecture, you must enter `mips` in response to this prompt. Do not enter `alpha`.

   The `ris` utility then displays the absolute path of the new RIS

environment:

```
The new environment is in /var/adm/ris/risn.mips.
```

The *n* in this display is the next available sequential number in your product area. For example, if your server already has a `/var/adm/ris/ris1.mips` environment, the new environment is `/var/adm/ris/ris2.mips`.

10. Change to the directory of the new RIS environment.

    For example, if the area you just created is `ris2.mips`, then enter the following command:

    ```
    # cd /var/adm/ris/ris2.mips
    ```

11. Extract the files and create the directory structure required for DEC OSF/1 clients by entering the following commands:

    ```
    # restore xf */ROOT ./RisFiles
    # RisFiles Extract /var/adm/ris/ris2.mips/product_2/ROOT

    Extracting netload ...done.
    netload
    ```

    Replace `ris2.mips/product_2` in the preceding command with the name of the RIS area you just created and the appropriate product number.

12. Edit the `/etc/exports` file.

    You must add a line similar to the following for each RIS area that your ULTRIX server is serving to DEC OSF/1 clients:

    ```
    /usr/var/adm/ris/ris2.mips/kit -r=0 -o
    ```

Your ULTRIX server is now ready to register clients for the DEC OSF/1 for Alpha AXP product.

Caution

Before clients use the new RIS area to perform upgrade installations, read the *Release Notes* and the *Installation Guide*. Failure to carefully follow the directions for upgrade installations can result in loss or corruption of data.

Worksheet B

This appendix contains a worksheet for recording setup information for the software sharing client. Make as many copies of this worksheet as you need.

RIS Client Configuration Worksheet

Network

System name:

Hardware Ethernet address: ☐☐-☐☐-☐☐-☐☐-☐☐-☐☐

TCP/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: →

ZK-0618U-R

Glossary

This glossary defines terms and concepts related to software sharing.

client
: A computer system that uses resources provided by another computer, called a server.

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.

RIS area
: A reserved disk area physically connected to a RISC server, containing one or more product environments in which are stored installable software kits.

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 software kits 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.

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 DEC OSF/1 `setld` software installation utility.

Index

A

architecture
of RIS, 1–2 to 1–5

B

Berkeley Internet Name Domain
See BIND
BIND, 4–2
booting
RIS client, 5–1
bootp, 5–1
bootp protocol
requirement for, 2–3
bootpd, 5–1, 5–2
bootpd daemon, 5–1t, 6–3
bootptab, 5–1
bootptab file, 5–1t, 5–2, 6–2

C

CD-ROM
mounting, 3–1
client
adding, 4–1 to 4–4
for RIS, 4–1 to 4–4
characteristics of, 1–5
defined, 1–1
description of, 1–2
client (cont.)
Ethernet address, 4–2
hardware compatibility, 2–1
listing, 4–5
registration, 4–1
of host name, 4–2
IP address, 4–2
naming service, 4–2
removing, 4–4
RIS
characteristics of, 1–5
troubleshooting, 6–1 to 6–5
software version compatibility, 2–1
client registration
problems, 6–1
compatibility, server and client, 2–1
configuring
procedure for server, 1–2
creating RIS area, 3–1

D

daemon
bootpd, 5–2
inetd, 5–1
internet, 5–1
tftpd, 5–3

deleting a client
See client, removing
deleting product list, 4–5
disk space
planning for RIS, 2–5
distribution device, 1–1
distribution media
See also CD-ROM

E

/etc/bootptab file, 6–2
/etc/hosts file, adding clients to, 4–2
/etc/inetd.conf file, 6–3
Ethernet
See also LAN
address of client, 4–2
setting up a client on, 2–3

F

file system
memory-resident in RIS, 1–5

H

hardware
compatibility of, 2–1
Ethernet address of client, 4–2
hosts file, adding clients to, 4–2

I

inetd, 5–1
inetd daemon, 5–1t
inetd.conf file, 5–1t
/etc/inetd.conf file, 6–3
installation
of network on server, 2–3
installation (cont.)
of RIS software subsets
in existing area, 3–4
in new area, 3–1
of server operating system, 2–3
Internet
See IP address
IP address, registering, 4–2

K

kit
See subset

L

LAN
sharing software on, 1–1
listing products, 4–5
local area network
See LAN

M

maintenance
See management
management of RIS, 4–1 to 4–5
MOP protocol
diagnosing failures of, 6–4
host naming limitations imposed by, 4–2n
problems, 6–4
verbose mode, 6–4

N

naming service, 4–1
registering clients, 4–2
network
installation of, 2–3

network (cont.)
naming service, 4–1
Network File system
See NFS
Network Information Service, 4–2
See NIS
NFS
using a remote RIS area, 3–4
NIS, 4–2

O

operating system
installable by RIS, 1–5
installing on server, 2–3

P

planning disk space for RIS, 2–5
product environment, 1–3
multiple in single RIS area, 1–4
products in
deleting, 4–5
listing, 4–5

R

registering a client, 4–1
host name, 4–2
information required for, 4–1
IP address, 4–2
with naming service, 4–2
remote boot
flow, 5–3
Remote Installation Services
See RIS
removing a client, 4–4
RIS
adding a client, 4–1 to 4–4
architecture of, 1–2 to 1–5
client
preparing to register, 4–1
configuration procedure for server, 1–2
deleting products, 4–5
disk space
planning, 2–5
installing subsets, 3–1 to 3–4
listing clients, 4–5
listing products, 4–5
product environment, 1–3
remote booting, 5–1, 5–3
removing a client, 4–4
server setup, 3–1 to 3–4
system components, 1–1
troubleshooting, 6–1 to 6–5
using an NFS-mounted RIS area, 3–4
RIS area, 1–2
contents of, 1–3
creating, 3–1
exporting and importing, 1–4
multiple, 1–4
RIS client
booting, 5–1
RIS daemons
bootpd, 5–1t
inetd, 5–1t
tftpd, 5–1t
RIS files
bootptab, 5–1t
inetd.conf, 5–1t
ris.tty.lock file, 6–1
risdb file, 6–2

rislock file, 6–1

S

server
defined, 1–1
function in RIS, 1–3
hardware compatibility, 2–1
management tasks, 4–1 to 4–5
planning disk space, 2–5
setup, 3–1 to 3–4
network installation, 2–3
operating system installation, 2–3
prerequisite tasks, 2–3
RIS, 3–1 to 3–4
setup preparation, 2–1 to 2–5
software version compatibility, 2–1
setup tasks
See server, setup
showing product list, 4–5
subset
choosing
for RIS, 3–3
defined, 1–4
descriptions of, 2–3
installing in RIS
in existing area, 3–4
in new area, 3–1
mandatory, 3–3
optional, 3–3
sizes of, 2–3
subsets, 1–4

T

tftp, 5–1
tftp protocol
requirement for, 2–3
tftpd, 5–1
tftpd daemon, 5–1t, 6–5
troubleshooting RIS, 6–1 to 6–5

V

version compatibility, 2–1

Y

Yellow Pages service
See NIS
YP
See NIS

How to Order Additional Documentation

Technical Support

If you need help deciding which documentation best meets your needs, call 800-DIGITAL (800-344-4825) before placing your electronic, telephone, or direct mail order.

Electronic Orders

To place an order at the Electronic Store, dial 800-234-1998 using a 1200- or 2400-bps modem from anywhere in the USA, Canada, or Puerto Rico. If you need assistance using the Electronic Store, call 800-DIGITAL (800-344-4825).

Telephone and Direct Mail Orders

Your Location	Call	Contact
Continental USA, Alaska, or Hawaii	800-DIGITAL	Digital Equipment Corporation P.O. Box CS2008 Nashua, New Hampshire 03061
Puerto Rico	809-754-7575	Local Digital subsidiary
Canada	800-267-6215	Digital Equipment of Canada Attn: DECdirect Operations KAO2/2 P.O. Box 13000 100 Herzberg Road Kanata, Ontario, Canada K2K 2A6
International	————	Local Digital subsidiary or approved distributor
Internal[a]	————	SSB Order Processing – NQO/V19 *or* U. S. Software Supply Business Digital Equipment Corporation 10 Cotton Road Nashua, NH 03063-1260

[a] For internal orders, you must submit an Internal Software Order Form (EN-01740-07).

Reader's Comments

DEC OSF/1
Sharing Software on a Local Area Network
AA-PS3LB-TE

Please use this postage-paid form to comment on this manual. If you require a written reply to a software problem and are eligible to receive one under Software Performance Report (SPR) service, submit your comments on an SPR form.

Thank you for your assistance.

Please rate this manual:	Excellent	Good	Fair	Poor
Accuracy (software works as manual says)	☐	☐	☐	☐
Completeness (enough information)	☐	☐	☐	☐
Clarity (easy to understand)	☐	☐	☐	☐
Organization (structure of subject matter)	☐	☐	☐	☐
Figures (useful)	☐	☐	☐	☐
Examples (useful)	☐	☐	☐	☐
Index (ability to find topic)	☐	☐	☐	☐
Page layout (easy to find information)	☐	☐	☐	☐

What would you like to see more/less of? _____

_____

What do you like best about this manual? _____

_____

What do you like least about this manual? _____

_____

Please list errors you have found in this manual:

Page	Description
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Additional comments or suggestions to improve this manual:

_____

_____

_____

What version of the software described by this manual are you using? _____

Name/Title _____ Dept. _____

Company _____ Date _____

Mailing Address _____

_____ Email _____ Phone _____

---- Do Not Tear - Fold Here and Tape ----

digital™

No Postage
Necessary
if Mailed in the
United States

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO.33 MAYNARD MASS.

POSTAGE WILL BE PAID BY ADDRESSEE

DIGITAL EQUIPMENT CORPORATION
OPEN SOFTWARE PUBLICATIONS MANAGER
ZKO3-3/Y32
110 SPIT BROOK ROAD
NASHUA NH 03062-9987

--- Do Not Tear - Fold Here ---

Cut Along Dotted Line

Reader's Comments

DEC OSF/1
Sharing Software on a Local Area Network
AA-PS3LB-TE

Please use this postage-paid form to comment on this manual. If you require a written reply to a software problem and are eligible to receive one under Software Performance Report (SPR) service, submit your comments on an SPR form.

Thank you for your assistance.

Please rate this manual:	Excellent	Good	Fair	Poor
Accuracy (software works as manual says)	☐	☐	☐	☐
Completeness (enough information)	☐	☐	☐	☐
Clarity (easy to understand)	☐	☐	☐	☐
Organization (structure of subject matter)	☐	☐	☐	☐
Figures (useful)	☐	☐	☐	☐
Examples (useful)	☐	☐	☐	☐
Index (ability to find topic)	☐	☐	☐	☐
Page layout (easy to find information)	☐	☐	☐	☐

What would you like to see more/less of? _____

_____

What do you like best about this manual? _____

_____

What do you like least about this manual? _____

_____

Please list errors you have found in this manual:

Page	Description
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Additional comments or suggestions to improve this manual:

_____

_____

_____

What version of the software described by this manual are you using? _____

Name/Title _____ Dept. _____

Company _____ Date _____

Mailing Address _____

_____ Email _____ Phone _____

---- Do Not Tear - Fold Here and Tape ----------

digital™

No Postage
Necessary
if Mailed in the
United States

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO.33 MAYNARD MASS.

POSTAGE WILL BE PAID BY ADDRESSEE

DIGITAL EQUIPMENT CORPORATION
OPEN SOFTWARE PUBLICATIONS MANAGER
ZKO3-3/Y32
110 SPIT BROOK ROAD
NASHUA NH 03062-9987

--- Do Not Tear - Fold Here ----------

Cut Along Dotted Line