

**ULTRIX-32
Introduction to
System and Network Management**

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ULTRIX-32 Operating System, Version 3.0

Digital Equipment Corporation

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About This Manual

This guide provides you with introductory information on system and network management, and identifies where you will find the detailed information on the procedures involved. You will need to perform some or all of these procedures depending on your particular system management and network management requirements.

Audience

The *ULTRIX-32 Introduction to System and Network Management* is written for the person responsible for managing and maintaining an ULTRIX system who has had little exposure to system and network management. It assumes that this individual is familiar with ULTRIX commands, the system configuration, the system's controller/drive unit number assignments and naming conventions, and an editor such as vi or ed. You do not need to be a programmer to use this guide.

Organization

This manual consists of 3 chapters. The chapters are:

- Chapter 1: Introduction
Summarizes local system and network management concepts and explains superuser privileges.
- Chapter 2: Local System Management
Briefly describes local system management and identifies the corresponding system management guides.
- Chapter 3: Network Management
Briefly describes network management and explains the available ULTRIX operating system services and servers and identifies other network facilities that you can use. It also identifies the corresponding network management guides.

Related Documents

You should have all of the ULTRIX system and network management guides as well as the processor-specific installation guide and the Advanced Installation Guide.

You should also have the hardware documentation for your system and peripherals.

Conventions

The following conventions are used in this manual:

special	In text, each mention of a specific command, option, partition, pathname, directory, or file is presented in this type.
command(x)	In text, cross-references to the command documentation include the section number in the reference manual where the commands are documented. For example: See the <code>cat(1)</code> command. This indicates that you can find the material on the <code>cat</code> command in Section 1 of the reference pages.
literal	In syntax descriptions, this type indicates terms that are constant and must be typed just as they are presented.
<i>italics</i>	In syntax descriptions, this type indicates terms that are variable.
[]	In syntax descriptions, square brackets indicate terms that are optional.
. . .	In syntax descriptions, a horizontal ellipsis indicates that the preceding item can be repeated one or more times.
function	In function definitions, the function itself is shown in this type. The function arguments are shown in italics.
UPPERCASE	The ULTRIX system differentiates between lowercase and uppercase characters. Enter uppercase characters only where specifically indicated by an example or a syntax line.
example	In examples, computer output text is printed in this type.
example	In examples, user input is printed in this bold type.
%	This is the default user prompt in multiuser mode.
#	This is the default superuser prompt.

>>>

This is the console subsystem prompt.

In examples, a vertical ellipsis indicates that not all of the lines of the example are shown.

<KEYNAME> In examples, a word or abbreviation in angle brackets indicates that you must press the named key on the terminal keyboard.

<CTRL/x> In examples, symbols like this indicate that you must hold down the CTRL key while you type the key that follows the slash. Use of this combination of keys may appear on your terminal screen as the letter preceded by the circumflex character. In some instances, it may not appear at all.

Introduction 1

This chapter describes system management responsibilities, summarizes system and network management, and explains superuser privileges.

Local system management includes modifying system files, adding and deleting users, and changing disk partition structures. Network management includes setting up a local area network and establishing the network services that are available with the system. You perform local system and network management tasks after the ULTRIX-32 operating system is installed.

The tasks you perform depend upon the environment in which the system resides. For example, if your processor is a VAX 8800 that you plan to configure with a number of terminals, you must add several user logins and perhaps several printers. Adding users and printers is a local system management function. If your system is a VAXstation 2000 that you plan to run in a network environment, you must create a local area setup for your system. Setting up a local area network is a network management function.

1.1 Responsibilities

When you perform local system management and network management functions, you must also assume other responsibilities such as the following:

- Preparation
Before you set up a service or perform a system management procedure, you may need to fill out work sheets, record information in your own internal documentation, or generate statistical information that is required as input by some system utilities.
- Set up of the service or system capability
After you complete the preliminary tasks, you must be familiar with the utilities that you must execute. For example, the dms utility creates the diskless management service, the lprsetup utility sets up system printers, and the nfssetup utility sets up the network file system.

- **Routine Maintenance**

After you set up a service or perform a particular management task, you may have to make adjustments, either because the set up is not exactly what you wanted, or because changing conditions require you to modify the service or related system files. Routine maintenance also includes activities that you must perform on a regular basis, such as backing up and restoring file systems.

- **Troubleshooting**

Sometimes system errors occur. They can be caused by a system condition, the way a task was performed, or the manner in which a service is set up. When a system error occurs, you must know how to correct the problem.

1.2 Local System Management Summary

Local system management involves the following:

- Setting up the system environment
- Shutting down and starting up the system
- Building a kernel
- Making changes to the disk partition structure
- Backing up and restoring files and file systems
- Setting up the error logging facility
- Exercising the system
- Recovering from system crashes

These are discussed in Chapter 2.

1.3 Network Management Summary

Network management involves the following:

- Local area networks
- Network services and network servers, including uucp and terminal emulation

These are discussed in Chapter 3.

1.4 Superuser Privileges

To perform most system and network management tasks, you must log into the system as the superuser. As the superuser (root login), the system processes your requests without performing the normal security checks. In addition, the superuser has complete access to any file and

complete control of any process on the system. For example, the superuser can override file mode permissions or kill any process that is executing. Because you can log in as superuser during multiuser operations, most system management activities can be performed without interrupting user activity.

To log into the root account, use the superuser password that was created during the installation procedure, or the current superuser password. For security reasons, create passwords for all accounts using the `passwd` command. Each time you log into the system under a specified login, the system prompts you for your password.

To ensure system security, change the superuser password regularly and restrict use of the superuser account to those with the required system knowledge and those with system responsibility.

If you log into the console when the system is in single-user mode, superuser privileges are automatic. During multiuser operations, you can obtain superuser privileges from any terminal that you are logged into by using the substitute user command `su` with either `root` or no name specified.

Although you can log in as superuser at the login prompt, using the `su` command is the preferred method. When you log in with your own user name and substitute your user identification to `root`, a traceable accounting record is created in `/usr/adm/sulog`. This record identifies who assumed superuser privileges and when. In addition, this method can also increase system security. If you do obtain superuser privileges by logging in as `root` at the system prompt, the system prompt may differ depending on your site. For example, most systems indicate superuser privileges by changing the multiuser prompt to a number sign (`#`), from either a dollar sign (`$`) in the Bourne Shell or a percent sign (`%`) in the `csh` shell.

If the entry `secure` is missing from the corresponding `tty` line in the `/etc/ttys` file, you cannot log in to the system on that `tty` line as `root` (superuser).

Local System Management 2

This chapter briefly describes local system management, highlights the commands that help you manage your environment, and directs you to other manuals in the documentation set that contain related topics.

Local system management is performed at the local system level. Local system management can overlap with network management. For example, a local system management task is to set up your system environment which includes modifying system files such as the `/etc/hosts` file, which is a local file required for network operations.

2.1 Setting up the System Environment

To set up the system environment, you describe how you want the ULTRIX-32 operating system to perform at the system level. How you set up your system environment depends on your processor, its associated hardware, and the environment in which your system resides. It also depends on the preferences of the system users.

To set up the system environment, you must be familiar with the following:

- Modifying system files
- Adding and removing users
- Adding devices and system printers
- Adding software subsets
- Monitoring system performance

The following sections provide a brief description of the previous functions. For a complete explanation of how to set up your system environment, see the *ULTRIX-32 Guide to System Environment Setup*.

2.1.1 Modifying System Files

After your system has been installed, you must create or modify a number of system files. System files are files that the system needs to perform a number of different functions, such as allowing users to log in, enabling printers to work, and displaying a login message of the day. You must

maintain the following system files:

- `/etc/passwd` - Contains user-specific system access data. Use the `adduser` and `removeuser` commands to maintain this file.
- `/etc/group` - Contains group-related file access data. Use the `addgroup` command to add groups to this file.
- `/etc/ttys` - Contains terminal initialization information.
- `/etc/fstab` - Stores file system table entries.
- `/usr/lib/aliases` - Contains user names associated with sendmail aliases.
- `/usr/lib/crontab` - Contains instructions executed by the system clock daemon.
- `/etc/motd` - Stores the current message-of-the-day.
- `/usr/adm/syserr/syserr.hostname` - Contains system error messages.

2.1.2 Adding and Removing Users

To allow users access to the system, you must create user accounts that contain information such as the user's name and their user and group identification codes. Accordingly, you may have to remove a user from the system or alter information on their accounts.

Use the `adduser` command to create user accounts. To delete user accounts, use the `removeruser` command. These commands update the `/etc/passwd` and `/etc/group` files. Note that you can also use the `vipw` command to edit these files manually. See the *Guide to System Environment Setup* for more information on these commands.

2.1.3 Adding Devices and System Printers

To expand your environment, you can add devices to your system. These devices include terminals, disk drives, tape drives, pseudoterminals, and printers. The utility that creates the special files for the added devices is the `MAKEDEV` utility.

Before you can add devices, you must check your system configuration file to ensure that the device driver for a particular device is loaded into the kernel. If the device is not specified in your system configuration file, add it and rebuild the kernel before running the `MAKEDEV` utility.

The `ULTRIX-32` operating system provides an interactive utility, `lprsetup`, that enables you to add system printers automatically.

See the *ULTRIX-32 Guide to System Configuration File Maintenance* to make changes to the system configuration file and to rebuild the kernel. See the *ULTRIX-32 Guide to System Environment Setup* to add devices and printers.

2.1.4 Adding Software Subsets

A software subset is a collection of executable files and data files needed to perform a specific function or provide a particular class of services. Software subsets can be either supported or unsupported. To add software subsets to your system, use the `setId` utility.

Refer to the *ULTRIX-32 Guide to System Environment Setup* for information on this utility. Refer to the *ULTRIX-32 Advanced Installation Guide* for a list of the available software subsets.

2.1.5 Monitoring System Performance

The system provides a number of utilities that enable you to monitor system performance and use. The utilities that monitor system performance generate statistical information on input/output, process status, virtual memory, and the system tables. The utilities that monitor system use generate information on login activity, command use, and printer use.

Once you set up your system environment, it is good system management practice to generate and save the reports that these utilities provide so that you have some statistical and system use information with which to measure the system's performance.

Refer to the *ULTRIX-32 Guide to System Environment Setup* for information on monitoring system performance.

2.2 Shutting Down and Starting Up the System

The ULTRIX-32 operating system provides you with several ways to shut down and start up the system. You can shut down multiuser mode and remain in single-user mode, shut down and halt the processor, or shut down multiuser mode and immediately reboot the system.

Accordingly, you can start up the system in single-user or multiuser mode. System start up is also referred to as booting the system. When you start up the system in single-user mode, the system comes up with the root file system mounted and with the `sh` program running at the console. When you start up the system in multiuser mode, it checks all of the file systems in the `/etc/fstab` file, mounts them, and enables users who are listed in the `/etc/passwd` file to log in.

You can also start up the system using the interactive mode. This facility provides additional prompts and messages and allows you to bring the system up in either single-user or multiuser mode.

Refer to the *ULTRIX-32 Guide to System Shutdown and Startup* for information on shutting down and starting up the system. Refer to the *ULTRIX-32 Guide to System Environment Setup* for information on the `/etc/passwd` file and the `/etc/fstab` file.

2.3 Building a Kernel

The kernel is the system image that controls system scheduling, memory management, input and output services, device management, and organization of the file systems. The system uses the system configuration file to build a kernel. Except for diskless systems, the system configuration file resides in `/usr/sys/conf` and has the same name as the system name that you specified during the installation procedure. The interactive utility that you use to build a kernel is `doconfig`.

The following list highlights some instances when you must rebuild the kernel:

- To add a device that is not specified in the configuration file.
- To create swap areas on two disk drives instead of one to improve the response time.
- To increase your login capacity.
- To add layered products, such as the DECnet/ULTRIX communication product, to your system.

Refer to the *ULTRIX-32 Guide to System Configuration File Maintenance* for more information on building a kernel and the system configuration file.

2.4 Making Changes to Disk Partitions

Disk partitions are predetermined sections on a disk which are made up of sectors. The disk partition sizes is dependent upon the type of disk you are using. All disks can have up to eight partitions. Each partition can have one file system, but a file system cannot exceed the partition size.

A partition must be altered when the following occurs:

- A file system exceeds the capacity of the partition on which it resides.
- The paging and swapping partition is not large enough for your environment.
- You need to set up a diskless environment and the existing partition space must be reorganized to accommodate the diskless clients.
- The dump partition is not large enough to hold all of core memory during a system crash.

The following commands allow you to manage disks:

- `chpt` - Displays and changes partition sizes.
- `df` - Displays the current file system assignments and the available free space for each file system.

- newfs - Creates a new file system.
- diskpart - Displays the default disk partition sizes of the supported disks.
- dms - Sets up the diskless management service and if you want to dedicate one or more disks for a diskless environment, allocates the disk partitions and creates the necessary file systems for a diskless environment.

Refer to the *ULTRIX-32 Guide to System Disk Maintenance* for more information on changing disk partitions. Refer to the *ULTRIX-32 Guide to Diskless Management Services* for more information on setting up a diskless environment.

2.5 Backing Up and Restoring Files and File Systems

You should back up your file systems regularly to avoid data loss caused by hardware failures, a system crash, or human error. In addition, if you devise a backup strategy, you can minimize the time and number of required tapes or diskettes needed to complete a backup.

To back up and restore local file systems, use the `dump` and `restore` commands. To back up and restore files and file systems over a network, use the `rdump` and `restore` command. You can also use the `opser` utility to back up file systems locally or remotely.

System users can back up and restore individual files with the `tar` command for tapes and the `mdtar` command for disks. In addition, the system provides a labeled tape facility, `ltf`, which reads and writes single-volume, ANSI-compatible tape volumes. This utility enables you to transfer data between ULTRIX-32 and non-ULTRIX systems.

Refer to the *ULTRIX-32 Guide to System Backup and Restore* for more information.

2.6 Setting up the Error Logging Facility

The error logging facility records and reports system errors and other events that occur on your MicroVAX or VAX system. The components of the error logging facility are as follows:

- A kernel buffer that logs error messages in binary form.
- The `elcsd` daemon, which transfers the error messages from the kernel buffer to the error log file.
- The `elcsd.conf` file, which contains `elcsd` daemon configuration parameters.

- The `uerf` command, which generates system error and event reports. Refer to the *ULTRIX-32 Guide to the Error Logger* for more information.

2.7 Exercising the System

The ULTRIX-32 operating system provides you with a number of exerciser utilities that let you test part or all of your system. The exercisers are troubleshooting tools for the system. These utilities reside in the `/usr/field` directory. The system components and the exerciser utilities that test them are:

- Terminal communications system, `cmx`
- Disk drives, `dskx`
- Non-NFS linked file systems, `fsx`
- Line printers, `lpx`
- Memory, `memx`
- Tape drives, `mtx`
- TCP/IP network system, `netx`
- Shared memory capabilities, `shmx`

Each of the exercisers has an on-line help facility which prints a description of how to use the exerciser.

Refer to the *ULTRIX-32 Guide to System Exercisers* and to the *ULTRIX-32 Reference Pages* for information on how to run these utilities.

2.8 Recovering from System Crashes

The ULTRIX-32 operating system monitors its own internal status and performs a number of internal consistency checks. If an internal check shows inconsistencies, the system prints panic messages to the console and then crashes. The panic messages help you determine the cause of the crash.

Before the system crashes, but after a panic message is displayed, the system updates all file system information. The system then performs a core dump of the memory image to the dump device specified in the configuration file. If the system hangs and does not produce crash dump, you must force a crash dump.

After the system dumps the raw memory image, the system reboots itself and invokes `/etc/fsck` to check for file inconsistencies during the reboot process. When the system has successfully rebooted, analyze the crash dump image with the `adb` and `nm` commands.

See the *ULTRIX-32 Guide to System Crash Recovery* for more information.

Network Management 3

This chapter briefly describes network management, identifies the commands needed to set up the network or network service, and directs you to other manuals in the documentation set that discuss related topics. Network management includes setting up, maintaining, and troubleshooting the network and network services. For example, when you set up your system on a local area network, you are performing a network task. To complete this task, you must use the `netsetup` command, which updates certain network-related files such as `/etc/hosts` and `/etc/networks`.

Routine network management includes monitoring network performance, cleaning up network-related files and directories such as `/usr/spool/mqueue/syslog`, and adding new systems or files to the network or network service.

Because networks and network services provide access to your local system from remote systems, system security may be compromised. The system manager should be aware of system security issues and should know how to minimize the security risks created by networks and network services.

3.1 Local Area Networks

Most of the network services and utilities require the use of a local area network over which to transfer data. The only network services and utilities that do not require a local area network are those that use telephone lines to transfer data, such as the `uucp` utility and the IBM 2780/3780 Terminal Emulator. All other network utilities and services require that your system be established on a local area network.

A local area network consists of two or more computer systems connected by a transmission medium such as an Ethernet cable. Each computer system is connected to the transmission medium by a hardware interface such as a DEUNA. Most systems connected to the same local area network are in the same building or cluster of buildings and are usually under the same system administration.

A local area network is useful for transferring data and sharing resources across systems. For example, a local area network allows the users on one system to access devices, such as a printer connected to another

system. This means both systems can use one printer.

A local area network uses the standard Internet protocols such as TCP/IP and FTP and is usually faster than uucp utility for transferring data.

Useful local area network commands include the following:

- rsh - execute a shell command on a remote system
- rlogin - log into a remote system
- rcp - copy files to and from a remote system
- ruptime - show host status of remote systems
- rwho - show who is logged in on systems on the network

Before setting up a local area network, you need to know your system's Internet address, the network class, the broadcast address, and the host names and addresses of the other systems on the network.

To set up a local area network, use the netsetup command. This command is interactive and prompts you for the information required to set up your system on a local area network.

See the *ULTRIX-32 Guide to Networking* for details about setting up and maintaining a local area network.

Once you set up your system to operate on a local area network, you can add the network services that the ULTRIX-32 operating system provides.

3.2 Network Services

A network service is a utility that allows you to expand your local system to make use of remote systems over a communications cable such as an Ethernet. The following network services are available with the ULTRIX-32 operating system:

- Network File System (NFS) service
- Yellow Pages (YP) service
- Berkley Internet Name Domain (BIND) Service
- Remote Installation Service (ris)
- Diskless Management Services (dms)
- Ethernet Communications server

There are two other network facilities that are available with the ULTRIX-32 operating system: the uucp utility and the IBM 2780/3780 Terminal Emulator. These facilities do not require a local area network; however, your system must be connected to the remote system by a modem and telephone lines.

The following sections describe the network facilities and server in more detail.

3.2.1 The Network File System Service

The Network File System (NFS) service lets client systems share files and directories that are made available by other systems called servers. The NFS service allows you to make efficient use of system resources such as file system space.

The server makes files available to the client systems by exporting the file systems and directories over the network. The exported file system and directory information is specified in the `/etc/exports` file on the server.

Client systems can mount an exported file system or directory onto a local mount point, such as `/mnt`, by using the `mount` command.

If your system is a client, you can have remote file systems and directories automatically mounted each time your system goes to multiuser mode by placing the appropriate entries in the `/etc/fstab` file on your system.

NFS eliminates the need to copy files across the network from one system to another, thus making it easier for client systems to access remote files and directories. A remotely mounted file system provides transparent access of the server's files to the client system.

Before you can set up NFS, your system must be established on a local area network. To set up NFS, use the `nfssetup` command. This command is interactive and prompts you for the information required to set up the NFS environment on your system.

If you are running NFS, you can choose to run the NFS locking service. The NFS locking service supports both local (kernel) and remote (daemon) file and region (or record) locking. It coordinates file and region locking, which is crucial when several processes access a shared database simultaneously.

Refer to the *ULTRIX-32 Guide to the Network File System* for a complete explanation of how to set up and use the NFS service.

3.2.2 The Yellow Pages Service

Yellow Pages (YP) is a data base lookup service that enables systems on a local area network to maintain a set of commonly used data bases. The YP service consists of a YP master server, YP slave servers and clients, and YP data bases. The YP master server contains the master copy of the data bases. Any updates to the YP data bases are always made on the YP master, which then propagates copies of its modified data bases to the slave servers.

YP clients can access the data bases from any YP server, including the master and slaves. The data is the same regardless of which server provides the information.

The YP lookup service is transparent to users on systems running YP. The data bases that YP allows systems to share include system files such as `/etc/hosts`, `/etc/services`, `/etc/passwd`, `/etc/networks`, `/etc/rpc`, and `/etc/group`. In addition to these system files, you can set up any YP data bases your system needs to share with others.

The YP service is very useful for systems on a local area network where common system files change frequently. For example, if new systems and users are added to your local area network regularly, it is easier to update the master YP server once and then let YP propagate the new information to the rest of the servers, than it is to update the individual system files on each system on the network. By updating the system files on only one system, you eliminate the possibility of having the system files on the different systems on the network become out of date.

Before you can set up YP, your system must be established on a local area network. To set up YP, use the `ypsetup` command. This command is interactive and prompts you for the information required to set up the YP environment on your system.

Refer to the *ULTRIX-32 Guide to Yellow Pages Services* for a complete explanation of how to set up and use the YP service.

3.2.3 The Berkeley Internet Name Domain (BIND) Service

The BIND service implements the DARPA Internet name server for the ULTRIX-32 operating system. A name server is a network service that allows network clients to identify resources or objects in the network. This service also allows clients to share these identified resources with other objects in the network. Thus, the purpose of this service is to store and retrieve host names and their addresses.

The BIND service has two parts: the user interface, which is called `resolver` and the BIND server called `named`. The user interface `resolver`, consists of a number of library routines that make, send, and interpret network data packets which are transmitted over the network to or from Internet domain servers. The `named` server is a daemon that runs in the background and responds to information requests from network clients.

You should consider implementing the BIND service instead of the YP service when there are a number of processors in a large network that cross organizational boundaries. The BIND service enables you to break the network down into a hierarchy of domains so that network data base administration tasks are distributed over the network.

See the *ULTRIX-32 Guide to Bind Service* for more information on this service and on how to implement it on your system.

3.2.4 The Remote Installation Service

The remote installation service (ris) allows you to install ULTRIX-32 software products onto a ris server on the network. Once the network kit has been properly set up on a ris server, the client MicroVAX or VAXstation families of processors can install the ULTRIX-32 software products from the server instead of a standard distribution medium, such as a disk or tape.

The first task is to load the ULTRIX-32 software products from the distribution medium into the ris directory of the ris server. Then register each client system so that it can access the network kit from the ris server. For each client, select the specific software subsets you want to install and place entries for them in the client's model file on the ris server.

Once you have registered a client on the ris server, the client's system manager can boot the client to install the network kit from the ris server onto the client. See the Basic Installation Guide for the client processor for information on how to install ULTRIX-32 software products from a ris server.

If a system is no longer a client, then you need to remove the system from the ris server's registered clients.

Before you can use ris, the server and clients must be established on a local area network.

See the *ULTRIX-32 Guide to the Remote Installation Service* for information on how to set up the network kit on the ris server.

3.2.5 Diskless Management Services

The Diskless Management Services (DMS) are provided by the dms utility. The dms utility enables you to set up a server for diskless clients. DMS servers provide software that client systems, which may not have disks, can access across the network. The diskless clients share file systems in a diskless environment set up on the server. None of the software is transferred from the server to the client; it remains on the server.

Any supported processor type can be a DMS server, but only the processors from the MicroVAX and VAXstation families can be DMS clients.

DMS is useful for those client systems that do not have their own system disks. It is also useful for those clients who want to use more ULTRIX software than their disk space can accommodate. Another feature of DMS

is that one client can have access to more than one diskless environment. The `dms` utility helps you accomplish the following tasks on the DMS server:

- Partition a disk and create the necessary file systems
- Install the shared software subsets from the distribution medium
- Establish a series of defaults that each client can use
- Register the clients to access the software on the DMS server

See the *ULTRIX-32 Guide to Diskless Management Services* for a complete discussion on how to set up the DMS server and how to boot a client across the network from the server.

3.2.6 The Ethernet Communications Server

A terminal server is an Ethernet communication server that allows you to connect several terminal and printer devices to your local area network. Because the terminals and printers are connected to the terminal server, instead of being hardwired to the processor, you do not have to shut the system down to perform the initial connections.

See the *ULTRIX-32 Guide to Ethernet Communications Servers* for information on how to set up a terminal server on an ULTRIX-32 operating system after the terminal server hardware has been properly installed on the local area network. This guide also explains remote node maintenance functions that let you load and control terminal servers.

3.2.7 The uucp Utility

The `uucp` utility is widely adapted by most UNIX operating systems and allows you to transfer files among them and among the ULTRIX-32 operating system. In addition, your system can use `uucp` to send and receive mail across telephone lines instead of a local area network.

The `uucp` utility is economical to set up, although the ensuing telephone bills can become costly. Because `uucp` uses serial lines, it can take a long time to transfer files.

A typical `uucp` installation consists of a modem connected to the telephone system and the appropriate `uucp` files residing in `/usr/lib/uucp`. In addition, you need `uucp` entries in the `/etc/passwd`, `/etc/acucap`, and `/etc/tty` files. You also need the appropriate `/usr/spool` directories.

The `uucp` utility allows users on remote systems to access those files and directories for which you grant permission.

Some useful `uucp` commands include:

- tip – connect to a remote system
- uucp – UNIX to UNIX copy program
- uuencode – decode a binary file for transmission by mail
- uuencode – encode a binary file for transmission by mail
- uulog – read log file entries
- uuname – list systems uucp recognizes
- uuse – send a file to a remote system
- uustat – uucp status inquiry and job control
- uux – UNIX to UNIX command execution

The uucp maintenance tasks include the following:

- Polling remote sites
- Adding and deleting remote incoming connections (users)
- Adding or deleting outgoing connections
- Moving modems from one port to another
- Adding multiple telephone numbers for outgoing connections
- Cleaning up excess files and directories
- Maintaining uucp security

To set up the uucp utility, use the uucpsetup command. This command is interactive and prompts you for the information required to set up uucp on your system.

See the *ULTRIX-32 Guide to the uucp Utility* for details on how to set up and maintain uucp.

3.2.8 IBM Terminal Emulation

The 2780/3780 Terminal Emulator is a software package that allows your ULTRIX-32 operating system to emulate a 2780 or 3780 IBM Data Communications Terminal. This is also referred to as a Remote Job Entry Subsystem (RJE). The 2780/3780 Terminal Emulator uses the Binary Synchronous Communications (BSC) protocol to send and receive files across a communications (telephone) line connected to an IBM system that supports 2780/3780 devices.

With the 2780/3780 Terminal Emulator, you can create a program on your ULTRIX-32 system and then process it as a batch job on an IBM system. This is useful for those who want to use an IBM processor, but have an ULTRIX-32 system.

The ULTRIX-32 commands for the 2780/3780 Terminal Emulator are 2780e, 3780e, and 2780d.

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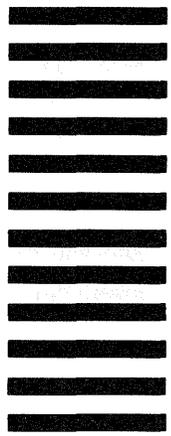
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