# Using AIX,® AppleTalk Services, and Mac OS Utilities on the Apple Network Server

*Installing, using, and administering the system*

# Contents

# Preface    About This Book

This preface describes:

■ Apple software provided with AIX

■ what's in this guide and who should use it

■ the available print and on-screen documentation

■ special terms used in this guide

## What the Network Server software offers

The software described in this guide contains IBM's AIX (version 4.1) operating system for use on the Apple Network Server. In addition, Apple Computer, Inc. has supplied AppleTalk networking services to work with AIX, and two applications that use a Macintosh interface for handling UNIX tasks. These are the Disk Management Utility and CommandShell (which is used for terminal emulation).

## Who should use this guide

This guide is for system administrators and users of AIX on the Network Server. It is meant for those who are familiar with basic UNIX system administration techniques, but who are not familiar with AIXwindows, the Common Desktop Environment™, InfoExplorer™, or the software that Apple Computer, Inc. is including with AIX.

## How to use this guide

This guide offers the basic information necessary to get up and running with AIX on the Network Server. Detailed information on the use of the AIX operating system and on system administration is available on screen. For a discussion of the on-screen documentation, see "Documentation and On-screen Information" next in this Preface.

This guide begins with an introductory chapter (Chapter 1) that introduces you to the basic hardware and software configurations, user interfaces, and standard AIX system management tools.

This is followed by a chapter on installation (Chapter 2), which describes installation of the AIX Base Operating System (BOS) and additional software from Apple Computer (the Disk Management Utility and CommandShell).

Chapters 3 through 6 discuss system startup and shutdown, the use of the AIXwindows graphical interface and the Common Desktop Environment, the use of the InfoExplorer on-screen documentation system, and basic AIX system-administration tools.

Chapters 7 through 9 describe how to set up AppleTalk networking services, how to manage file storage with the Disk Management Utility, and how to use CommandShell for remote access.

Chapter 10 offers assistance with error messages and troubleshooting.

## Documentation and on-screen information

This guide is the only printed documentation that comes with AIX and the Apple software for the Network Server. However, it is assumed that you also have *Setting Up the Network Server* available, which is included with the Network Server.

In addition, you can read or print IBM's AIX documentation using the InfoExplorer hypertext retrieval system, which is described in detail in Chapter 5. InfoExplorer makes available to you a wide range of user and system-administration documentation, including the *AIX 4.1 Getting Started* guide, upon which this guide is based.

For quick-start instructions on consulting IBM documents with InfoExplorer, see "Using InfoExplorer to Learn InfoExplorer (Graphical Interface)" or "Using InfoExplorer to Learn InfoExplorer (ASCII Interface)," in Chapter 5 of this guide.

Users interested in learning more about AIX commands should consult the information in the *AIX Version 4.1 System User's Guide: Operating System and Devices*. Users in a networking environment who are interested in learning more about AIX communications commands should consult the *AIX Version 4.1 System User's Guide: Communications and Networks*. For information on ordering documentation published by IBM, call 800-879-2755. From outside the United States, call 919-850-7500.

## Terminology used in this guide

This section explains the terminology used in this guide to refer to modifier keys and to various mouse and keyboard operations.

### Modifier keys

If you are using a keyboard that doesn't have an Alt key, use the Option key wherever this guide refers to the Alt key.

### Mouse buttons

Some users will use a three-button mouse and some a one-button mouse. The instructions in this guide are written for a three-button mouse, as are the IBM documents that you can display with InfoExplorer (see "Documentation and On-Screen Information," earlier in this chapter).

If you are using a three-button mouse, the phrase *the mouse button* refers to the first button (often called "the leftmost" button or "Mouse Button 1") on your three-button mouse. When this guide asks you to perform a mouse action, such as *clicking* to select an object, use the first button unless the instructions say otherwise.

If you are using a one-button mouse, wherever this guide instructs you to press the right mouse button, press the Right Arrow key on the keyboard. For the equivalent of the middle button on a three-button mouse, press the Left Arrow key.
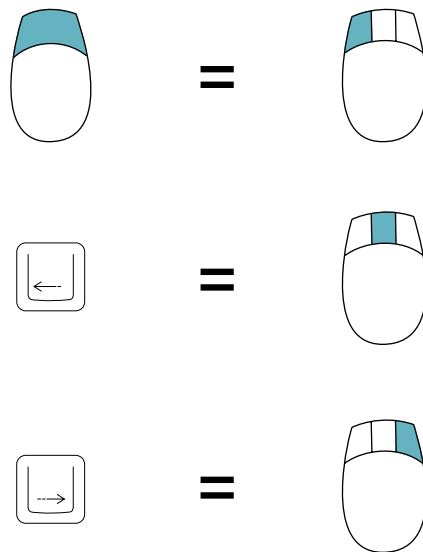
## Basic mouse and keyboard operations

In this guide, some terms represent a series of actions that you perform with the mouse, keyboard, or both. For example, the word *enter* indicates that you type a character (or a series of characters), then press the Return key.

Here is a list of standard terms for mouse and keyboard operations and the meaning of each term.

| Term | Action |
| --- | --- |
| Click | Point to the object and then press and immediately release the mouse button. |
| Double-click | Point to the object and then press and release the mouse button twice in quick succession without moving the pointer. |
| Drag | Point to an object on the screen, such as an icon that you want to move. Press and hold down the mouse button while moving the mouse until you have accomplished the desired task, such as moving the icon to a new location, and then release the mouse button. |
| Choose | Activate a command in a menu by pointing to the menu title and dragging (usually downward) through the menu until the command you want is highlighted. Then release the mouse button. |
| Point | Move the mouse to position the pointer over an object on the screen. |
| Select | Designate where the next action will take place. To select an object such as an icon, point to the object and click the mouse button once. When selected, the object appears highlighted. To select text, drag across the text until the entire range of text that you want to select is highlighted. |
| Type | Type a series of characters without pressing the Return key. |
| Press | Press a single key or key combination without pressing the Return key afterward, or point to an object and then press and hold down the mouse button without moving the mouse. |
| Enter | Type a series of characters and then press the Return key. |

This guide refers to the *Return* key, although your keyboard might label it the *Enter* key.

# 1 Introduction to the System

This chapter introduces you to the AIX operating system for use on the Network Server. It covers the following topics:

- hardware configuration
- software configuration
- user interfaces
- AppleTalk and Mac OS applications
- introduction to standard AIX system management tools

## Introduction

For information on setting up the Network Server, consult *Setting Up the Network Server,* which came with your Network Server, before you install AIX or perform any other procedures discussed in this guide.

This guide assumes that you are administering the system either from a console, that is, a monitor and keyboard directly connected to the Network Server, or from a remote Macintosh computer.

If you are planning to work on a console that is directly connected to the Network Server, consult *Setting Up the Network Server* for hardware specifications. The console allows you to use the AIX graphical interface— AIXwindows or the Common Desktop Environment (for information, see Chapter 4 of this guide). If you are administering the system from a remotely connected Macintosh computer running Macintosh System 7 or later, you can use the Disk Management Utility and CommandShell (see Chapters 8 and 9 of this guide).

You can also use a remotely connected X server, such as MacX on a Macintosh computer.

## The mouse

The mouse most commonly used with AIX has three buttons. If you are using a one-button mouse, you can use the arrow keys on the keyboard for the middle and right mouse buttons, as follows:

- If you need to use the right mouse button, press the Right Arrow key.
- If you need to use the middle mouse button, press the Left Arrow key.
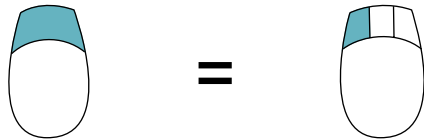
## System software components

Your Network Server uses three basic types of software:

- application programs
- device drivers
- the AIX operating system

The following figure shows the relationship between the different software programs and the hardware.

**Computer system software relationship**

| Application programs |
|---|
| Device drivers |
| Operating system |
| Hardware platform |
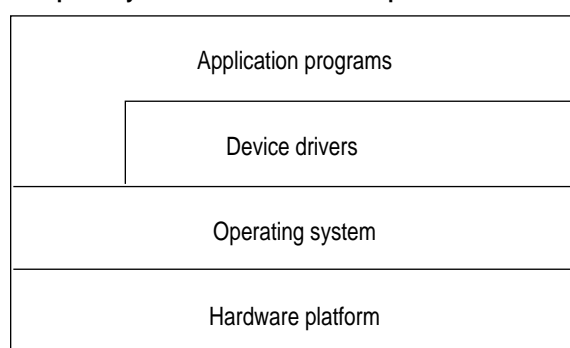
## Application programs

Application programs allow you to perform specific user tasks, such as running databases, file servers, or computer-aided design programs.

## Device drivers

Device drivers interact directly with computer hardware elements, such as printers and monitors, and shield the application programs from the hardware specifics of computers.

### Operating system

The operating system is a collection of programs that controls the running of the computer and organizes the resources of a computer system. These resources are the hardware components of the system, such as keyboards, printers, monitors, and disk drives. The AIX operating system comes with executable programs or utilities that maintain your files, send and receive messages, provide miscellaneous information about your system, and so on.

An application program relies on the operating system to perform many detailed tasks associated with the internal workings of the computer. The operating system also accepts commands directly from you to manage files and security.

## Root-user processes and root permission

Root-user processes are programs that can be run only by a user with root permission. A system administrator has root permission for all processes, which allows him or her to

- read, write to (that is, change), or execute any program or file
- call any system function
- perform certain subsystem-control operations

If you are not allowed to run a command or to read or change a file, the system displays a message saying you do not have the correct permissions or you are not allowed to run that command. The system administrator may be the only person who can log in as root on your system. However, the system administrator can grant a user permission to use particular commands, giving that user some control over processes.

## User interfaces

There are two types of user interfaces: the graphical user interfaces and the command-line interface.

### Graphical user interfaces

When a user interface has graphic objects, such as windows and menus, it is called a graphical user interface (GUI). This section describes the following graphical user interfaces:

- AIXwindows
- The Common Desktop Environment (CDE)

#### AIXwindows

AIXwindows lets you move windows, resize them, and copy text from window to window. It allows applications to run separately and appear simultaneously in different windows on your monitor.

The aixterm terminal window, in the AIXwindows interface, emulates a terminal. It contains a command-line prompt that allows you to run UNIX commands. The AIXwindows interface is also used by many applications that run on AIX. For a detailed description of the AIXwindows interface, see Chapter 4.

#### The Common Desktop Environment

The Common Desktop Environment (CDE) allows you to use icons to access networked devices and a wide variety of applications without having to be aware of their locations, startup commands, or command-line options. It allows you to exchange data across applications simply by dragging and dropping objects.

### The command-line interface

The command-line interface is a character-based interface. It is also known as the *shell*. The screen displays a system prompt, and the commands you type from the keyboard appear next to the prompt.

## The Disk Management Utility and CommandShell

In addition to AIX 4.1, the software used to run the Network Server also includes the Disk Management Utility and CommandShell, which were created by Apple for use with AIX on the Network Server. These applications run on a remotely connected Macintosh computer. They connect to AIX daemon processes to allow you to perform system administration tasks.

■ The Disk Management Utility. This application allows you to manage all aspects of disk storage. It uses a graphical user interface that offers various views of the disk storage structure as well as methods of adding to, deleting from, and modifying the disk storage structure. For more information, see Chapter 8, "Managing File Storage With the Disk Management Utility."

■ CommandShell. This application is a terminal emulator that runs multiple windows on your screen so that you can run different AIX applications or processes simultaneously. For more information, see Chapter 9, "Remote Access With CommandShell."

## AppleTalk and AppleTalk services

You also have available to you AppleTalk and AppleTalk networking services, created by Apple and engineered for use with AIX on the Network Server. AppleTalk allows remotely connected Macintosh computers to access the AIX server without using TCP/IP or other networking protocols. For more information, see Chapters 7 and 8.

For information on standard network protocols, such as TCP/IP, see the InfoExplorer article "Network Overview for System Management." InfoExplorer is described in Chapter 5.

## Standard AIX system management tools

In addition to conventional command-line system administration, AIX includes several system management tools and installation utilities, including the Install Assistant, System Management Interface Tool (SMIT), and Visual System Manager (VSM).

The Installation Assistant application guides you through customization tasks. The interface for Install Assistant provides step-by-step instructions for completing each task. The application tells you why you would want to perform certain tasks. If you are familiar with the tasks, you can skip the instructions.

SMIT is a menu-based tool that constructs and executes commands from the options you choose. With SMIT you can

- install, update, and maintain software
- configure devices
- configure disk storage units in volume groups and logical volumes
- make and extend file systems and paging space
- manage users and groups
- configure networks and communication applications
- configure printers
- identify system problems

VSM provides a graphical interface that lets you manage your system by directly manipulating icons. You can use tools in VSM to perform many of the same tasks as the SMIT application. The VSM tool includes the following applications:

- Device Manager, which displays system objects and dialog boxes that represent your system's device configuration database. This allows you to manage objects such as graphic adapters, ports, buses, and memory cards.
- Print Manager, which allows you to perform basic SMIT tasks on printer and print queues.

- Storage Manager, which lets you manage physical volumes, volume groups, logical volumes, and file systems through manipulation of icons.

- Users & Groups Manager, which lets you add users with simple templates. You can also set passwords and the default interface for users.

For information on using VSM, see Chapter 6, "Using System Administration Tools."

The software for the Network Server also provides Mac OS utilities that provide a Macintosh interface for logical volume management (the Disk Management Utility, see Chapter 8 of this guide) and terminal emulation (CommandShell, see Chapter 9 of this guide).

## Where to go from here

If you have not yet installed AIX, proceed to Chapter 2.

*Note:* If you plan to use the Redundant Array of Independent Disks (RAID) software as your disk controller, install RAID before installing AIX. If you install RAID after AIX has been installed, you will have to reinstall AIX. Back up your disks carefully following the backup instructions in Chapter 2.

If AIX has already been installed, proceed to Chapter 3.

For information on the AIXwindows interface, see Chapter 4.

For information on InfoExplorer, see Chapter 5.

For information on administering the system, particularly if you need assistance with AppleTalk, the Disk Management Utility, or CommandShell, see Chapters 7 through 9.

For troubleshooting assistance and information on error messages, see Chapter 10.

# 2 Installing AIX on Your Network Server

This chapter describes how to install the AIX Base Operating System (BOS). This chapter also describes how to perform initial system configuration.

The topics covered in this chapter include:

- getting ready for installation
- installing the BOS
- installing additional software such as extensions to the BOS provided by Apple Computer
- setting up your system after you have completed the BOS installation program
- backing up your system
- installing the BOS from a system backup
- installing Mac OS utilities on a remote Mac OS client

## Before you install

Before you begin the AIX installation process, do the following:

- Set up your hardware and connect any peripheral devices such as an additional hard disk drive.

- Locate your Installation CD.

- Obtain the Network Server key.

You must install the operating system on the local system (your Network Server).

For information about setting up your hardware, see *Setting Up the Network Server.*

## Installing the AIX Base Operating System

Follow these steps to install the AIX Base Operating System.

1  **Turn on your Network Server.**

2  **Insert the Installation CD into the drive.**

3  **Turn the front key to the left (service) position.**

4  **Restart your Network Server with the CD in the drive.**

To restart your system, press the reset button.



Reset button
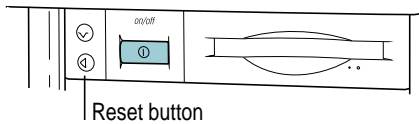
When your system starts, it will use the Installation CD as the boot disk.

A message appears asking you to define the system console.

5   **Press F1 and then Enter to use the local display as your console.**

If you have a standard keyboard (without function keys), the top row of the keypad serves as the function keys F1 through F4. If you have a standard keyboard, press the Clear key on the keypad instead of F1.

6   **When prompted, select  a language for installation instructions.**

For English, type 1 and press Enter.

The following message appears on your screen.

```
Welcome to the Base Operating System

Installation and Maintenance


Type the number of your choice and press Enter.

Choice is indicated by >>>.


>>>  1     Start install now with default settings

     2     Change/show installation settings and install

     3     Start maintenance mode for system recovery


     88    HELP ?

     99    PREVIOUS MENU
```

7   **To begin installation, type 1 and press Enter.**

To examine or modify installation settings, you can type 2 and press Enter.

The Installation and Settings screen appears.

```
Installation and Settings


Either type 0 and press Enter to install with current
settings, or type the number of the setting you want to
change and press Enter.


1.   System Settings

     Method of installation.............Preservation

     Disk where you want to install...........hdisk0
2.   Primary Language Environment Settings (after
install):

     Cultural Convention......English (United States)

     Language.................English (United States)

     Keyboard.................English (United States)

     Keyboard Type............Default
3.   Install Trusted Computing Base...............No
>>> 0  Install AIX with current settings listed above.

     88 Help ?

     99 Previous Menu


WARNING: Base Operating System installation will destroy
or impair recovery of some data on the destination disk
HDISK0.
```

Use this dialog box to specify the following:

■ the installation method

You can choose either the New and Complete Overwrite option or the
Preservation Install option. The New and Complete Overwrite option
erases all the information on your hard disk before installing the BOS. The
Preservation Install option keeps the user data in the root volume group
when it installs the BOS.

- the destination disk

- the language environment

- the Trusted Computing Base (TCB) setting

  The Trusted Computing Base tries to ensure that the programs you run are trusted programs. If you want to change the TCB setting, do so during installation. This setting cannot be changed later.

8   **When you have selected the appropriate settings, type** 0 **and press Enter to begin the installation.**

The Installing Base Operating System dialog box appears, which shows you the progress of the installation and informs you when the installation is complete.

The installation process for the BOS takes about 20 to 30 minutes to complete.

9   **Turn the front key back to the upright (unlocked) position before the installation completes.**

When the BOS installation completes, the installation program restarts your computer. The key must be in the upright position during this restart to boot from the hard disk instead of the CD.

The BOS is now installed, and you can customize your installation. The next section lists the customization tasks that you need to perform to set up your system initially.

## Installing additional software

Once you have installed the BOS, you need to install additional software, such as the extensions to the AIX operating system provided by Apple Computer.

To install additional software, use the Installation Assistant. After you have installed the BOS, your computer restarts and automatically starts the Installation Assistant application. The Install Assistant application guides you through the installation process and provides step-by-step instructions for completing each task.

To install additional software using the Installation Assistant:

**1 Click Install Software Applications from the Installation Assistant Task List.**

A menu appears with several items.

**2 Click Install a Bundle of Software (Easy Install).**

An Easy Install dialog box appears for additional installation information.

**3 Specify the CD-ROM drive as the software source.**

**4 Select the All Licensed option as the bundle of software to install.**

To select this bundle, you need to scroll to the bottom of the list of bundles and click the All Licensed icon.

**5 Click Install/Update.**

The installation process begins. This process requires about 45 to 55 minutes to complete.

**6 Click Exit.**

When you click Exit, you exit Easy Install and return to the task list for the Installation Assistant.

**7 Click Tasks Completed—Exit to AIX Login.**

You must click the Tasks Completed option to quit this application to ensure proper installation of the software.

*Note:* If you install from a terminal, a text-based Installation Assistant installs additional software. To install the necessary software with the text-based Installation Assistant, choose the custom install option and select the `all_licensed` bundle to install.

## Performing initial setup and administration tasks

After you have installed the BOS and additional software, the system can run with its default settings: one user (root), the date and time that was set when the system was manufactured, and other general settings. However, you probably want to customize these settings and provide additional information, such as a network configuration.

The Installation Assistant provides step-by-step instructions for completing each customization task. The application also tells you why you would want to perform certain tasks. If you are familiar with the tasks, you can skip the instructions and simply complete the tasks.

These are some of the tasks you may need to perform:

- Set the system date and time.
- Set a root user account password and restrict access to system resources. This step is vital to ensure the security of your computer.
- Set up your TCP/IP network environment.

  For more information about configuring your TCP/IP environment, use InfoExplorer to access the on-screen documentation. You can learn how to use InfoExplorer in Chapter 5, "Using InfoExplorer to Retrieve Information."
- Change the primary language environment.
- Create user accounts.
- Configure your printer and add print queues for local printers and remote print servers. See Chapter 7, "Setting Up AppleTalk and AppleTalk Services," to learn how to set up an AppleTalk printer and print queue.
- Import any existing volume groups.
- Back up your system. See "Backing Up Your System," later in this chapter, for information about backing up your system.

After you've finished your customization tasks, you can use the Installation Assistant to log in to the system. Use the Installation Assistant task item "Tasks Completed—Exit to AIX Login" to quit the Installation Assistant and ensure proper configuration.

You can access the Installation Assistant at any time by entering the command `install_assist`.

For more information about any of these tasks, consult the on-screen documentation with InfoExplorer.

## Setting your display resolution

After you've installed the operating system, you may want to customize your display resolution.

To set your screen preferences, you need to log in to AIX. For information about logging in, see Chapter 3.

To set your screen preference:

1   **Start SMIT.**

To start SMIT, enter `smit` on the command line. See Chapter 6 for more information about using SMIT.

2   **Choose Devices.**

The Devices menu appears.

3   **Choose Graphic Displays.**

The Graphic Displays menu appears.

4   **Choose Display Resolution and Refresh Rate.**

SMIT displays a list of available devices.

5   **Click the device name.**

A dialog box appears with the attributes for the device.

6   **Specify your resolution and refresh rate.**

Use the List button to display the available resolutions and refresh rates.

For example, you can set your resolution and refresh rate to 1024x768@72Hz.

7   **Click OK.**

8   **Restart your system.**

## Backing up your system

After you have installed the BOS and performed your initial customization and configuration, it is a good idea to create a system backup. You use a backup to restore a corrupted file system and recover data.

You can use the Installation Assistant to create a backup after your initial installation. You can also use the System Management Interface Tool (SMIT) to make a backup. SMIT uses the `mksysb` command to create a backup image that you can store either on a tape or in a file. If you choose to back up to tape, the backup program writes to the tape a boot image that you can use for installation on other systems.

For more information on using SMIT, see Chapter 6 and use InfoExplorer.

### Configuring before the backup

Configure your system before you create a backup image if you want the image to be identical and have the same users, passwords, network addresses, and so on. However, if you plan to use the backup image to install the BOS on other Network Servers, create the backup image before configuring the system.

If you install the backup image on other systems, you might not want passwords and network addresses copied. Using the same passwords on many systems can create a security risk, and copying network addresses creates duplicate addresses and can disrupt communications.

The BOS installation program automatically installs only the device drivers required for the hardware configuration of the installed machine. Therefore, if you are installing a system backup on other machines, you may need to install additional device drivers on the source system before making the backup image.

To install additional device support on the source system, use the Install Additional Device Software SMIT menu item.

## Creating a backup

Follow the steps in this section to create a system backup.

1   **Log in as root.**

2   **Mount all file systems you want to back up.**

    Refer to the mount command for details.

3   **Free at least 8.8 MB of disk space in the `/tmp` directory or increase the size of your disk partition.**

    The `mksysb` command requires this working space. To determine the free space in the `/tmp` directory, use the `df` command. If necessary, use SMIT or the `chfs` command to change the size of the file system.

4   **Enter the following SMIT command:**

    `smit mksysb`

    The Back Up the System screen appears.

5   **Select how you want to store the backup.**

    Press F4 to list available tape devices.

6   **If you want to create map files, select the Create Map Files field.**

    Map files match the physical partitions on a drive to its logical partitions.

7   **If you want to create a bootable backup, leave the default of yes. If you do not want a bootable backup, press Tab to change the option to no.**

8   **Specify if you want to expand the `/tmp` directory if you have a bootable backup.**

9   **Specify the number of blocks to write in a single output, or leave the field blank to accept the system default.**

**10** **For a file backup, press Enter. For a tape backup, insert a tape and press Enter.**

The Command Status screen appears.

If you are creating a tape backup, the system may prompt you to insert another tape.

**11** **When the backup completes, exit SMIT.**

The backup is complete. If you created a bootable tape, it can start your system if you are ever unable to start it from the hard disk.

## Verifying a backup tape

You can use the procedures in this section to view the contents of a backup tape. The contents list verifies most of the information on the tape, but it does not verify that the tape can be used for installations. The only way to verify a boot image on a tape is to try to start the system from it.

To verify a backup tape:

**1** **Enter the following SMIT command:**

```
smit lsmksysb
```

The List Files in a System Image screen appears.

**2** **Type the number of blocks to read for your tape device, or leave the field blank to accept the system default.**

**3** **Either type the tape device name in the second field or accept the name provided.**

**4** **Press the Enter key.**

The Command Status screen appears listing the contents of the backup tape.

## Installing the BOS from a system backup

You can install the BOS from a tape backup image.

Installing from a system backup reduces repetitive installation and configuration tasks.

When you install a backup image, the system determines if the target system has enough disk space to create all the logical volumes. If so, the entire backup is installed. Otherwise, the installation program stops the system and prompts you to select more destination hard disks.

You can create a backup with SMIT using either the Backup the System menu or the command `mksysb -i` *TargetDevice.* See "Backing Up Your System," earlier in this chapter, for more information.

> **WARNING** If you are using a backup to configure many systems, make sure that the backup image was created before the system was configured with network information and addresses and user accounts and passwords. Duplicating this information causes network problems and security risks. If you prefer, you can manually modify this information on the new system after installation.

To install from a backup:

**1 Put the backup tape in the tape drive.**

**2 Shut down the system. Enter the command**

```
shutdown -F
```

**3 Turn the front key to the left (service) position.**

**4 Turn on your computer.**

The computer starts from the backup tape. Follow the instructions in "Installing the AIX Base Operating System" earlier in this chapter.

## Restoring a corrupted file system

Once you have created a backup, you might need to restore information that is lost or damaged.

To restore a file system from a tape backup:

**1   Put the backup tape in the tape drive.**

**2   Shut down the system. Enter the command**

`shutdown -F`

**3   Turn the front key to the left (service) position.**

**4   Turn on your computer.**

The computer starts from the backup tape.

A message appears asking you to define the system console.

**5   Press F1 and then the Enter key to use the local display as your console.**

You need an extended keyboard to identify your console unless you are installing with a terminal connected to the modem port.

**6   When prompted, select  a language for installation instructions.**

For English, type `1` and press Enter.

The following message appears on your screen.

```
Welcome to the Base Operating System

Installation and Maintenance


Type the number of your choice and press Enter.

Choice is indicated by >>>.

      1     Start install now with default settings

      2     Change/show installation settings and install

>>>   3     Start maintenance mode for system recovery


      88    HELP ?

      99    PREVIOUS MENU
```

**7** **Type 3 and press Enter.**

A menu appears that lists options for system maintenance.

```
          Maintenance


Type the number of your choice and press Enter.
Choice is indicated by >>>.


>>>  1    Access a Root Volume Group

     2    Copy a System Dump to Removable Media

     3    Access Advanced Maintenance Functions

     4    Install from a System Backup


     88   HELP ?

     99   PREVIOUS MENU
```

**8** **Type 1 and press Enter.**

The choice indicated by 1 lets you access a root volume group.

When you choose 1, the system warns you that you might overwrite existing information and then lists the available volume groups.

**9** **Type the number of the volume group that you want to restore and press Enter.**

A menu appears that lists the file systems on this volume group.

**10** **Type the number of the file system that you want to restore and press Enter.**

Your system lists options for mounting the file system.

**11** **Select Mount File System and Start Shell.**

Your system mounts the file system and provides a shell for you to enter UNIX commands to examine the file system from the backup and restore information.

# Installing Mac OS utilities on a Mac OS client

The software for the Network Server provides several Mac OS utilities to perform such tasks as terminal emulation and remote administration of disk storage.

You can install the Mac OS utilities on any computer running the Macintosh Operating System.

To install the Mac OS utilities on a Mac OS client, follow these steps.

1   **Quit all other applications.**

    The installation program adds extensions to your System Folder and does not allow other programs to be running during the installation process.

2   **Insert the *Mac OS Utilities for the Network Server With AIX* disk.**

    This is a 3.5-inch disk provided with the software for the Network Server.

3   **Double-click the Installer icon.**

    A Welcome to AppleTalk Services dialog box appears.

4   **Click Continue.**

    A dialog box appears that provides installation options.
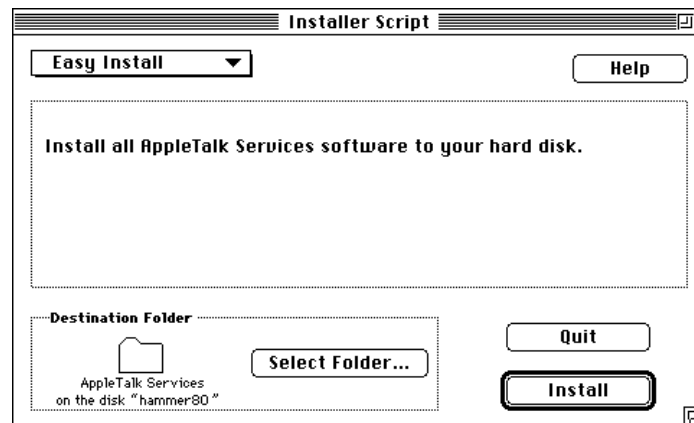
**5    Choose your type of installation from the pop-up menu in the upper-left corner of the dialog box.**

You can choose one of the following options:

■ Easy Install, which installs all of the Mac OS utilities and necessary additional components.

■ Custom Install, which lets you specify the components to install. Click the triangle to the left of "Everything" to view and select the components to install.

*Note:* All Mac OS utilities require the Network Server Passwd Tool, and CommandShell requires the CommandShell VT102 component.

■ Custom Remove, which lets you remove Macintosh utility components from your system.

**6    Select the destination folder for the installation.**

By default, the Mac OS utilities are installed in a folder named AppleTalk Services, and the extensions are placed in the System Folder in the boot system.

To change the disk for the installation, hold down the Option key. The Select Folder option changes to Select System Disk. Use this option to specify the installation disk.

**7    Click Install.**

The applications and components are installed on your system.

**8    Once the installation is complete, restart your computer.**

See Chapter 7, "Setting Up AppleTalk and AppleTalk Services," to learn how to configure and set up Mac OS utilities.

# 3

# System Startup, Logging In, Shutting Down, and Rebooting

This chapter describes how to begin and end a work session. It covers the following topics:

- logging in and out
- rebooting
- shutting down the system

## Before logging in

This guide assumes that the following conditions have been met:

- You have the documentation for your computer and monitor hardware available and that you are acquainted with the use of the hardware and any necessary peripheral devices.

  For detailed information on starting up and shutting down the Network Server, see *Setting Up the Network Server,* which was packaged with the Network Server.

- AIX has been properly installed on the server. If this is not the case, follow the directions in Chapter 2.

- You have a user account and a password, or if you are administering the system, you have root privileges and the root password.

*Note:* If you have problems booting AIX, consult the chapter "Starting Up Your Server" in *Setting Up the Network Server,* where there is a description of causes of Open Firmware problems and potential solutions. There is also a description of error messages that might show up on the LCD during the startup process.

## Logging in

To use the system, you must identify yourself to the system as an authorized user by logging in with your login name.

The appearance of the login prompt depends upon whether your system is set to log in from the command-line interface or from the graphical interface. For information on setting the system to log in to the graphical interface, see "Setting Up Your System So That CDE Starts Automatically," in Chapter 4.

*Note:* If your login prompt does not appear after you start up the system, see "System Error Messages" in Chapter 10.

The login prompt for the command-line interface is

```
login:
```

For more information on the graphical interface login window, see the next section, "The Graphical Interface Login Window" later in this chapter.

1  **Type your login name following the** `login:` **prompt, and press Return.**

```
login: LoginName
```

If the `password:` prompt does not appear, you have no password defined, and you can begin working with the operating system. If the `password:` prompt does appear, continue with step 2.

2  **Type your password and press Return.**

```
password: YourPassword
```

The screen does not display your password as you type it.

If the system displays an error message stating that your login is incorrect, log in again and enter the correct login name and password.

Remember that UNIX is case sensitive, that is, you must enter the login name and password using the same lowercase or uppercase characters that were used when the name and password were assigned. Thus, if your login name is *johnson,* you will not be able to log in as *Johnson.*

*Note:* The root password is also the password for Open Firmware.

After you have logged in and depending on how your system is set up, your system will start up in a graphical interface (AIXwindows or Common Desktop Environment) or in a command-line interface (the shell).

### The graphical interface login window

The graphical interface login window contains an Options button that allows you several options. For example, you can change to a command-line login as follows:

**1  Click the Options button.**

**2  Choose Command Line Login.**

A message appears that tells you to press any key to display the login prompt.

**3  Press any key.**

The `login:` prompt appears.

The Options menu also offers the following options:

- Language. Allows you to change the session language.
- Session. Allows you to choose Regular Desktop (the Common Desktop Environment) or Failsafe session (an X windows environment).
- Reset Login Screen. Restarts the X server.

To delete what you have typed in the Login field, click the Start Over button.

## Shutting down

From the user's viewpoint, stopping (shutting down) a system is simple, but from the system's viewpoint, the shutdown process involves a series of events designed to preserve file integrity.

The safest and most thorough way to halt the operating system is to use the `shutdown` command. When you designate the appropriate command options, the `shutdown` command notifies users that the system is about to stop operations, terminates all existing processes, unmounts file systems, and shuts down the system.

The steps that take place during a system shutdown depend on how the system was customized. The shutdown described in this section may not appear exactly the same on your system.

*Note:* You must have root privileges to shut down the system.

To shut down the system:

■ **At the prompt, enter**

```
shutdown
```

that is, type the command and then press Return.

By default, the system waits one minute before stopping the user processes and the init process. You will see the following message:

```
shutdown completed...
```

## Rebooting the system

A *system reboot* recopies the operating system from disk to memory and starts it without turning the system completely off. A reboot is also known as a *system reset.* It reinitializes the operating system by repeating the initial program load (IPL) operation. When the system is first turned on, the operating system is usually booted automatically.

When the `-r` option is specified with the `shutdown` command, the system reboots after it completes the shutdown.

■ **At the prompt, enter**

```
shutdown -r
```

The system shuts down and reboots.

You can also use the `reboot` command. If no other users are logged into the system, use the `reboot` command to cause the system to recognize newly installed software, to reset peripheral devices, or to perform routine maintenance tasks, such as checking file systems.

The `shutdown` command is used instead of the reboot command when the system is running and other users are logged in.

The steps that take place during a system reboot depend on how the system was customized. The reboot process described in this section may not be exactly the same on your system.

*Note:* You must have root privileges to reboot the system.

■ **At the prompt, enter**

```
reboot
```

The system reboots.

## Shutting down to single-user mode

In some cases, you may need to enter single-user mode (also referred to as *maintenance* or *standalone* mode) in order to perform software maintenance and diagnostics. To shut down the system to single-user mode, the current directory must be the root directory, and you must have root privileges.

1 **Be sure that you are working in the root directory by entering**

```
cd /
```

2 **Enter**

```
shutdown -m
```

The system shuts down to single-user mode. A system prompt appears, and you can perform maintenance activities.

## Shutting down quickly

Use the following procedure to stop the system quickly without notifying other users.

■ **At the prompt, enter**

```
shutdown -F
```

The -F option instructs the shutdown command to bypass sending messages to other users and to shut down the system as quickly as possible.

# 4

# Using AIXwindows and
# the Common Desktop Environment

This chapter describes the use of the AIXwindows interface, which allows you to manage the aixterm terminal windows and any other X client windows on your screen. It covers the following topics:

- starting and using the AIXwindows interface
- working with menus in the AIXwindows interface
- manipulating icons
- using the Common Desktop Environment

# Introduction to AIXwindows

AIXwindows runs a terminal emulator (`aixterm`) in a terminal window. The AIXwindows interface allows you to

- run several programs simultaneously on a single screen
- create multiple windows to meet your specific needs
- cut and paste text between windows
- control various terminal functions

*Note:* Many of the commands described in this chapter use the Alt key. If your keyboard does not have an Alt key, use the Option key in its place.

# Starting AIXwindows from the command line

When you log in to your system, you start in either the command-line interface, AIXwindows, or Common Desktop Environment, depending on how your system is set up. If you start up in the command-line interface, start AIXwindows by entering the following command:

```
xinit
```

# Elements of the AIXwindows interface

When AIXwindows starts, an aixterm terminal window appears that contains the elements shown in the following illustration:
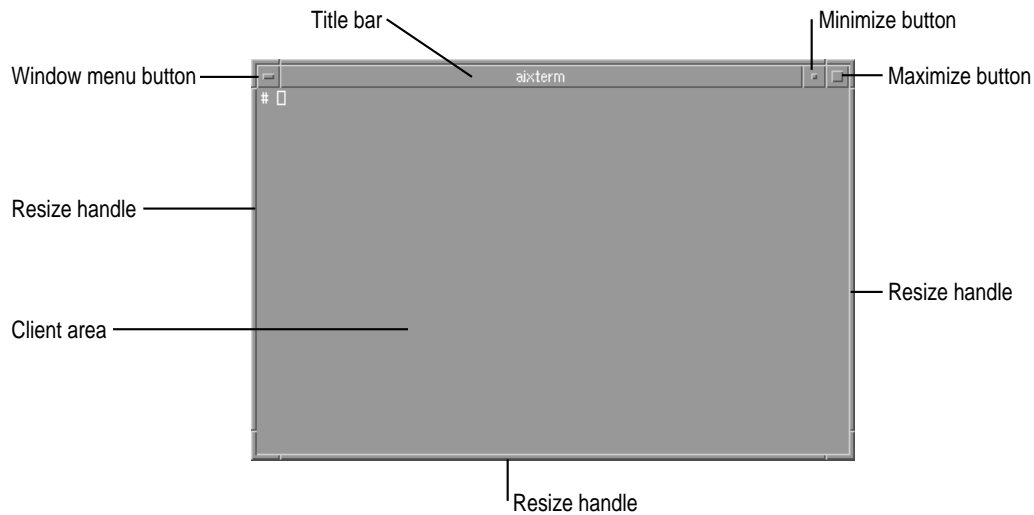


The elements of the window are described here:

- Client area. The input and output of the program take place here.
- Resize handles. Point to a resize handle and drag it to change the window size.
- Title bar. The title of the program or other specified information is displayed.
- Window menu button. Click the window menu button to display the Window Manager menu.
- Minimize button. Click the minimize button to convert the window to an icon.
- Maximize button. Click the maximize button to expand the window to its maximum size (often the full screen), or to contract it to its previous size.

## Mouse pointer shapes

When AIXwindows starts, an X-shaped mouse pointer appears at the center of the screen. The pointer shape changes according to its location. For example, when the pointer is directly over the root window (the background behind all windows), the pointer has an X shape. When the mouse points inside a terminal window, the pointer changes to an I-beam shape. A description and illustration of pointer shapes follows.

### Arrow pointers

An arrow pointing to the upper-left corner is the general-purpose pointer used in most window areas for selecting and activating single objects.

An arrow pointing to the upper-right corner indicates a pending menu action. This shape indicates that a menu is popped up or pulled down and that you must choose a menu item or release the menu.

### Caution pointer

The caution pointer indicates that some action is expected in another area before you can give input to the current area. All mouse and keyboard actions are ignored in the area where the caution pointer appears.

### Four-directional arrow pointer

The four-directional arrow pointer indicates that a move operation is in progress. During a move operation, the object, or an outline of the object, tracks the location of the pointer.

### Hourglass pointer

The hourglass pointer indicates that an action is in progress in the area. While the hourglass pointer is active, all mouse and keyboard actions are ignored in the area. The hourglass pointer and the watch pointer (shown later in this section) mean the same.

### I-beam pointer

The I-beam pointer indicates where you can perform actions on the text and changes the location of the text-insertion cursor.

### Resize pointer
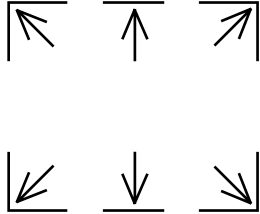


The resize pointer indicates that the pointer is at one of the resize bars of the window. The direction of the arrow indicates the direction in which you move the pointer to increase the size of the window. The horizontal and vertical pointers indicate that the window is changed in either the horizontal or vertical direction. The diagonal pointers indicate that the window is changed in both the horizontal and vertical directions simultaneously.

### Sighting pointer



The sighting pointer is used to make precise position selections. For example, in a drawing program, it may be used to indicate a pixel to fill or the connecting points of lines.

### Watch pointer



See "Hourglass Pointer," earlier in this section.

### X pointer



The X pointer indicates that the pointer is outside any application area.

## Selecting a window

To activate a window so that it can receive input:

■ **Point to any part of the window and click the mouse button.**

The window frame changes color.

## The Window Manager menu

The Window Manager menu (which is often referred to as the *window menu*) allows you to perform the most important window-manipulation tasks.

To display the Window Manager menu:

■ **Click the Window Manager menu button (to the left of the window's title bar) with the mouse button. You may also press the Shift-Esc or the Alt (or Option)-Spacebar key combination while pressing the left mouse button.**

The Window Manager menu contains the following items:

■ Restore. Restores a window from an icon or to its previous size.

■ Move. Changes the location of the window (see "Moving a Window" later in this chapter).

■ Size. Changes the size of a window (see "Resizing a Window" later in this chapter).

■ Minimize. Turns the window into an icon.

■ Maximize. Enlarges the window to cover the entire root window.

■ Lower. Sends a window to the back or bottom of the window stack, the position closest to the root window. If the window is active, it remains active until another window is made active.

■ Close. Immediately stops the process running in the window and closes the window.

To cancel the Window Manager menu:

■ **Press Esc (the Escape key).**

### Choosing a menu item

To choose a menu item, follow these steps:

1   **Display the menu.**

2   **Hold down the mouse button and drag the pointer down the menu until the item you wish to choose is highlighted.**

3   **Release the mouse button.**

You can also press the accelerator keys (shown to the right of the menu items) without displaying the menu, or you can press the underlined mnemonic characters with the menu displayed.

## Displaying the root menu

The root menu offers several options for controlling your AIXwindows interface.

To display the root menu:

1   **Point to the root window (the background behind all other windows).**

2   **Press and hold the right mouse button (or the Right Arrow key).**

You can customize the root menu. See the article "Managing AIXwindows Menus, Mouse Buttons, and Keyboard Bindings" in InfoExplorer (which is described in Chapter 5). By default, the root menu contains the following items:

■ New Window. Opens a new aixterm window.

■ Clients. Opens a submenu that allows you to display a new clock, open the System Management Interface Tool (SMIT), or lock the screen.

■ Custom. Opens the Customizing Tool interface for customizing applications.

■ Refresh. Refreshes the screen.

■ Pack Icons. Arranges all icons on the screen in one or more neat rows.

■ Restart. Restarts the Window Manager.

■ End Session. Quits AIXwindows.

## Moving a window

You can move windows using the mouse or the Move item in the Window Manager menu.

■ **Point in the window's title bar, and drag the mouse pointer in the appropriate direction.**

If you prefer, you may use the following procedure:

1 **Choose Move from the Window Manager menu.**

2 **Point in the window and drag the window to its new position.**

3 **When the window reaches the new location, press the Return key or click any mouse button.**

*Note:* To cancel the move, press Esc before you release the mouse button.


## Opening a new terminal window

To open a new terminal window:

■ **Choose the New Window menu item from the root menu.**

If you prefer, you may use the following procedure:

■ **At the prompt in a window, enter**

```
aixterm&
```

A new window is displayed, usually 80 characters wide and 25 lines long.

## Bringing a window forward or moving it back

You can use any of three methods for moving a window forward and backward (in other words, on top of or beneath other windows).

■ **Click in any visible portion of a window frame.**

If the window is behind other windows, it becomes the active window and moves to the front.

■ **Display the root menu and choose Shuffle Up to move the window at the bottom of the window stack to the top, or choose Shuffle Down to move the window at the top of the window stack to the bottom.**

■ **Display the Window Manager menu and choose Lower (or press the L key), or you can press the Alt (or Option)-F3 key combination.**

The frontmost window moves behind the other windows.

*Note:* If you use the Lower menu item to move the active window behind the other windows, the active window stays active until another window is made active.

## Resizing a window

You can change the size of a window using the mouse, the Window Manager menu, or a combination of the mouse and keyboard.

1 **Point to an edge or corner of the window frame.**

2 **Drag the edge or corner to increase or decrease the size of the window.**

3 **When the window reaches the desired size, release the mouse button.**

If you prefer, you may use the following procedure:

1   **Display the Window Manager menu and choose Size (or press the I key), or you can press the Alt (or Option)-F8 key combination.**

A counter appears in the center of the screen, showing the size in characters of the window as it changes; the outline of a rectangle surrounds the window. Use the mouse to expand or shrink the window.

2   **When the window reaches the desired size, press the Return key, or click any mouse button.**

*Note:* To cancel the resizing, press Esc before you release the mouse button.

## Maximizing a window and restoring it to its previous size

You can maximize a window by expanding it to the full size of the screen.

■   **Click the maximize button (at the extreme right of the title bar) with the mouse button.**

If the window is already maximized, this action returns the window to its previous size.

If you prefer, you may use the following procedure:

■   **Display the Window Manager menu and choose Maximize (or press the X key) , or you can press the Alt (or Option)-F10 key combination.**

To return a window to its previous size:

■   **Display the Window Manager menu and choose Restore (or press the R key), or you can press the Alt (or Option)-F5 key combination.**

## Closing a window

When you quit an application that is running within its own window, the window usually closes. However, if you must close a window yourself, do the following:

■ **Double-click the window menu button.**

If you prefer, you may use the following procedure:

■ **Display the Window Manager menu and choose the Close menu item (or press the S key), or you can press the Alt (or Option)-F4 key combination.**

## Changing windows into icons and restoring windows from icons

To change a window into an icon, do the following:

■ **Click the minimize button (on the right side of the title bar, but to the left of the maximize button).**

If you prefer, you may use the following procedure:

■ **Display the Window Manager menu and choose the Minimize menu item (or press the N key) , or you can press the Alt (or Option)-F9 key combination.**

In either case, the window disappears and its icon appears.

To restore a window from an icon:

■ **Double-click the icon or, with the icon selected, press the Alt (or Option)-F5 key combination.**

# Getting help in a window

There are various tools available to help you when you need more information about commands or about the operating system.

- The InfoExplorer program, an on-screen hypertext information base, allows you to display and print items from IBM's on-screen documentation (see Chapter 5).

- The `help` command displays information about basic commands.

- The `man` command displays information about all commands, subroutines, and files.
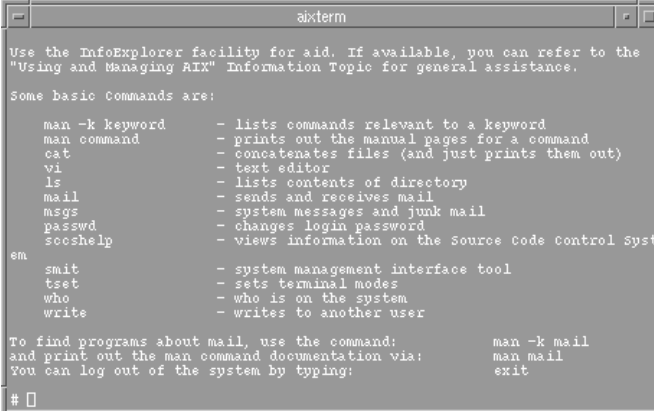
## Using the `help` Command

The `help` command presents a one-page display of information for new users. Use this command as follows:

- **At the prompt in a terminal window, enter**

  `help`

The system displays information as shown in in the following figure.

```
aixterm

Use the InfoExplorer facility for aid. If available, you can refer to the
"Using and Managing AIX" Information Topic for general assistance.

Some basic Commands are:

    man -k keyword        - lists commands relevant to a keyword
    man command           - prints out the manual pages for a command
    cat                   - concatenates files (and just prints them out)
    vi                    - text editor
    ls                    - lists contents of directory
    mail                  - sends and receives mail
    msgs                  - system messages and junk mail
    passwd                - changes login password
    sccshelp              - views information on the Source Code Control Syst
em
    smit                  - system management interface tool
    tset                  - sets terminal modes
    who                   - who is on the system
    write                 - writes to another user

To find programs about mail, use the command:         man -k mail
and print out the man command documentation via:      man mail
You can log out of the system by typing:              exit

# 
```

## Exiting and logging out from AIXwindows

Before exiting AIXwindows, stop any programs that are running in terminal windows. This avoids loss of data.

When you exit a program, the command-line prompt returns to the terminal window. However, if you started the program automatically or from a menu, exiting removes the terminal window.

Choosing Close from the Window Manager menu immediately stops any program running in the window. Interrupting a program like this may cause it to lose data. However, you can close the clock or an idle terminal window (one showing a command-line prompt) with no ill effect.

To exit AIXwindows:

■  **Select End Session in the root menu.**

## Copying text between windows

When you have text in a terminal window, the `aixterm` program allows you to select text and copy it within the same window or to other windows if the application that is running in the window supports this feature.

To copy text from one window into another window:

1  **Have the window you want to copy from and the window you plan to copy into open on your screen.**

2  **Point to the beginning of the text you want to copy.**

3  **Press and hold down the mouse button.**

4  **Drag the pointer across the text you want to copy and release the mouse button at the end of the selection.**

   While the mouse button is held down, the text to be copied is highlighted.

5  **Move the mouse pointer to the window in which you want the copied text to be inserted.**

6  **Press the middle mouse button (or the Left Arrow key, if you are using a one-button mouse).**

   The copied text is inserted at the cursor's position.

## The aixterm menus

Usually, the aixterm menus are divided into two sections separated by a horizontal line. The top portion contains various modes that can be toggled on or off. A check mark is displayed next to a mode that is currently active. Choose one of these modes to reverse its state.

The bottom portion of the menu contains the command entries; choose one of these to perform the action indicated.

### The aixterm Options menu

To display the aixterm Options menu:

1   **With the mouse pointer anywhere inside the window, press and hold down the Control key and the mouse button.**

2   **When the aixterm Options menu appears, release the Control key.**

3   **While still holding down the mouse button, drag the pointer to the item you want to set or reset, and then release the mouse button.**

For instructions on using this menu, consult the article "Basic aixterm Tasks" in InfoExplorer. InfoExplorer is described in Chapter 5.

### The aixterm Modes menu

To display the aixterm Modes menu:

1   **With the mouse pointer anywhere inside the window, press and hold down the Control key and the right mouse button (or the Right Arrow key, if you are using a one-button mouse).**

2   **When the aixterm Modes menu appears, release the Control key.**

3   **While still holding down the right mouse button (or the Right Arrow key, if you are using a one-button mouse), drag the pointer to the item you want to set or reset, and then release the mouse button (or arrow key).**

For instructions on using this menu, consult the article "Basic aixterm Tasks" in InfoExplorer. InfoExplorer is described in Chapter 5.

## Using the Common Desktop Environment

Help volumes, InfoExplorer information, and IBM's hard copy manuals may refer to the Common Desktop Environment (CDE) as *AIXwindows Desktop, Common Desktop Environment desktop, the CDE desktop, CDE,* or simply, *the desktop*. From this point on, this guide uses the term CDE.

CDE allows you to access networked devices and tools without having to use the command line. You can exchange data across applications simply by using your mouse to drag and drop objects.

For more information on CDE, consult InfoExplorer (described in Chapter 5) or *Common Desktop Environment 1.0 User's Guide* (CDE Documentation Group, Addison-Wesley Publishing Company, 1995).

### Starting CDE from the command line

If you log in from the login window in graphic mode (described in the section "Logging In," Chapter 3), CDE starts automatically. If CDE is not set to start automatically on your system, use the following command to start CDE from the command-line interface:

```
xinit /usr/dt/bin/dtsession
```

### Setting up your system so that CDE starts automatically

You can use any one of three ways to configure your system so that CDE starts automatically:

■ from the command line

■ with the System Management Interface Tool (SMIT)

■ with SMIT fastpath

This section tells you how to configure CDE autostart from the command line. For information on configuring CDE autostart with SMIT or with SMIT fastpath, use InfoExplorer, described in Chapter 5, to locate the article "Starting and Stopping the AIX Common Desktop Environment."

To configure CDE autostart from the command-line interface:

**1**  **Enter the following command:**

```
/usr/dt/bin/dtconfig -e
```

**2**  **Reboot the machine.**

To disable CDE autostart:

**1**  **Enter the following command:**

```
/usr/dt/bin/dtconfig -d
```

**2**  **Reboot the machine.**

## Elements of CDE

The CDE front panel appears.
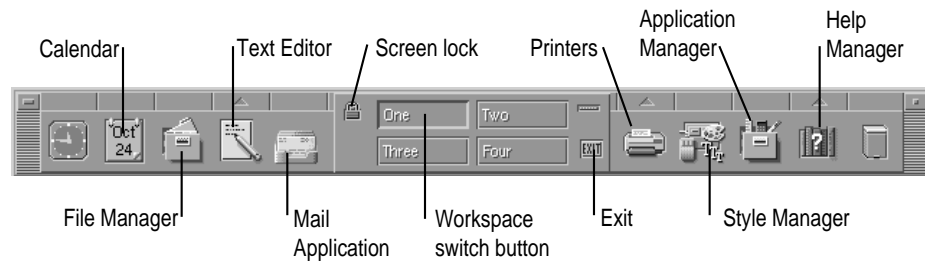


The following paragraphs describe the icons displayed along the bottom of the desktop.

### Calendar

Click the Calendar icon to display a calendar application.

### File Manager

Click the File Manager icon to display the File Manager. Use the File Manager to handle desktop objects (such as files, directories, and application icons) which you can manipulate without having to remember commands.

### Text Editor

Click the Text Editor icon to open a Text Editor window. Click the Help button in the Text Editor window for information on using Text Editor.

### Personal Applications menu

Click the arrow above the Text Editor icon to open the Personal Applications menu, which contains the following items:

- Install Icon. Adds applications to the front panel. For assistance, click Install Icon with the right mouse button and select Help.
- Text Editor. Opens a Text Editor window.
- Terminal. Opens a new terminal window.
- Icon Editor. Opens an Icon Editor dialog box. For assistance, click the Help button in the Icon Editor dialog box.

### Mail Application

Click the Mail Application icon to display an application for sending and receiving mail.

### Screen lock

Click the lock icon to lock the screen and display a dialog box that asks for the user's password to unlock the screen.

### Workspace switch button

Click the numbered buttons to switch between four different screens with different applications running in each.

### Exit

Click Exit to begin the logout process.

### Printers

Click the arrow above the Printers icon to display the Personal Printers menu, which contains the following items:

- Install Icon
- Default Printer

### Style Manager

Click the Style Manager icon to display a dialog box that allows you to customize the visual appearance or the behavior of your desktop.

### Application Manager

Click the Application Manager icon to display the Application Manager, which contains a variety of action icons that allow you to start applications. Click the Application Manager Help button for more information.

### Help Manager

Click the Help Manager icon to display a window that introduces you to desktop help. Click the arrow over the Help Manager icon to display the Help menu. For a description of the menu items, see "Using the Help Menu" later in this chapter.

## Opening a terminal window on CDE

The default terminal emulator on CDE is the dtterm window, which is discussed in the following sections.

## Opening a dtterm window on CDE

To open a dtterm terminal window on CDE when no terminal windows are currently open:

**1** **Click the arrow just above the Text Editor icon at the bottom of the screen.**



The Personal Applications pop-up menu appears.
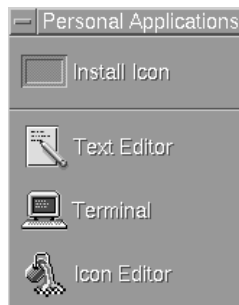


**2** **Choose Terminal from the pop-up menu.**

A dtterm window appears.

If a dtterm window is already displayed, you can use the steps listed above to open a new dtterm window, or you can do the following:

■ **Choose New from the Window menu of an existing window.**

The dtterm menus are described in the next section, "Using the dtterm Window" later in this chapter.

## Opening an aixterm window on CDE

To open an aixterm window on CDE, do the following:

■ **In a dtterm window, enter**

```
aixterm&
```

## Using the dtterm window

The dtterm window operates much like the aixterm window that is described earlier in this chapter. However, the aixterm menus do not operate in dtterm. Instead, dtterm has a menu bar available that allows you to open a Window menu, an Edit menu, an Options menu, and a Help menu. If the menu bar is not displayed, you can display it by choosing Toggle Menu Bar from the Window Manager menu (see the next section, "The dtterm Window Manager Menu") or by pressing the right mouse button (or the Right Arrow key, if you are using a one-button mouse).

Like other terminal windows, the dtterm window has a Window Manager menu, which you display by pressing the Window Manager button at the upper-left corner of the dtterm window. The illustration shows the Window Manager button and the menu bar.
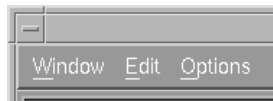


### The dtterm Window Manager menu

The dtterm Window Manager menu offers the following options:

■ Restore. Restores a maximized screen to its original size. See "Maximize" later in this list.

■ Move. Allows you to move the window by repositioning the mouse pointer. End the move by clicking the mouse button.

■ Size. Allows you to resize the window by moving the pointer to the border you wish to change, then moving the border to its new position. End the resizing by clicking the mouse button.

■ Minimize. Turns the window into an icon.

■ Maximize. Expands the window to occupy the full screen. Restore it to its original size by choosing Restore from this menu.

■ Lower. Sends a window to the back or bottom of the window stack, the position closest to the root window. The window remains active until another window is made active.

- Occupy Workspace. Displays a menu that allows you to display the window in a workspace other than the one it currently occupies. You can also choose to replicate the window in all workspaces. See "Workspace Switch Button" under "Elements of CDE" earlier in this chapter.

- Occupy All Workspaces. Replicates the window in all workspaces. See "Workspace Switch Button" under "Elements of CDE" earlier in this chapter.

- Unoccupy Workspace. Removes the window from the current workspace if it occupies more than one workspace.

- Close. Closes the window. Applications running in the window are stopped.

- Toggle Menu Bar. Removes or redisplays the menu bar.

### The dtterm Window menu

The Window menu contains two items:

- New. Opens a new dtterm window.
- Close. Closes the current dtterm window.

### The dtterm Edit menu

The Edit menu contains two items:

- Copy. Saves highlighted text to be copied.
- Paste. Places copied text at the cursor position.

### The dtterm Options menu

The Options menu contains the following items:

- Menu Bar. Toggles the menu bar on and off. To toggle the menu bar back on, choose Toggle Menu Bar from the Window Manager menu, or press the right mouse button (or the Right Arrow key) and choose Menu Bar from the Options menu.

- Scroll Bar. Toggles the scroll bar on and off.

- Global Options. Displays the Global Options dialog box. See "dtterm Global Options Dialog Box" next in this chapter.

- Terminal Options. Displays the Terminal Options dialog box. See "dtterm Terminal Options Dialog Box" later in this chapter.

- Window Size. Offers the choice of 80 X 24, 132 X 24, or Default.
- Font Size. Offers several window-font sizes.
- Reset. Offers a choice of hard or soft reset.

## dtterm Global Options dialog box

Choose Global Options from the dtterm Options menu to display the Global Options dialog box.
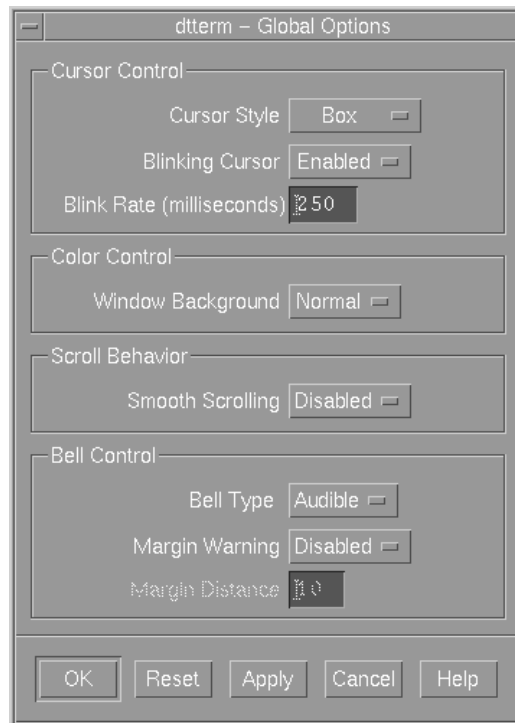


The Global Options dialog box allows you to control the following:

- cursor style and blink rate
- window background color control (normal or inverse)
- smooth scrolling enabled or disabled
- bell type and margin warning

For additional information, click the Help button at the bottom left of the dialog box.

### dtterm Terminal Options dialog box

Choose Terminal Options from the dtterm Options menu to display the
Terminal Options dialog box.
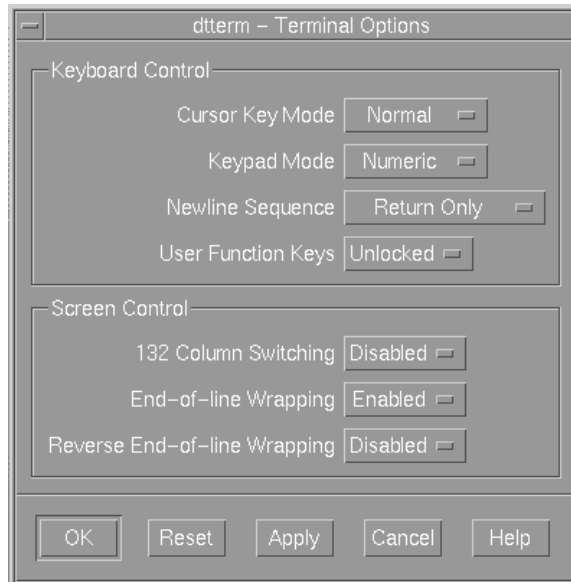


The Terminal Options dialog box allows you to control the following:

- Cursor Key Mode. Sets the mode to Normal mode (the default), to move
  the cursor in the specified direction, or Application, to generate escape
  sequences for an application to use.

- Keypad Mode. Sets the mode to Numeric mode (the default), to display the
  numeral corresponding to the key pressed, or Application, to generate
  escape sequences for an application to use.

- Newline Sequence. Allows you to choose between Return Only (the
  default), which generates a carriage return, and Return/Line Feed, which
  generates a line feed and a carriage return.

- User Function Keys. Locks or unlocks the function keys.
- 132 Column Switching. Disables (the default) or enables 132-column switching. When 132-column switching is enabled, if an application switches to 132 columns, the window automatically enlarges to 132 columns. If 132-column switching is disabled, nothing happens if the application switches to 132 columns.
- End-of-line Wrapping. Enables (the default) or disables wrapping text to the next line when the end of the line is reached.
- Reverse End-of-line Wrapping. Disables (the default) or enables wrapping a backspace at the beginning of a line to the previous line.

### The Workspace menu

To display the Workspace menu, hold down the right mouse button while the mouse pointer is on the desktop background. By default, the menu contains the following items:

- Shuffle Up. Moves the rearmost window to the top of the stack of windows.
- Shuffle Down. Moves the top window in the stack to the bottom of the stack.
- Minimize/Restore Front Panel. Turns the front panel into an icon or restores it.
- Refresh. Refreshes the screen.
- Restart Workspace Manager. Restarts CDE.
- Logout. Displays a Logout Confirmation dialog box, which allows you to proceed with the logout or to cancel it.

## Using CDE Help

The first time you log in to CDE, a help window introducing the desktop is displayed that provides quick access to helpful topics.

■ To display information about using desktop menus and controls and other introductory topics, click the topic "Basic Desktop Skills."

■ Click the topic "A Quick Tour of the Desktop" for an introductory review of the types of applications available in the CDE environment.

■ Click the topic "How to Get Help" for details about accessing and using CDE Help.

### Accessing CDE topics

You have a number of ways to access CDE Help topics:

■ Help key. The quickest and easiest way to get help is to press F1, usually known as the Help key. When you press F1, the application you are using responds by displaying the help topic most closely related to your current activity.

■ Help Manager. To access the extensive CDE Help volumes:

**1  Click the Help Manager icon located on the CDE front panel.**

When you click the Help Manager icon, the Help Manager dialog box appears, which contains a hypertext-linked list of all the help volumes that support
the desktop.

**2  In the Help Manager dialog box, click "Common Desktop Environment (CDE)" to display the list of help volumes that have been installed on your desktop.**

Browse the list of titles.

**3  To open a volume, click its title.**

### Using the Help menu

To view the Help menu and its available items, click the arrow above the Help Manager icon.

The Help menu contains the following items:

- Install Icon. Adds applications to the front panel. For assistance, click Install Icon with the right mouse button (or the Right Arrow key) and select Help.

- Help Manager. Displays the Help Browser help volume, which gives you access to the installed desktop help volumes on the system.

- Desktop Introduction. Displays the help volume titled "Introducing the CDE Desktop," which contains topics covering basic desktop concepts and skills. This help volume appears automatically the first time a user logs in to CDE.

- Front Panel Help. Displays the help volume for the front panel; it contains information on how to use and customize the front panel.

- On Item Help. Changes the pointer to a question mark that you can drag and drop on desktop objects for specific information on those objects.

## Special Circumstances

If you need to start applications on a workstation other than your own, and that workstation is also running the CDE desktop, you may need to do some configuring on both workstations.

Also, if your CDE desktop has one of the following special configurations, you may need to change certain Login Manager files before starting CDE:

- Your system console is an ASCII terminal.

- Your system is an X terminal or a host for X terminals.

# 5

## Using InfoExplorer to Retrieve Information

This chapter presents an overview of the use of InfoExplorer, IBM's information retrieval system.

This chapter covers the following topics:

- using InfoExplorer's graphical interface
- using InfoExplorer's ASCII interface
- navigating through InfoExplorer
- searching by word and phrase
- customizing InfoExplorer

## Introduction to InfoExplorer

The Hypertext Information Base Library contains information on how to use, manage, and program the AIX operating system and other programming language software. InfoExplorer allows you to find all information in the Hypertext Information Base Library, and thus serves as a complete on-screen information source.

## Starting InfoExplorer

You can view InfoExplorer in the InfoExplorer graphical interface or the InfoExplorer ASCII interface.

### Starting InfoExplorer in graphics mode

There are two ways to start InfoExplorer in graphics mode. If CDE is displayed, you may do the following:

**1   Double-click the Application Manager icon.**

**2   In the Application Manager window, double-click the Information icon.**

**3**  **In the Application Manager - Information window, double-click the InfoExplorer icon.**



If you are working in the command-line interface, do the following:

■  **Enter the command**

```
info -g
```

You may start InfoExplorer from a terminal window in AIXwindows or CDE as follows:

■  **Enter the `info` command.**

By default, two windows appear:

■  A *navigation window* containing, by default, the article "Topic & Task Index." This default can be changed. See "Customizing the InfoExplorer Graphical Interface" later in this chapter.

■  A *reading window* that contains the article "Welcome to the InfoExplorer Window Interface," which shows you how to perform basic window operations.

The navigation window has two rows of buttons at the bottom of the window that offer a variety of options for navigating through the information database.

For further information on InfoExplorer in graphics mode, see "Using the InfoExplorer Graphical Interface," next in this chapter. For further information on types of windows used by InfoExplorer, see "InfoExplorer Windows" later in this chapter.

For information on starting and using InfoExplorer in ASCII mode, see "Using the InfoExplorer ASCII Interface" later in this chapter.

For information on the command options that you can use with the `info` command, see "The `info` Command Options" later in this chapter.

# Using the InfoExplorer graphical interface

The following paragraphs describe the use of the graphical interface.

## Using InfoExplorer to learn InfoExplorer (graphical interface)

This section offers a quick procedure for displaying Chapter 7, "Accessing Information With InfoExplorer," of IBM's *AIX Version 4.1 Getting Started*. If you are planning to use the InfoExplorer ASCII interface, see "Using InfoExplorer to Learn InfoExplorer (ASCII Interface)" later in this chapter.

1  **Click the List of Books button at the bottom of the navigation window.**

   The List of Books appears.

2  **In the list headed "Base Operating System Books," click *AIX Version 4.1 Getting Started.***

3  **Scroll down to Chapter 7.**

4  **Click the title of the section you wish to consult.**

   The text is displayed.

5  **If you wish to print the article, choose Print from the Info menu (in the menu bar of the reading window).**

## Highlighting conventions in InfoExplorer articles

The Hypertext Information Base Library uses the following font and highlighting conventions:

- **Bold** identifies commands, keywords, files, directories, and other items named by the system.
- *Italics* identifies parameters for which you supply the names or values.
- `Courier` identifies examples of specific data values, displayed text, portions of program code, messages from the system, or information you enter.

## InfoExplorer windows

InfoExplorer uses two basic types of windows: navigation windows and reading windows.

### Navigation windows

Navigation windows help you navigate to the articles containing the information you want. Navigation windows contain lists of topics with hypertext links. The hypertext links are enclosed in boxes. They allow you to display articles on the specific topic. Only one navigation window can be displayed at a time. The contents of the navigation window are replaced each time you display another navigation window.
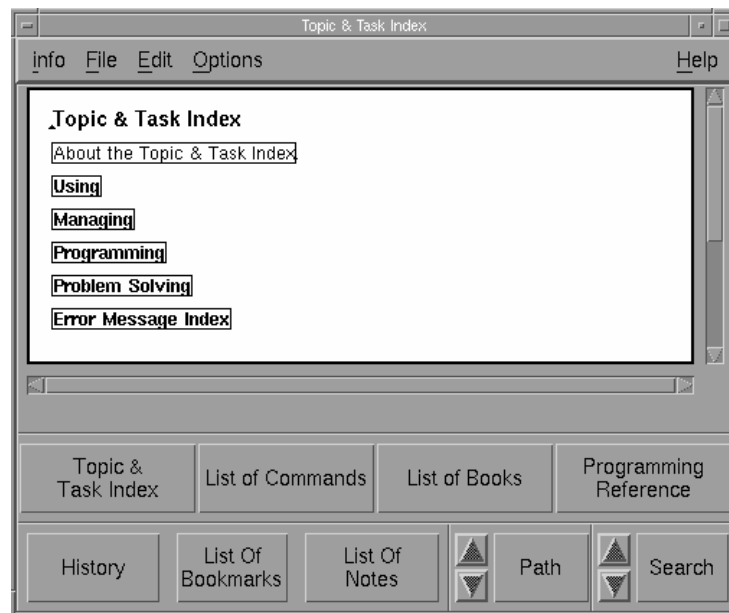


The buttons at the bottom of the Navigation window are described briefly in the following table.

| Button | Material displayed |
|---|---|
| Topic & Task Index | A list of tasks and topics grouped by subject area |
| List of Commands | Information on commands listed alphabetically and by functional categories |
| List of Books | A list of AIX documents available with InfoExplorer |
| Programming Reference | Programming reference information arranged under major functional categories that are listed alphabetically |
| History | A list of all InfoExplorer locations accessed since starting InfoExplorer or clearing the History list |
| List of Bookmarks | A list of bookmarks used to mark places in the InfoExplorer database for future reference |
| List of Notes | Notes you have made about the information you have accessed |
| Path | The path of your information search through InfoExplorer |
| Search | A simple or a compound search window for entering words and phrases and criteria for your search through the database |

### Reading windows

Reading windows contain conceptual, procedural, or reference information on a topic. They explain how to perform a task, or they document commands, calls, subroutines, files, or file formats. You can display more than one reading window at a time (with the Hold button), or you can have the contents of the window replaced each time you select more information.

You can click the following buttons that appear at the bottom of a reading window in order to perform the actions indicated:

- Make Note. Creates a note and places a note icon in the text. Click the Up Arrow button to jump to the previous note; click the Down Arrow button to jump to the next note.

- Make Bookmark. Creates a bookmark in the text. Click the Up Arrow button to jump to the previous bookmark; click the Down Arrow button to jump to the next bookmark (if you have previously loaded a list of bookmarks).

- Path. Displays your path list. You can jump to any article in your path list, or you can clear or modify the path list. Click the Up Arrow button to jump to the previous item; click the Down Arrow button to jump to the next item on your path list.

- Search. Searches the InfoExplorer or other databases for specific terms or phrases.

At the top of the window, there are three buttons that you can click to activate reading-window functions:

- Hide Links. Alters the text so no links show. To hide links, click the Hide Links button. To show all links, release the Hide Link button by clicking it again.

- Hold. Opens an article in a new window without replacing the original article.

- Close. Closes the reading window.

## Using InfoExplorer graphical interface Help

From an InfoExplorer window, you can view help information about the functions and options available for the current window, or you can search through a list of topics for the appropriate help information.

### Displaying Help for a specific window

The Help menu in each window contains an On Window item, which displays an article describing the function, menus, and buttons that are available in the current window.

To display help for a window:

**1**  **Click Help in the menu bar to display the Help menu.**

**2**  **Choose On Window.**

A help article opens in a new reading window.

### Getting Help from the List of Helps

The Help menu in each InfoExplorer window contains a List of Helps item, which displays a list of InfoExplorer help topics. The help articles display the information and procedures for a wide range of tasks.

To use the List of Helps:

**1**  **Click Help in the menu bar to display the Help menu.**

**2**  **Choose List of Helps.**

**3**  **Click the desired help topic.**

## Searching for information

InfoExplorer allows you to look for information by word or phrase. This type of search looks through the entire text of the hypertext information base. For example, you can search for information even if you do not know a task or command name under which the information is stored.

You can perform a simple search or a compound search. The *simple search* allows you to search using a word or string of words (in exact order) in text, article titles, or both. The *compound search* allows you to search using a word, set of words, or several sets of words. Moreover, the compound search allows you to specify the search with the following options:

■ And, Or, and But Not operators

■ proximity options

■ search categories

■ precedence

### Specifying the databases to search

There are two ways to specify the information databases to be searched:

■ Select a temporary information database in the Compound Search window. This selection applies to both simple and compound searches and stays in effect for the current session of InfoExplorer or until you change the selection during the session.

■ Select a default information database by choosing Defaults from the Options menu (see "Customizing the InfoExplorer Graphical Interface" later in this chapter). This default information database applies to both simple and compound searches and stays in effect for future sessions of InfoExplorer. Temporary information database selections made from the Compound Search dialog box can override the default selection during an InfoExplorer session, but the default selection returns when you restart InfoExplorer.

### The simple search

You can perform a simple search as follows:

**1   Click the Search button at the bottom of the navigation window.**

The Simple Search dialog box appears.

```
┌────────────────────────────────────────────────────────┐
│ ─                    Info: Simple Search          □ □   │
├────────────────────────────────────────────────────────┤
│  info  Edit                                     Help    │
│                                                         │
│                                            ┌─────────┐  │
│                                            │  Close  │  │
│                                            └─────────┘  │
│                                                         │
│    Search For:    ┌──────────────────────────────────┐ │
│                   │ I                                │ │
│                   └──────────────────────────────────┘ │
│                   ☐ Search Title Only                   │
│                                                         │
│   ┌──────────┐    ┌─────────────┐   ┌────────────────┐ │
│   │  Enter   │    │ Clear Query │   │Compound Search │ │
│   └──────────┘    └─────────────┘   └────────────────┘ │
└────────────────────────────────────────────────────────┘
```

**2   Type the phrase for which you are searching in the Search For field and press Return.**

A list of articles on the simple search appears.

If you wish to print the article, choose Print from the "info" menu.

For an on-screen tutorial about performing a simple search, follow the directions in "Using InfoExplorer to Learn InfoExplorer (Graphical Interface)," earlier in this chapter, to find the section "Searching for Information (InfoExplorer Windows)" in Chapter 7 of IBM's *AIX Version 4.1 Getting Started.*

### The compound search

If the Simple Search dialog box appears when you click the Search button in the navigation window, click the Compound Search button at the bottom right of the Simple Search dialog box. The Compound Search dialog box appears.
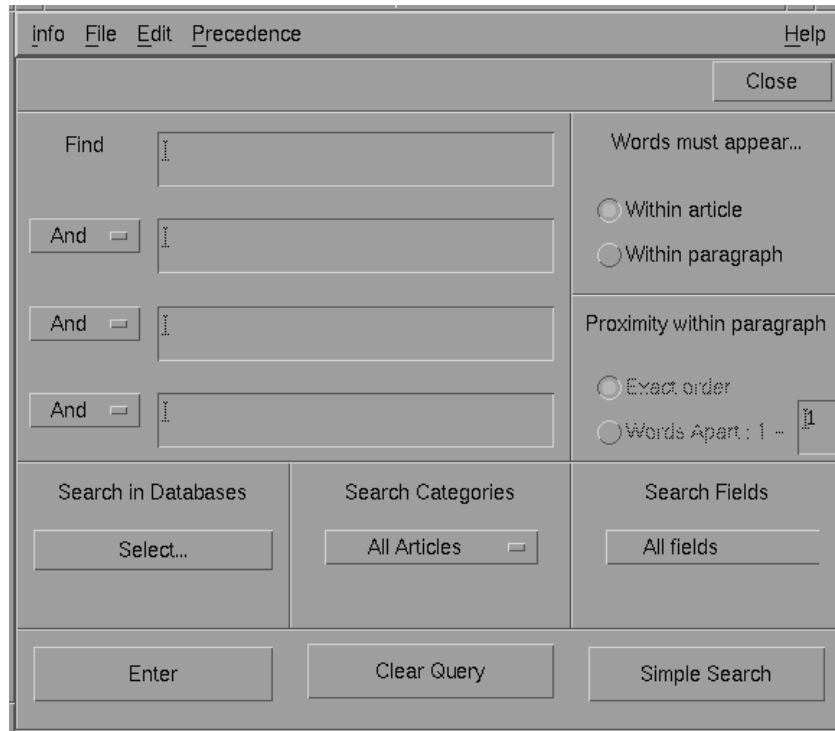
This dialog box allows you to enter four text strings. You can specify the following:

- The buttons along the left of the last three text boxes allow you to choose the And, Or, or But Not operators.

- You may specify whether the strings should appear in the same article or paragraph.

- You may specify how far apart they must be within a paragraph.

- You may choose the databases, categories, and fields in which they must appear.

For more information about compound searches, do a simple search to find the InfoExplorer articles "How to Perform a Compound Search (InfoExplorer Windows)" and "The Compound Search Window." The simple search is described in this chapter in the previous section.

## Printing from the InfoExplorer graphical interface

You can print the following information from the InfoExplorer graphical interface:

- articles from a reading window
- all articles referred to by a navigation window
- artwork displayed in a graphic window
- public and private notes

For detailed information on printing, follow the directions in "Using InfoExplorer to Learn InfoExplorer (Graphical Interface)," earlier in this chapter, to find the section "Printing Information (InfoExplorer Windows)" in Chapter 7 of IBM's *AIX Version 4.1 Getting Started*.

## Keys and keystroke sequences for the InfoExplorer graphical interface

In the InfoExplorer graphical interface, you can use special keys and key sequences to move within a window, choose items from a menu, access additional windows, and start processes.

For detailed information, follow the directions in "Using InfoExplorer to Learn InfoExplorer (Graphical Interface)," earlier in this chapter, to find the section "Using Special Keys and Key Sequences (InfoExplorer Windows)" in Chapter 7 of IBM's *AIX Version 4.1 Getting Started*.

## Stopping InfoExplorer

You can stop the InfoExplorer program from any open InfoExplorer window.

To exit the InfoExplorer program and save all bookmarks and notes:

- **Choose Quit from the "info" menu in any InfoExplorer window.**

  All open windows are closed and the program is exited.

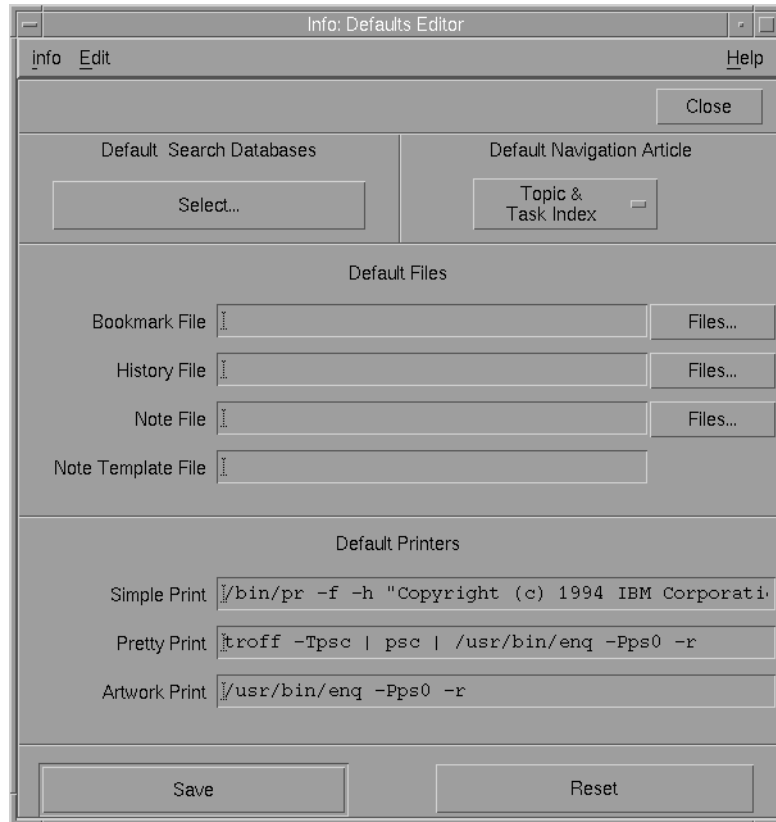To exit the InfoExplorer program without saving all bookmarks and notes:

- **Choose Close from the navigation window menu located to the left of the title bar.**

  All open windows are closed and the program is exited.

## Customizing the InfoExplorer graphical interface

The Options menu in the navigation window allows you to reset
InfoExplorer defaults.

**1** **Choose Defaults from the Options menu (in the navigation window's menu bar).**

The Defaults Editor dialog box appears.

```
┌─────────────────────────────────────────────────────────────────┐
│ ─                    Info: Defaults Editor                   ▪ □ │
├─────────────────────────────────────────────────────────────────┤
│ info   Edit                                              Help    │
│                                                                  │
│                                              ┌──────────┐        │
│                                              │  Close   │        │
│                                              └──────────┘        │
│     Default  Search Databases    │    Default Navigation Article │
│   ┌──────────────────────────┐   │      ┌──────────────────┐     │
│   │        Select...         │   │      │    Topic &    ▭  │     │
│   └──────────────────────────┘   │      │   Task Index     │     │
│                                         └──────────────────┘     │
│                        Default Files                             │
│   Bookmark File [                    ]         ┌─────────┐       │
│                                                │ Files...│       │
│    History File [                    ]         └─────────┘       │
│                                                ┌─────────┐       │
│       Note File [                    ]         │ Files...│       │
│                                                └─────────┘       │
│ Note Template File [                 ]         ┌─────────┐       │
│                                                │ Files...│       │
│                       Default Printers                           │
│   Simple Print [/bin/pr -f -h "Copyright (c) 1994 IBM Corporati│
│    Pretty Print [troff -Tpsc | psc | /usr/bin/enq -Pps0 -r    ] │
│   Artwork Print [/usr/bin/enq -Pps0 -r                        ] │
│   ┌──────────────────────┐       ┌──────────────────────┐       │
│   │        Save          │       │        Reset         │       │
│   └──────────────────────┘       └──────────────────────┘       │
└─────────────────────────────────────────────────────────────────┘
```

**2** **To change the default search databases, click the button below the Default Search Databases option; to change the default navigation article, click the button below the Default Navigation Article option.**

**3** **Click the appropriate item in the list that appears.**

**4** **Click the Save button.**

# Using the InfoExplorer ASCII interface

This section introduces the InfoExplorer program ASCII interface. Since InfoExplorer information is hypertext, you view the information on your computer screen and select links to move from one article to another. Thus you can choose your own path through the hypertext documentation.

## Starting InfoExplorer in ASCII mode

To start InfoExplorer in ASCII mode:

■ **Enter the command**

```
info -a
```

A *navigation screen* appears that is, by default, the Topic & Task Index screen. To change this default, see "Customizing the InfoExplorer ASCII Interface" later in this chapter. The navigation screen displays lists of topics that contain hypertext links to pertinent articles. The articles are displayed in a *reading screen.* For more information on navigation screens and reading screens, see "InfoExplorer ASCII Screens" later in this chapter.

## Using InfoExplorer to learn InfoExplorer (ASCII interface)

This section offers a quick procedure for displaying Chapter 7, "Accessing Information With InfoExplorer," of IBM's *AIX Version 4.1 Getting Started.*

1 **Press Control-O to activate the menu bar.**

2 **Use the Left and RIght Arrow keys (or press D) to highlight Display in the menu bar, then press Return.**

3 **Use the Down Arrow key to highlight List of Books in the Display menu.**

4 **Use the Tab key to highlight *AIX 4.1 Getting Started,* then press Return.**

5 **Use the Tab key to highlight the section you wish to consult.**

6 **Press Return to display the information.**

To print the article:

**1**  **Press Control-O to activate the menu bar.**

**2**  **Press I to highlight "info" and press Return to display the menu.**

**3**  **Use the Down Arrow key to highlight Print Article, then press Return.**

## InfoExplorer ASCII screens

In the InfoExplorer ASCII interface, different screens contain different types of information. For example, you use some screens specifically for moving through the information database. These screens, which include the Topic & Task Index and the Books, are *navigation screens*. The InfoExplorer program displays one navigation screen at a time. The contents of this screen are replaced each time you select a function that displays its information in this location.

The screen that contains the text you want to read is called the *reading screen*. When you do an information search, the navigation screen becomes the reading screen. Reading screens provide conceptual, procedural, or reference information. They display articles that teach you about a topic, explain how to do something, or provide you with information about commands, calls, subroutines, files, or file formats.

## The reading screen

When you start the InfoExplorer ASCII interface for the first time, the first screen that appears is the reading screen, containing the document "Welcome to the InfoExplorer ASCII Interface." The reading screen contains procedural, conceptual, and reference information. The first line of the screen displays the menu options, and the second line displays a title bar. The phrase "info Document" appears at the right end of the title bar.

```
 info  Help  Display  .History  Bookmarks  Notes  Search  Exit
  Welcome to the InfoExplorer ASCII Interface              info Document
  Welcome to the InfoExplorer ASCII Interface

  With InfoExplorer, you can access software and hardware information in an
  online information base consisting of articles connected by hypertext links.
  A hypertext link is a one-way path from one piece of information to another.

  Words that are underlined in InfoExplorer text are hypertext links. The
  InfoExplorer program automatically highlights the current link in reverse
  video. To see more information about the InfoExplorer program, use the Tab
  key to move from link to link. When the item you want to see is highlighted,
  press the Enter key:

  *  InfoExplorer Help

  *  Basic InfoExplorer Screen Operations

  *  New InfoExplorer Features

  *  Reader's Comment Form

  *  Copyright and Trademark Information.
```

Only one reading screen is available at a time. Each time you select a link to another article, the contents of the article you select replace the contents of the original article.

## The navigation screen

The navigation screen is the starting point for finding documentation about the operating system and other programs available on your system. Information is organized by topic and task, by book, or alphabetically by commands or programming reference items.

The first line of the screen contains the menu bar; the second line displays a title bar that displays the title of the screen. In the figure below, the second line informs you that the title is Topic & Task Index and that this is a navigation screen.

```
info  Help  Library  Display  .History  Bookmarks  Notes  Search  Exit
 Topic & Task Index                                            info Navigation
 Topic & Task Index

About the Topic & Task Index.

Using

Managing

Programming

Problem Solving

Error Message Index

Glossary

README Files

To send a comment to the documentation manufacturer, see InfoExplorer
Reader's Comment.
```

*Note:* The navigation information in this section applies to the InfoExplorer program that is shipped with your operating system. The navigation information may or may not apply to other libraries.

While you are viewing the InfoExplorer program through the ASCII interface, only one navigation screen is available at a time. Each time you select a link to another navigation article, the contents of the article you select replace the contents of the original article. For information on selecting links, see "Selecting an ASCII Hypertext Link" later in this chapter.

### Moving between the screens

To return to the navigation screen from the reading screen (or to go back to the reading screen from the navigation screen), press Control-W.

### Selecting an ASCII hypertext link

Items that are underscored in navigation screens or reading screens are hypertext links; the currently selected link is highlighted in reverse video.

To follow a link to more information:

1   **Press the Tab key (or Control-F) to move from one link to the next.
Press Control-B to move back to the previous link.**

2   **Press the Return key to display the linked information.**

### Getting Help

You can display the Help menu as follows:

1   **Press Control-O to activate the menu bar at the top of the screen.**

2   **Use the Left and Right Arrow keys (or press H) to highlight the menu title Help.**

3   **Press Return.**

You can then choose between the following items:

■   This Window. Displays specific help information for the screen you are viewing, including the following:
    —links to articles that describe the screen
    —functions available from that screen
    —a list of menus available in the screen
    —links to descriptions of the menu items

    You can select links to display information that you want to read. To return to the help information screen after selecting a link, use the Path or History menu in the menu bar. See "Returning to a Previous Location" later in this chapter.

■   List of Helps. Displays a list of hypertext links to articles that describe key aspects of the InfoExplorer program and documentation, along with links to the individual help screens.

## Scrolling information in ASCII screens

You can move forward or backward through text displayed in either the navigation screen or the reading screen by using the following keys and key sequences.

| Move | Keystroke |
| --- | --- |
| Previous page | Page Up key or Control-P |
| Next page | Page Down key or Control-N |
| Cursor up one line | Up Arrow |
| Cursor down one line | Down Arrow |

## Choosing an ASCII menu item

Each InfoExplorer screen contains a menu bar across the top of the screen. To choose a menu item, do the following:

1  **Press Control-O to activate the menu bar.**

2  **Use the Left and Right Arrow keys (or type the initial letter of the menu title) to highlight the title of the menu you want to display, then press Return. Instead, you may type the underlined character in the menu title.**

The menu is displayed as a pull-down panel with several items.

3  **Use the Up Arrow and Down Arrow keys to highlight a menu item (or type the underlined character in the desired menu item); then press Return.**

The item you choose is invoked, or another menu is displayed.

To remove a menu without choosing an item, press Control-O. The cursor returns to the screen.

## Returning to a previous location

During the InfoExplorer session, the InfoExplorer program keeps two different records of where you have previously been: the History List and the Path List. These lists enable you to return to previous locations in the information database.

### History List

The History List records every location that you have displayed in the information database during the current InfoExplorer session. To view the History List, do the following:

1   **Activate the menu bar by pressing Control-O (if it is not already activated).**

2   **Use the Left Arrow and Right Arrow keys (or press the period key) to highlight .History, then press Return.**

    The History menu is displayed.

3   **Use the Up Arrow and Down Arrow keys to highlight the List All item, then press Return.**

4   **Use the Left Arrow and Right Arrow keys to highlight the location to which you wish to return.**

5   **Press Control-O to activate the menu bar.**

6   **Goto in the menu bar should be highlighted. If it isn't, highlight it, then press Return.**

### Path List

The Path List keeps track of your current navigation route starting with a primary navigation screen (Topic & Task Index, Books, Commands, or Programming Reference). Every time you return to a primary navigation screen, your previous path list is overwritten.

The Path menu contains three options:

■   Show List. Displays the path list.

■   Previous. Jumps to the previous location without displaying the path list.

■   Next. Jumps to the next location without displaying the path list.

To return to a previous location in the InfoExplorer program:

**1** **Activate the menu bar by pressing Control-O.**

**2** **Use the Left Arrow and Right Arrow keys (or type P), then press Return to display the Path menu.**

**3** **Use the Up Arrow and Down Arrow keys (or type S), then press Return, to display the Path List.**

A pop-up box displays a list of locations in the path. If you are in a primary navigation screen, you receive a message stating that the Path List is empty.

**4** **Use the Up Arrow and Down Arrow keys to highlight the location to which you want to return.**

**5** **Press Control-O to activate the menu bar.**

**6** **Highlight Goto in the menu bar, then press Return.**

The text appears in the reading screen.

## Finding information via the primary navigation routes

To display the primary navigation routes in the navigation screen:

**1** **Press Control-O to activate the menu bar.**

**2** **Use the Left Arrow and Right Arrow keys (or press D) to highlight Display.**

**3** **Press Return to display the menu, which offers the following choices:**

■ Task (the Topic & Task Index). Displays information by task. This is the default navigation article.

■ Commands. Displays an alphabetical list of available commands.

■ Books. Displays a list of articles arranged as though in hard-copy book form.

■ Programming Reference. Displays lists of programming functions in alphabetical order by functional categories.

## Searching by word and phrase

If you do not know what a task or command is, or in which book the information resides, use the search facility to search the InfoExplorer information database.

Two types of searches are available in InfoExplorer: the simple search and the compound search.

The *simple search* allows you to use a word or string of characters (in exact order) to search through text, article titles, or both. In the ASCII version of InfoExplorer, the Article Title item on the Search menu lets you perform a simple search of article titles.

The *compound search* allows you to search using a word, a set of words, or several sets of words. You can further specify the search with the following options:

■ And, Or, and But Not operators

■ proximity options

■ search categories

You can also specify the information databases to be searched for both simple and compound searches. There are two ways to specify an information database:

■ You can select a temporary information database in the Compound Search dialog box. This selection applies to both simple and compound searches and stays in effect for the current session of InfoExplorer or until you change the selection during the session.

■ You can select an information database as a default by choosing Defaults from the "info" menu and selecting DBselect. This default information database applies to both simple and compound searches, and stays in effect for future sessions of InfoExplorer.

Temporary information database selections made in the Compound Search dialog box can override the default selection during an InfoExplorer session, but the default selection returns when you restart InfoExplorer.
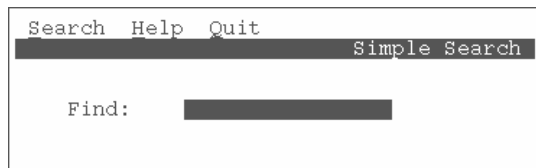
## The simple search

You can perform a simple search as follows:

1   **Press Control-O to activate the menu bar.**

2   **Use the Left and Right Arrow keys (or press S) to highlight Search, then press Return.**

3   **Use the Up and Down Arrow keys to highlight Simple in the Search menu, then press Return.**

```
Search  Path  Exi
 Simple
Compound
Article Titles
Glossary
Files
```

The Simple Search dialog box appears.

```
Search  Help  Quit
                        Simple Search

     Find:
```
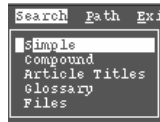
4   **Type the word or phrase you are searching for in the Find field, then press Return.**

A list of articles appears.

For an on-screen tutorial about performing a simple search, follow the directions in "Using InfoExplorer to Learn InfoExplorer (ASCII Interface)," earlier in this chapter, to consult "Searching for Information (ASCII Interface)" in Chapter 7 of *AIX Version 4.1 Getting Started.*

### The compound search

You can perform a compound search as follows:

1   **Press Control-O to activate the menu bar.**

2   **Use the Left Arrow and Right Arrow keys (or press S) to highlight Search, then press Return.**

3   **Use the Up Arrow and Down Arrow keys to highlight Compound, then press Return.**

The dialog box for doing a compound search appears.

Press the Tab key to move from field to field; in the highlighted fields, press the arrow keys to display the available choices.

The Find field allows you to specify three text strings and three operators (And, Or, But Not) to relate those strings to one another in the order in which they are displayed in the dialog box. For more information, see the InfoExplorer article "Narrowing or Broadening a Compound Search."

The Within field allows you to designate the proximity of the specified text strings (within the same article; within 10, 50, or 100 words of the same paragraph).

The Search field allows you to specify the kind of text searched (in the first field) and where in the database to perform the search (in the second field, following the word "in").

4   **Press Control-O to activate the menu bar.**

**5**    **Choose Search to proceed with the search.**

A search match list appears.

```
 ListAll   Help   Quit
                                                       Search Match List
 Navigation:   14 matches in 3 documents
 Commands Reference:   34 matches in 8 documents
 AIX Technical References:   NO MATCHES FOUND.
 AIXWindows Technical Reference:   NO MATCHES FOUND.
 Files Reference:   NO MATCHES FOUND.
 Help for SMIT:   7 matches in 6 documents
 Help for InfoExplorer:   NO MATCHES FOUND.
 AIX User Guides:   88 matches in 9 documents


```

**6**    **Use the Up Arrow and Down Arrow keys to highlight the appropriate item, then press Return. To list all hits in all sources, press Control-O to activate the menu bar; then, with Goto highlighted, press Return.**

A list of sources and the number of hits in each source appears.

**7**    **Use the Up Arrow and Down Arrow keys to highlight the appropriate item, then press Return.**

The appropriate information appears in a reading window.

For a more detailed description of the compound search, see the InfoExplorer article "How to Perform a Compound Search (ASCII)."

## Printing from the InfoExplorer ASCII interface

Follow the directions in "Using InfoExplorer to Learn InfoExplorer (ASCII Interface)," earlier in this chapter, to consult "Printing Information (ASCII Interface)" in Chapter 7 of *AIX Version 4.1 Getting Started.*

## Keystrokes used in the InfoExplorer ASCII interface

Different keys and key sequences are active depending on whether you are working in a text area, a menu bar, or a pop-up screen.

Keystrokes used in text areas

| Keys | Action |
| --- | --- |
| Control-W | Toggles between the navigation screen and the reading screen |
| Control-F or Tab | Moves to the next hypertext link |
| Control-B | Moves to the previous hypertext link |
| Return or Enter | Activates an operation |
| Control-L | Refreshes the screen |
| Control-N or Page Down | Scrolls vertically to the next page |
| Control-P or Page Up | Scrolls vertically to the previous page |
| Left Arrow | Moves the text cursor one character to the left |
| Right Arrow | Moves the text cursor one character to the right |
| Up Arrow | Moves the text cursor up one line |
| Down Arrow | Moves the text cursor down one line |
| < | Moves the text cursor 20 characters to the left |
| > | Moves the text cursor 20 characters to the right |

*Note:* The Left Arrow and Right Arrow keys do not function for the InfoExplorer program on WYSE terminals.

Keystrokes used in menu bars

| Keys | Action |
| --- | --- |
| Control-O | Toggles to make the menu bar active or inactive. |
| Esc-Esc or Control-O | Closes a pull-down menu and places the cursor in the text area. |
| Tab | Highlights the next menu in the menu bar. In pop-up screen menu bars, moves the cursor from the menu bar into the text area if no pull-down menus are currently highlighted. |
| Left Arrow | Highlights the previous option. If a pull-down menu is displayed, the previous menu title is highlighted and its pull-down menu is displayed. |

Keystrokes used in menu bars (*continued*)

| Keys | Action |
| --- | --- |
| Right Arrow | Highlights the next menu. If a pull-down menu is displayed, the next menu title is highlighted and its pull-down menu is displayed. |
| Up Arrow | Displays the pull-down menu for the highlighted menu title or highlights the previous item in a pull-down menu. |
| Down Arrow | Displays the pull-down menu for the highlighted menu title or highlights the next item in a pull-down menu. |
| Return or Enter | Activates the operation of the highlighted menu item. |

In some cases, the menu bar within a pop-up screen contains options that start or stop a process. The following keys can also be used to move within a pop-up screen or to cycle through options in the screen.

| Keys | Action |
| --- | --- |
| Tab | Moves to the next field |
| Left Arrow | Moves to the previous option in a group of options |
| Right Arrow | Moves to the next option in a group of options |
| Spacebar | Cycles through the options in a group of options |
| Up Arrow | Highlights the previous item in a list |
| Down Arrow | Highlights the next item in a list |
| Return or Enter | Activates the operation of the highlighted item, or ends text entry and advances to the next field |

## Stopping the InfoExplorer ASCII program

You can leave the InfoExplorer program from either the navigation screen or the reading screen.

**1 Activate the menu bar by pressing the Control-O key sequence.**

**2 Use the Left Arrow and Right Arrow keys (or press E) to highlight Exit, then press Return.**

The Exit menu appears.

**3 Choose the Confirm option by pressing Return.**

The operating-system command prompt appears and the InfoExplorer program stops.

## Customizing the InfoExplorer ASCII interface

You can change the defaults for the following items of the InfoExplorer
ASCII interface:

■ navigation window article

■ history, notes, and bookmark files

■ printers

To change the defaults:

**1** **In the navigation window, activate the menu bar by pressing Control-O.**

**2** **Use the Left Arrow and Right Arrow keys (or press i) to highlight "info," then press Return.**

**3** **Use the Up Arrow and Down Arrow keys to highlight Defaults, then press Return.**

```
info  Help  Library
  Print Article
  Print References
  Preferences
  Defaults
  Copyright
```
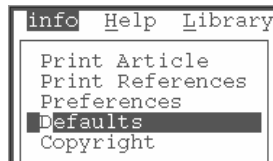
Use the dialog box that is displayed to change the default navigation article,
move the cursor into the Navigation Article field, and press the arrow keys to
display the available options for the default navigation article.

To edit the printer fields, move the cursor into the appropriate Printer field
and edit the existing text.

To set the default Bookmark, History, and Notes fields, choose from the file
lists in the Bookmarks, History, and Notes items in the menu bar of the
Defaults screen. For further information, see the InfoExplorer article "How to
Set Defaults."

**4** **From the menu bar in the Defaults screen, choose Save to save the changes; choose
Reset to delete the changes.**

# The `info` command options

You can use the `info` command with the items listed in the table.

| Option | Function |
|--------|----------|
| `-a` | Starts InfoExplorer ASCII version. |
| `-display` *host:number* | Specifies the display host. |
| `-f isofonts` | Specifies for text to be displayed in ISO fonts. |
| `-g` | Forces the window version of InfoExplorer to run on the default display or the display specified by the `-display` option. |
| `-h` *string* | Specifies a term that is used to search for a command article or content list for a specified topic or task. |
| `-help` | Displays the usage message. |
| `-hlc` *color* | Specifies the color for hypertext links. |
| `-iconic` | Starts InfoExplorer with the navigation window icon on the desktop. After the icon is opened, all application windows open normally. |
| `-l` *libname* | Specifies which database library InfoExplorer opens. |
| `-msh` *N* | Specifies the maximum number for search hits. |
| `-n [ti \| bl \| cl \| pr \| [1-8] ]` | Specifies the alphabetic abbreviation or the numeric value identifying which primary navigation article is displayed. |
| `-q` | Starts InfoExplorer quickly without displaying the copyright notice and the InfoExplorer "Welcome" article. |
| `-s` *term* | Specifies a term or phrase that is immediately used in a simple search. |
| `-shc` *color* | Specifies the color for search hits. |
| `-t` *string* | Specifies a term or phrase that is immediately used in a title search. |
| `-tags` | Sets the debug environment switch enabling the inclusion of the Tags menu in the Preferences window menu bar. |
| `-txc` *color* | Specifies the color for article text. |

# 6

# Using System Administration Tools

This chapter describes the following tools that provide special interfaces for handling system administration tasks:

- Visual System Management (VSM)
- System Management Interface Tool (SMIT)

## Visual System Management

Visual System Management (VSM) is a graphical interface that enables you to perform installation and system management tasks through direct manipulation of icons. For example, you can delete a user by dragging the User icon to the Trash Can icon. In addition to performing basic tasks, you can create new objects from system-defined or user-defined templates; sort, filter, and find objects; and display the objects in a variety of views.

### Starting VSM applications

You can start VSM applications from the command line (see "Starting VSM from the Command Line" later in this chapter) or from CDE.

### Starting VSM from CDE

Start VSM from CDE as follows:

1   **From the front panel, click the Application Manager icon.**



The Application Manager window appears.
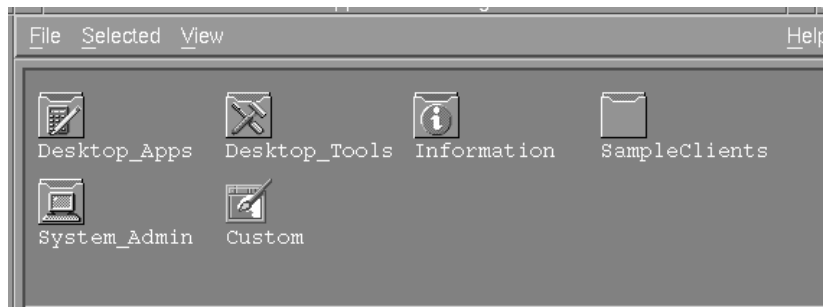
**2** **Double-click the System_Admin icon.**



This displays the Application_Manager–System_Admin window.
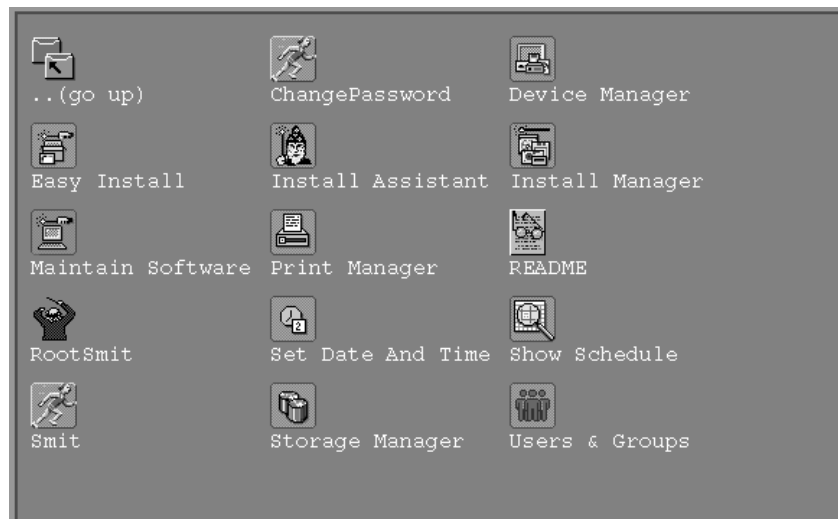


**3** **Double-click the desired application icon.**

### Starting VSM from the command line

You can start the following VSM applications from the command line of a terminal window with the commands listed.

| Application name | Command |
|---|---|
| Device Manager | `xdevicem` |
| Easy Install | `xinstallm -ez` |
| Install Manager | `xinstallm` |
| Maintain Software | `xmaintm` |
| Print Manager | `xprintm` |
| Storage Manager | `xlvm` |
| Users & Groups Manager | `xuserm` |

## The VSM interface

The features common to many VSM application windows are described in this section.

As an example, the Storage Manager window is illustrated.

Most VSM applications contain a work area that contains panes and wells, an area that contains actions, and an information area. For more information about how to work in a specific VSM application, read the help text in the information area, or click the Help button to start the Help System.

### Work area panes and wells

The work area is organized into *panes* containing icons that represent specific related functions or objects. You can double-click some of these icons that contain related objects to display a *well* (or wells). The well displays the related objects. Double-clicking an object that cannot be expanded brings up a *notebook* (dialog box) displaying the object's attributes. For information on working with objects, refer to the help in the information area.

Click to collapse area



Actions: Drag and drop onto objects to perform actions

Work area panes

Work area well:
Double-click to open

Information area
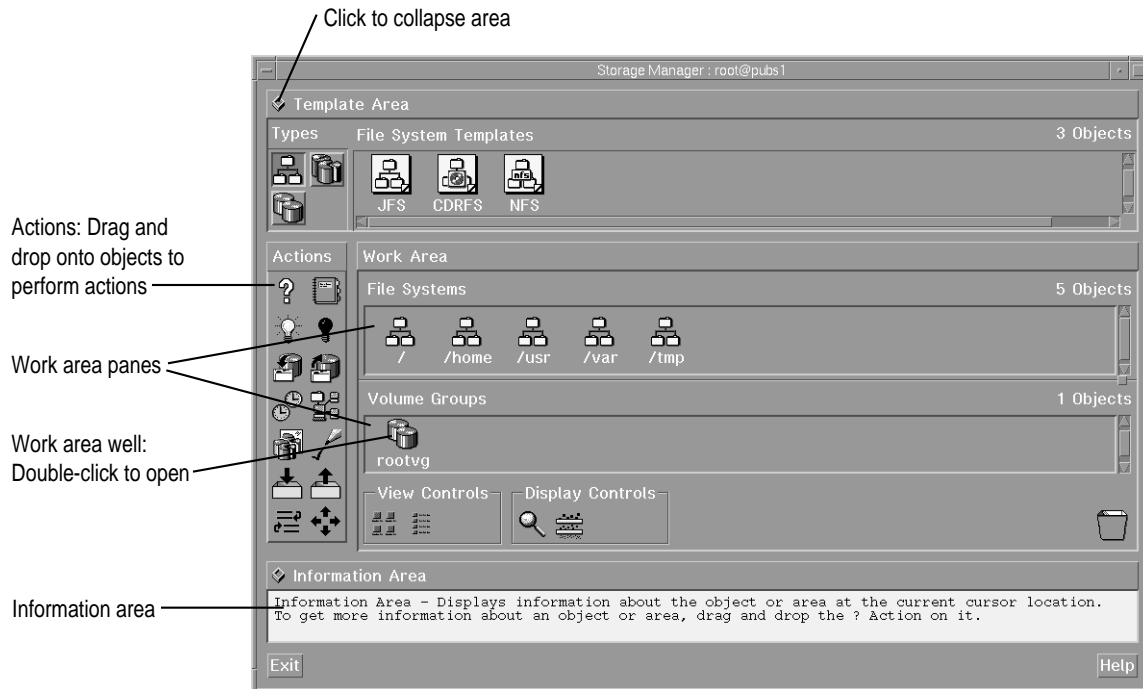
## Actions—dragging and dropping

The icons in the area labeled "Actions" represent various actions that you can perform on the objects in the panes and wells of the work area. Perform these actions by moving the mouse pointer to the action, pressing the middle mouse button (or the Left Arrow key), and dragging the action icon to the appropriate object on which you wish to perform the action. This is referred to as *dragging and dropping*.

## VSM dialog boxes

Dialog boxes appear if the system requires additional information for completing a task. For more information about dialog boxes, select the Help button in a dialog box. For information about the fields and buttons in a dialog box, click the question mark (?) button at the bottom of the dialog box.

### Information area

The information area displays a brief description of the object or area at which the mouse pointer is located. See the next section, "Getting Help in VSM."

## Getting help in VSM

All information about the application and how to use it is available on screen. Use the following methods to access help in the interface.

### Information area

The information area, which is at the bottom of the dialog box, provides context-sensitive help based on the position of the cursor. The description provided is often accompanied by an explanation of the task you can perform.

### Dragging and dropping the Item Help (?) action icon

Use the middle mouse button (or the Left Arrow key) to drag and drop the Item Help (?) action icon on a target to open a Help System window that takes you directly to the help for that target. Use the Item Help (?) action icon to learn more about a specific object or area. For more detailed information about the concepts discussed in the help screens, see the *AIX Version 4.1 System Management Guide: Operating System and Devices*.

### ? and Help buttons in a dialog box window

The question mark (?) button in a dialog box opens a help window that provides context-sensitive help for the highlighted field in the dialog box. The Help button opens the Help System window displaying the help topic for dialog boxes.

### Help button in a message window

The Help button in a message window provides more information about the message.

## VSM applications

The following sections describe how to use the available VSM applications. Start these applications by double-clicking their icons in the Application_Manager–System_Admin window or by entering a command, if available, at the command line.

### Device Manager

Double-click the Device Manager icon (or enter `xdevicem` at the command line) to display the Device Manager dialog box.

Device Manager displays system objects and dialog boxes that repesent the contents of your system's Device Configuration database. This enables you to manage some devices not covered by SMIT, such as graphic adapters, graphic display subsystems, ports, buses, expansion drawers, non-SCSI adapters, standard adapters, and memory cards. The Show Tree View button (at the bottom left of the dialog box) allows you to view how the devices are interconnected.

Device Manager does not include the following SMIT functions:

■ trace devices

■ printer subsystem management (including virtual printers)

■ communications applications and services

■ LFT devices: keyboard, displays, fonts, speakers

■ Xstation configuration

### Easy Install

Double-click the Easy Install icon (or enter `xinstallm -ez` at the command line) to display the Easy Install dialog box, which allows you to install software.

### Install Assistant

Double-click the Install Assistant icon to display the Install Assistant dialog box.

This dialog box offers an interface for performing the following tasks:

- setting the date and time and the root password
- configuring network communications
- managing system storage, paging space, and the language environment
- creating user accounts
- defining printers
- importing existing volume groups
- installing software applications
- backing up the system

### Install Manager

Double-click the Install Manager icon (or enter `xinstallm` at the command line) to display the Install Manager dialog box.

This dialog box allows you to perform the following tasks:

- installing and updating software products
- creating bundles
- defining installation settings

### Maintain Software

Double-click the Maintain Software icon (or enter `xmaintm` at the command line) to display the Maintain Installed Software dialog box.

This dialog box allows you to perform the following tasks:

- commit to a software update and automatically remove all previous versions
- reject an applied update, remove the updated files, and revert to a previous version of the software
- verify the correctness of the installed software

### Print Manager

Double-click the Print Manager icon (or enter `xprintm` at the command line) to display the Print Manager dialog box.

This dialog box enables you to perform basic SMIT tasks on printers and queues and is designed to make creating queues much simpler. In addition, it provides a graphical representation of queue and printer attachments as well as print jobs waiting in the queue.

Print Manager does not include the following SMIT functions:

- starting a print job
- scheduling jobs

### Storage Manager

Double-click the Storage Manager icon (or enter `xlvm` at the command line) to display the Storage Manager dialog box.

This dialog box enables you to manage physical volumes, volume groups, logical volumes, and file systems through direct manipulation. In addition, Storage Manager provides an easy way to view the contents of a logical volume.

### Users & Groups Manager

Double-click the Users & Groups icon (or enter `xuserm` at the command line) to display the Users & Groups Manager dialog box.

This dialog box simplifies adding users by providing system-defined and user-customized templates. Simple drag-and-drop actions enable you to set user passwords, change a user's language, and specify whether or not a user can log in to a system.

## VSM keyboard basics

You can perform many of the mouse actions by using various key sequences, even though the help windows always refer to mouse actions. For a description, use InfoExplorer to consult "VSM Keyboard Basics" in Chapter 6 of IBM's *AIX Version 4.1 Getting Started.*

For a description of InfoExplorer, see Chapter 5 of this guide. For a summary of commands for accessing *AIX Version 4.1 Getting Started,* see the section "Using InfoExplorer to Learn InfoExplorer (Graphical Interface)" or "Using InfoExplorer to Learn InfoExplorer (ASCII Interface)," both in Chapter 5 of this guide.

**IMPORTANT**  Set the `keyboardFocusPolicy` resource in your `.Xdefaults` file to `explicit` so that you can set the input focus using key sequences. When using the keyboard, the focus area is emphasized. Generally, a focus area can be selected or serve as a drop site.

The following explains how to use key sequences in place of a mouse:

- Point: Press Tab (forward) or Shift-Tab (backward) to move between areas. Use the arrow keys to move from object to object in an area. The focus area is emphasized.

- Click or select: Press the Spacebar key. A selected object appears with a white background outlined in black.

- Double-click: Quickly press the Spacebar key twice.

- Drag and drop: If the phrase is "drag and drop on a target," select the target object. If the phrase is "drag and drop in an area," select an object, then select the target area and press the Insert key.

- Multiselect: To multiselect, select an object, then use the arrow keys to point to another object and press Shift-Spacebar. Continue until you have selected all the desired objects in the area. You can select all by selecting, Control-/ and deselect by entering Control-\.

■ Choose: Point to an object or area and press Shift-F10 to view a pop-up menu. Use the arrow keys to move from item to item. Press the Spacebar or Return to select the item; or you can select an item by pressing its mnemonic (underlined character). Pressing the Esc key cancels the pop-up menu.

The following tables contain default key sequences you can use in VSM.

Default key mappings for managing the VSM interface

| Key | Function |
| --- | --- |
| Spacebar | Selects an object |
| Shift-Spacebar | Multiselects objects |
| Control-/ | Selects all objects |
| Control-\ | Deselects all objects |
| Insert | Drops a selected object in a selected area |
| Tab | Moves the focus from area to area |
| Shift-Tab | Moves the focus backward from area to area |
| Arrow keys | Moves the focus from object to object in an area |
| F1 | ? Item Help action for selected object |
| F2 | Sort Display control for selected area |
| F3 | Find Display control for selected area |
| F4 | Filter Display control for selected area |
| F5 | Large Icon View control for selected area |
| F6 | Small Icon View control for selected area |
| Delete | Trash action on selected object |
| Control-Backspace | Notebook action on selected object |

Default key mappings for managing the help window

| Key | Function |
| --- | --- |
| F1 | Provides help on using the help window |
| F10 | Moves the focus back and forth between the read window and the menu bar in the Help System window |
| Control-K | Opens a Keyword Search window displaying a help index |

| | |
|---|---|
| Control-B | Backtracks to the previous help topic |
| Control-U | Goes up one level in the topic hierarchy |
| Control-H | Returns to the home topic |

Default key mappings for managing the windows

| Key | Function |
|---|---|
| Alt-F3 | Lower |
| Alt-F4 | Close |
| Alt-F5 | Restore |
| Alt-F6 | Moves the input focus from window to window within the VSM application |
| Alt-Shift-F6 | Moves the input focus to the previous window within the VSM application |
| Alt-F7 | Move |
| Alt-F8 | Size |
| Alt-F9 | Minimize |
| Alt-F10 | Maximize |
| Alt-Tab | Raises the next window in the stack and moves the input focus to that window |
| Alt-Shift-Tab | Raises the previous window in the stack and moves the input focus to that window |
| Alt-Esc | Raises the next window in the stack without changing the input focus |
| Alt-Shift-Esc | Raises the previous window in the stack without changing the input focus |

## Using the System Management Interface Tool (SMIT)

You can use the System Management Interface Tool (SMIT) to perform system administration. SMIT provides a task-oriented interface to use the commands required to manage your system. SMIT menus and dialog boxes let you quickly create administration commands and free you from the details of complex command syntax. SMIT also creates log files that you can use to duplicate system configuration or learn about specific commands.

*Note:* Other system management tools are available. You can use the Disk Management Utility for logical volume management or the Visual System Management (VSM) applications.

You can use SMIT to help start the installation process and install optional software, as well as manage the following:

- users and groups
- system environment, performance, and problems
- storage and file systems
- printers, terminals, and tape drives
- print jobs and print queues
- networks

For information about SMIT, see the *System Management Guide: Operating System and Devices* available through InfoExplorer.

# 7 Setting Up AppleTalk and AppleTalk Services

This chapter describes AppleTalk and AppleTalk services and covers the following topics:

- installing AppleTalk
- using SMIT to start, stop, and query AppleTalk services
- using AppleTalk in single port mode
- using AppleTalk in multiport mode, including the configuring of routers, zones, and ports
- using AppleTalk commands to check AppleTalk status, start and stop AppleTalk, and test for network nodes
- configuring AppleTalk services such as the PPC daemon and Mac OS utilities
- setting your default printer and creating print queues

## AppleTalk networking

AppleTalk is a set of simple and flexible network protocols that connect computers and peripheral devices such as printers. AppleTalk over Ethernet provides high-speed communications between computers.

Computers running AppleTalk can take advantage of the Mac OS utilities such as the Disk Management Utility and CommandShell.

AppleTalk supports traffic on many ports concurrently. This allows you to use multiple network interfaces (such as several Ethernet cards) at the same time.

The AppleTalk kernel stack has full routing capabilities. This means you don't need a dedicated router to connect machines on multiple networks.

AppleTalk can run on some or all of your network ports and can run in parallel with other protocols on the port. For example, you can use AppleTalk with TCP/IP. You can set up the protocols so they can share your network card and cable, or you can dedicate separate cables for each protocol.

To use AppleTalk, you need to configure your system. You use the System Management Interface Tool (SMIT) to configure AppleTalk. If you have not used SMIT, simply follow the steps in this chapter. You can learn more about SMIT in Chapter 6 of this book.

## Before you can use AppleTalk

To take advantage of AppleTalk services, you need to install the  AppleTalk software. For information about installing additional software with the AIX Base Operating System, see Chapter 2, "Installing AIX on Your Network Server."

If AppleTalk is installed, entries for AppleTalk services will appear in the SMIT menu for Communications, Applications, and Services.

## Setting up and managing AppleTalk

You can set up AppleTalk networking services through the System Management Interface Tool (SMIT).

To set up AppleTalk with SMIT:

**1    Start SMIT.**

To start SMIT, type `smit` at the command prompt. The main SMIT menu appears.

```
System Management Interface Tool : root@p

Exit  Show                                    Help

Return To:

┌─────────────────────────────────────────────┐
│                                             │
│                                             │
│                                             │
└─────────────────────────────────────────────┘

System Management

  □  Software Installation and Maintenance      ▲
  □  Software License Management
  □  Devices
  □  System Storage Management (Physical & Log
  □  Security & Users
  □  Communications Applications and Services
  □  Print Spooling
  □  Problem Determination                       ▼

        [Cancel]
```
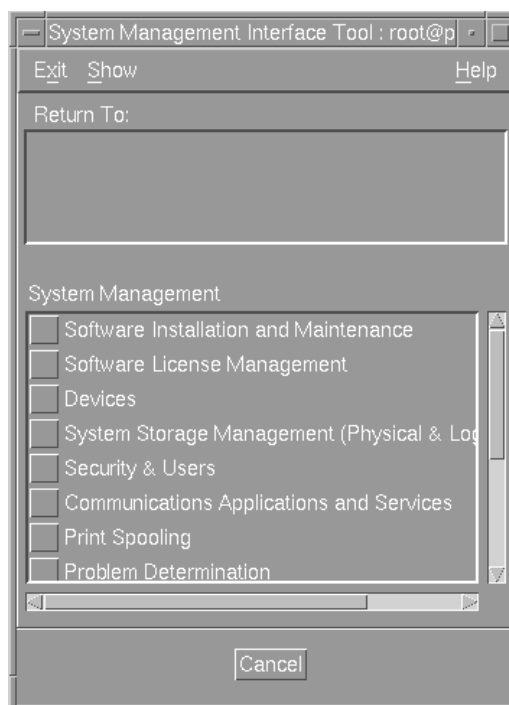
**2  From the main SMIT menu, choose Communications Applications and Services.**

A new menu appears that lists the services.

```
System Management Interface Tool : 
 Exit   Show                          Help
 Return To:
    System Management

 Communications Applications and Services
    TCP/IP
    NFS
    AppleTalk

                    Cancel
```
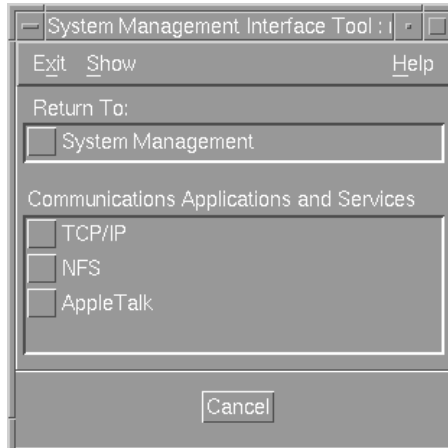
**3  Choose AppleTalk.**

SMIT displays the AppleTalk menu.

```
System Management Interface Tool : root@p
 Exit   Show                          Help
 Return To:
    System Management
    Communications Applications and Services

 AppleTalk
    Start AppleTalk in Single Port Mode
    Start AppleTalk in Multi Port Mode
    Stop AppleTalk
    Query AppleTalk Status
    AppleTalk Services

                    Cancel
```

The following sections describe each item.

## Using AppleTalk in single port mode

If you use AppleTalk in single port mode, you cannot use AppleTalk with another network interface.

To use AppleTalk in single port mode, choose the Start AppleTalk in Single Port Mode item from the SMIT AppleTalk menu. The SMIT dialog box presents two options.
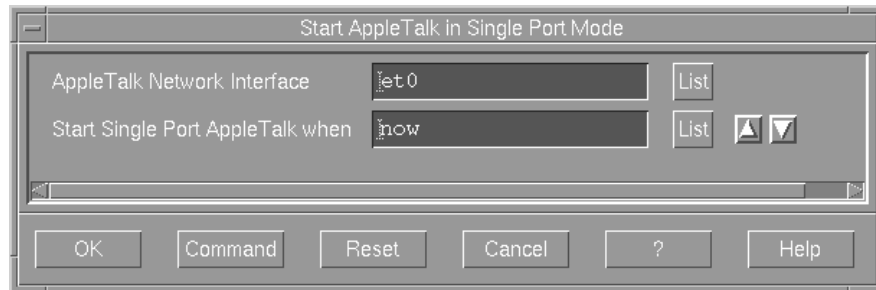


In this dialog box, select the interface for AppleTalk. By default, the system selects the built-in Ethernet interface (`et0`), but all compatible interfaces are listed in this dialog box.

You can then select when you want to start AppleTalk services:

- now
- during the next system restart
- both—now and during the next system restart

By default, the services start immediately.

If you choose to start AppleTalk right away and if several zones are available on the network, you must choose one of the zones as your home zone.

If you choose to start AppleTalk during the next system restart, or right away and during the next system restart, a configuration file (`/etc/rc.net.appletalk`) is created and run during startup.

Once you start the AppleTalk services, the system displays a message showing the current configuration for your machine (network number and node number, as well as the cable range of the AppleTalk network).

You can also get status information through the Query AppleTalk Services menu in SMIT, or by using the `atconfig` command with the `-q` option.

## Using AppleTalk in multiport mode

You can configure AppleTalk to take advantage of multiple network interfaces. To use multiple network interfaces with AppleTalk, you must set up routing and use multiport mode.

### Administering an AppleTalk router

To use AppleTalk in multiport mode, configure routing characteristics for the AppleTalk network.

#### Providing seed information

Each AppleTalk network needs one router configured to provide seed information. If your AppleTalk network does not have a seed router, you must configure your Network Server to perform routing. If there is another seed router on the network (you are connecting to an existing AppleTalk network), you don't have to set up a seed router. The port can use the seed information from the existing router.

An interface is seeding when it allocates a range of network numbers for one or more zones on a network. A seed router sends an AppleTalk network's identifying information to other routers connected to that network. Other routers obtain network information, such as zone names, from the seed router.

You use AppleTalk network and zone information to seed the network interface. For each port that is not connected to a router, you specify the network and zone information. You cannot start AppleTalk services until this information has been provided.

For more information about configuring AppleTalk networks, see "AppleTalk Networking Guide" and the manual for the Apple Internet Router.

## Configuring AppleTalk

To configure your Network Server as a router for AppleTalk, use SMIT. (To get to multiport configuration in SMIT, use the path Communications and Services/AppleTalk.)

**1  Click Configure AppleTalk for Multi-port Mode.**

**2  Click Add or Change AppleTalk Network Interface.**

The Single Select List dialog box appears.

**3  Click the interface you want to use.**

The Add or Change AppleTalk Network Interface dialog box appears.



To configure AppleTalk for multiport mode, provide the following information:

■ AppleTalk Network Interface

SMIT automatically provides this information in the dialog box for the interface you are configuring.

- Seed Port Network Range Start

  If you are configuring your Network Server to be a seed port, provide the first number in your network range. If you do not want to set up your server as a seed port (if there is another seed router on your network), leave this field blank or specify 0. If you specify a range and another seed router exists on your network, your information must match.

  If your Network Server is the only router on the network, you can use any numbers for your network range from 1 to 65,279.

  Each number in your network range supports up to 253 devices for networks with more than one segment and 254 devices for one segment networks. (See *Inside AppleTalk* for more information.) You need to have enough numbers in your range to support the devices on your network.

- Seed Port Network Range End

  If you are configuring your Network Server to be a seed port, provide the last number in your network range. If you do not want to set up your server as a seed port (if there is another seed router on your network), leave this field blank or specify 0.

  If your Network Server is the only router on the network, you can use any numbers for your network range from 1 to 65,279. If another seed router exists on your network, your information must match.

- Home Port

  You must select a home port, even if it is not the seed port. There is no advantage to using one port for a home port as opposed to another. You just need to select one.

  The home port is the physical networking interface and the AppleTalk zone where the AppleTalk services will be advertised.

  From a client perspective, the server home port appears as the zone where AppleTalk services such as file sharing are found in the Chooser.

  *Note:* The home port only applies to multiport mode. In single port mode, the home port is always the port chosen for AppleTalk services.

- Home Zone Number

  Specify the number of the zone (from the list created in the next item) for the home port. You must specify this zone for a seed router.

■ Zones

Creating a zone in an AppleTalk internet is a means of conceptually grouping devices, which makes it easier for users to locate and access network services. AppleTalk zones are created by routers and have no physical boundary (so a zone can be used by several interfaces).

You must define at least one AppleTalk zone for the network on each port configured as a seed port. The zone name can be shared between several network interfaces. The name of the zone cannot be longer than 32 characters. You can use all characters, except the colon (:), at sign (@), single quote ('), asterisk (*), equal sign (=), and tilde (~), in the zone name. Spaces are permissible.

Use the List button to the right of this field to display existing zones for other interfaces.

## AppleTalk configuration file

When you configure AppleTalk, SMIT creates a configuration file. Normally, you should not have to edit this file and you can perform all of your configuration through SMIT. However, there are some situations when you may need to edit this file. For example, if you want to have more than fifteen zones, you need to add them directly to the configuration file because the SMIT dialog box only displays the first fifteen zones.

Use a standard UNIX text editor such as `vi` to edit the configuration file. Here is an example file:

```
#AppleTalk Configuration file
et1:35200:35350:*
:TestNet 1:et1:*
```

The pound sign (#) in the first line of the file indicates a comment that the system ignores. The second line defines the network interface, specifies a range of network addresses, and the asterisk (*) indicates that this is the home port. The third line specifies a zone for the interface, and the asterisk (*) indicates that it is the home zone. The following sections contain more information about creating the lines for the configuration file.

A configuration file is also provided in `/etc/appletalk.cfg`. This file contains further explanation and examples.

To specify your home port in the configuration file, you add an asterisk (`*`) to the end of the line.

For example, the line

```
et1:*
```

specifies that the interface will be used as the home port.

After you specify the interface in the configuration file, you can specify a network range. The following line in an AppleTalk configuration file seeds the `et0` interface (Ethernet card 0) with addresses ranging from 25 to 50:

```
et0:25:50
```

For a nonseed entry, the configuration simply consists of the name of the interface followed by a colon. The optional asterisk (`*`) means that the interface will be used as the home port for AppleTalk services. The following lines in a configuration file show entries for nonseed entries:

```
et0:
```

```
et1:*
```

There must be only one home zone, and the home port must be listed in this entry.

Entries for the zones and interfaces can be mixed throughout the configuration file.

The format for zone definition is

*:name:interface:optional asterisk*

Here is an example zone for an AppleTalk configuration file:

```
:TestNet 1:et1:*
```

In the configuration file, a zone name entry must begin with a colon (:). The first field of the configuration line is the name of the zone (no longer than 32 characters). All characters, except the colon (:), at sign (@), single quote ('), asterisk (*), equal sign (=), and tilde (~) can be part of the zone name. Spaces are permissible.

The next fields are separated from the zone name field by a colon (:) and designate the list of (seed) interfaces using this zone name. If the zone name is to be used as the home zone, use an asterisk (*) as the last character of the zone configuration line.

## Starting AppleTalk and setting multiport options

When you choose the Start AppleTalk in Multi Port Mode item from the SMIT AppleTalk menu, you can specify the following options:

■ the interport routing mode

■ the router configuration file

■ when to start the AppleTalk multiport configuration

The following sections describe each option.
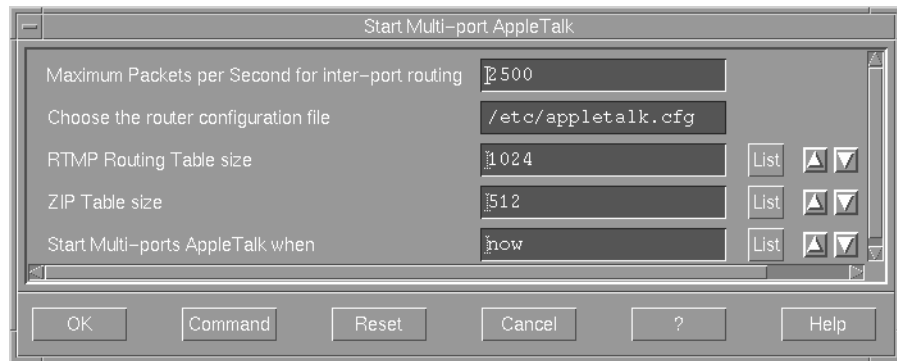
### Setting the interport routing traffic option

With the interport routing mode option, you can specify the amount of traffic allowed through the router (the traffic not going to the services published on the home stack, such as a file server).

This option allows the network administrator to choose how the AppleTalk kernel stack behaves—as a router or as an entity dedicated to the services on the server, "discouraging" users to perform cross-traffic file transfers.

With this option, you specify the maximum number of packets per second allowed to cross from one network to another. Once the system reaches the maximum number of packets per second, the system begins to drop packets. If you choose the default value, AppleTalk determines a reasonable number of packets to route from one port to another. Because routing uses the processing power of your Network Server, you may want to lower the default value. (The minimum value for this field is 500 packets per second.)

*Note:* This option does not limit the number of packets going to the home stack.

As an example, here are some possible values and their effects. (These numbers are simply guidelines and different network configurations may have slightly different ranges.)

■ A value of 750 makes interport transfers slow for users but does not use much of the processing power of your Network Server.

■ A value of 2500 allows several users to perform transfers from one port to another, but you may notice degraded performance for other applications on your Network Server.

■ A value of 5000 ensures that most of the systems resources are available for interport routing. With this value, routing could take up most of the system resources and significantly degrade the performance of other applications.

*Note:* There is no upper limit for the interport routing value, but a value above 5000 ensures that most of your system resources are available for routing.

### Specifying a configuration file

This dialog box displays the router configuration file that describes the multiport configuration (`/etc/appletalk.cfg`). You cannot change the name or location of this file.

### Specifying when to activate AppleTalk

You can also specify in this SMIT dialog box when the AppleTalk multiport configuration takes effect. You can choose

- now
- during the next system restart and consequent system starts
- both—right away and for all the future system restarts

*Note:* If you have changes that take effect during a system restart, the system creates a file (`rc.net.appletalk`) and overwrites any previous AppleTalk configuration that may have been selected.

## Removing an AppleTalk network interface

You can remove an interface from your system if you are no longer using it. When you delete an interface, you also delete the zones that are specific to the interface.

To remove a network interface from your AppleTalk configuration:

**1    Choose the Delete AppleTalk Network Interface item from the SMIT Configure AppleTalk for Multi-port Mode menu.**

A Delete AppleTalk Interface dialog box appears.

**2    Specify the interface to delete.**

You can use the List button to display the available interfaces.

**3    Click Done.**

## Stopping AppleTalk

To shut down AppleTalk, choose the Stop AppleTalk item from the SMIT AppleTalk menu. When you choose the Stop AppleTalk item, the following dialog box appears.
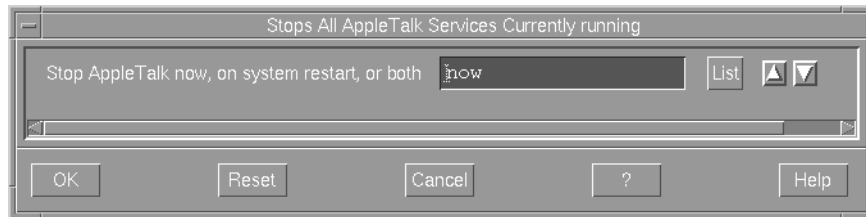


You can stop AppleTalk only if there aren't any processes using AppleTalk services. If you try to stop AppleTalk while one or several processes are using AppleTalk (like a file server), the system displays a list of the processes using AppleTalk, and AppleTalk is not stopped.

You need to manually terminate each process by stopping the application or daemon using AppleTalk. When you have terminated the processes that are using AppleTalk, you can shut down AppleTalk services.

In this SMIT dialog box, you can then select when you want to stop AppleTalk services:

■ now (by default)

■ during the next system restart

■ both—right away and during the next system restart

If you choose to stop AppleTalk the next time the server starts, the file used to start AppleTalk automatically during startup is deleted (`/etc/rc.net.appletalk`). The third option shuts down AppleTalk right away (if there aren't any processes using AppleTalk services) and erases any startup settings for AppleTalk so that AppleTalk does not automatically start during the next system restart.

## Querying AppleTalk status

To view the current status of AppleTalk services, choose the Query AppleTalk Status item from the SMIT AppleTalk menu.

This menu item queries the AppleTalk services and returns the current status. AppleTalk services can be stopped or started. If AppleTalk is active, SMIT displays a line of information for each interface currently configured. The line of information contains the name of the interface, the state of the interface (most likely "Online"), and network information including the network range, the AppleTalk address for the interface (made of the network and node numbers), and the logical AppleTalk port number.

An asterisk (*) in front of a line means that this port is the home port.

The following is an example of the result of a query about a four-port configuration. Note that interface et2 is the home port.

```
-------- AppleTalk Statistics -----------
                                Network:
 I/F    State                Range       Node     port
 ----  ----------------      -----------  ----------  ----
 et1   Online                35281-35281 35281:88     1
*et2   Online                35282-35282 35282:149    0
 et3   Online                35283-35283 35283:210    2
 et4   Online                35284-35285 35284:15     3
The following processes are using AppleTalk Services:
   1864
   10586
   1349
```

When application programs or services are currently registered on the AppleTalk stack, a list of the UNIX Process Identifiers (PID) of those services is displayed.

## Using AppleTalk commands

AppleTalk provides many commands to help you gain information about AppleTalk services. This section describes the most common uses of three commands. The commands are fully described in the manual pages.

The AppleTalk commands are located in the `/usr/sbin` directory.

### Querying and stopping AppleTalk with the `atconfig` command

You can use the `atconfig` command with the `-q` option to determine the current status of AppleTalk. If the AppleTalk kernel stack is active, the command

```
atconfig -q
```

returns information including the current node ID, network number, bridge address, and related information.

If no AppleTalk services are running but the AppleTalk kernel stack is still configured, you can shut down the AppleTalk kernel stack by running the following command:

```
atconfig -u
```

This command requires root access and should be used with caution. If any AppleTalk services are still in use, the command returns a list of the process identifiers of the UNIX processes currently using AppleTalk. You can't stop AppleTalk until you stop those process.

When the shutdown is complete, you may run `atconfig -q` to ensure that AppleTalk is no longer running.

### Using `atlookup` to list the NVEs in a zone

The `atlookup` command returns a list of all NVEs (network visible entities) in a given zone. The syntax for this command is

`atlookup` *<object>*:*<type>*@*<zone>*

where *type* is, for example, a printer or server type, *object* is typically the host name or other object name, and *zone* is the AppleTalk network zone. An equal sign (=) is treated as a wild card in the *<object>* and *<type>* fields, and an asterisk (`*`) represents the current zone.

For example, `atlookup "=:LaserWriter@*"` would return all LaserWriters registered in the current zone.

### Using `appleping` to ensure that a node is active

You can use the `appleping` command to ensure that a given node is active. The `appleping` command uses the AppleTalk Echo Protocol. The format for this command is

`appleping` *<name>*:*<type>*[@*<zone>*][*packet-size*[*npackets*]]

The *name:type@zone* parameter specifies the host computer by its name, type, and zone. If you do not specify a value for *zone,* `appleping` uses the local zone. The *npackets* parameter specifies how many packets to send before terminating, and *packet-size* specifies the size of each packet in bytes. The value of *packet-size* must be between 14 and 599; by default, its value is 64 bytes.

The `appleping` command reports whether a reply was received. The `appleping` command continues to send packets and to display the result until the number of packets specified or until you issue the interrupt character (usually by pressing Control-C). Before exiting, `appleping` displays a summary of statistics.

## Configuring AppleTalk services

The AppleTalk Services item in the SMIT Communication and Services menu lets you configure the Program-to-Program Communication (PPC) daemon and lets you set up AppleTalk printing.

### Setting up and starting the PPC daemon

The PPC daemon supports applications such as the Disk Management Utility and CommandShell and manages the exchange of AppleTalk communications between Mac OS utilities and your Network Server.

You can use the Program-to-Program Communication option in the SMIT AppleTalk Services menu to start, stop, and customize the PPC daemon. You can also use this option to add to the server new daemons that you have created for Mac OS utilities.

To use Mac OS utilities, you must start the PPC daemon. To start the PPC daemon:

1   **Click "Start the 'ppcd' daemon."**

This option appears in the Program-to-Program Communication menu available from the AppleTalk Services menu.

A dialog box appears.

2   **Specify when you want to start the daemon.**

You can start the daemon now, at the next system restart, or both.

3   **Provide a hostname for your computer.**

4   **Click OK.**

The daemon starts.

In addition to starting the PPC daemon, the PPC daemon selection under the AppleTalk Services item contains the following options:

■   Stop the 'ppcd' Daemon

■ List all 'ppcd' Services

This option displays all the daemons on the server used for Mac OS utilities such as the Disk Management Utility, the Status Demo AppleTalk Services application, and CommandShell. If you have added any additional daemons, they will also be displayed.

■ Add a 'ppcd' Service

This option lets you add a new daemon for a Macintosh utility to your system. When you choose this option, a dialog box appears that lets you specify information for the daemon.
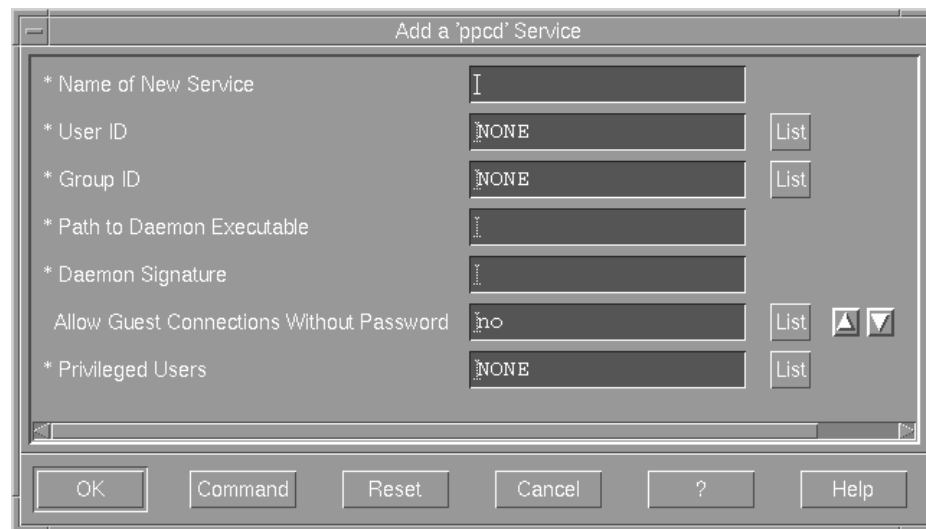


To add a PPC daemon service, you need to specify:

—Name of the service. Specify the name of the PPC component as you want it to appear in the PPCBrowser dialog box for the Mac OS client. Do not use spaces in the name.

—User ID. Provide a user name or user ID. This value determines the privileges the application has when it runs.

—Group ID. Provide a group name or group ID. This value determines the privileges the application has when it runs.

—Path of the daemon executable. Provide the full path to the server component (daemon).

—Daemon signature. The signature is a unique four-letter code that identifies the daemon. Mac OS clients use the signature to filter Mac OS utilities and search for specific types of applications.

—Guest access. The guest field is optional. If you select guest access, any client can connect to the application as the guest user (an actual account). If you choose not to have guest access, the user must supply a valid account (user name) and password to start the Mac OS utility.

—Privileged users. If you want specific users to be able the run an application with extra privileges (such as root privileges), provide their names in this field. If a user is listed in this field, the user ID and group ID values are not used.

■ Change/Show Characteristics of a 'ppcd' Service

After you select this option, select a service (daemon) to examine. The same options appear as those for the Add a 'ppcd' Service option. You can change any of them or just examine them.

■ Remove a 'ppcd' Daemon

Deletes an entry for a daemon from the PPC daemon configuration file.

## Setting up AppleTalk printing capabilities

To use AppleTalk for printing, you need to set a default printer and set up a print queue to allow print spooling. To do so, choose the AppleTalk Services item from the Communication and Services menu and choose the Configure AppleTalk Printing item. This item lets you select an AppleTalk printer and view printer status.

You can use the Selecting an AppleTalk Printer item to specify your printer. Before you can specify a printer, you need to start AppleTalk in either single port or multiport mode.

To select an AppleTalk printer:

**1    Choose Select an AppleTalk Printer.**

A dialog box appears.
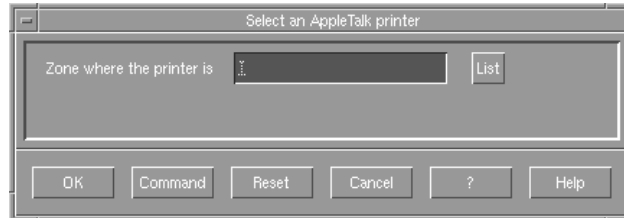


**2    Specify your AppleTalk zone.**

You can use the List button to see the available zones.

**3    Click OK.**

A list of available printers in that zone appear.

**4    Select the printer you want.**

Your printer is now selected as your default AppleTalk printer.

When you select an AppleTalk printer, the system creates a print queue named DEF_ATALK_PR_Q. If a print queue did not previously exist, the DEF_ATALK_PR_Q is set to your system-wide default print queue. You can also set the system-wide default queue through SMIT with the Print Spooling option.

Once you have selected an AppleTalk printer, you can print using UNIX commands such as lpr, enscript, and pr. If you do not specify a print queue with UNIX commands, the print job is sent to the default print queue. You can use command-line options to specify your print queue. For example, the lpr, enscript, and pr commands can be used with the -P *queue* option, which lets you specify the print queue.

If you want to configure several printers and print queues, refer to the on-screen documentation in InfoExplorer for printers and printing.

# 8

# Managing File Storage With the Disk Management Utility

Managing logical volumes in AIX is complex. To simplify this process, Apple Computer provides the Disk Management Utility. The Disk Management Utility graphically represents the relationships between physical volumes, volume groups, logical volumes, and file systems and lets you make changes by dragging icons and using dialog boxes.

This chapter describes how to set up and use the Disk Management Utility application to perform logical volume management.

The topics covered in this chapter include:

- understanding logical volume management
- understanding the Disk Management Utility
- setting up the Disk Management Utility
- starting the Disk Management Utility
- using the overview window
- configuring physical volumes, logical volumes, and file systems
- exiting the Disk Management Utility

## Overview of logical volume storage

Logical volume storage provides a transparent method of dividing and allocating storage space on the system's disks. The set of operating-system commands, library subroutines, and other tools that allow you to establish and control logical volume storage is called the Logical Volume Manager (LVM). The Disk Management Utility lets you utilize the LVM through the Macintosh interface on remote Mac OS clients.

Using the LVM, you may combine several physical disks (physical volumes) into a single volume group, which acts like a single large disk. The volume group can then be partitioned into individual logical volumes. Individual logical volumes can be allocated across multiple physical disks.

At the base of the logical volume storage system lies the hard disk drive, or disk. To be used by the operating system, the storage space on a disk must go through a process of configuration. This section describes that process.

For more information about logical volume management, see "Logical Volumes" in the *System Management Guide: Operating System and Devices* available through InfoExplorer.

### Physical volumes

First, the disk must become a physical volume. A *physical volume* is a disk connected to the computer system with certain configuration and identification information. A disk must be designated as a physical volume and put into an available state before it can be assigned a volume group.

The first time you start up the system after connecting a new disk, the operating system detects the disk and examines it to see if it has a unique physical volume identifier (PVID) in its boot record. If it does, the drive is designated as a physical volume with a physical volume name (typically hdisk*x* where *x* is a system-wide unique number). The unique physical volume identifier for a physical volume remains with the associated disk even if the disk is moved to another physical location on the system.

## Volume groups

The disk as physical volume must now become part of a volume group. A *volume group* is a collection of 1 to 32 physical volumes, possibly of varying size and type. When you install AIX, you automatically create the root volume group (`rootvg`).

You create additional volume groups with the New Volume Group command in the Configuration menu in the Disk Management Utility. Other commands from the Configuration menu let you configure and remove volume groups.

Small systems may require only one volume group to contain all the physical volumes attached to the system. On larger systems, the use of multiple volume groups adds storage flexibility. You can create volume groups to separate groups of disks for security, maintenance, or performance reasons.

You can migrate data from one physical volume to another physical volume in the same volume group. This allows you to free the physical volume so it can be removed from the volume group.

Disks that are not considered physical volumes (disks without physical volume identifiers) cannot be added to volume groups. Some examples of devices that cannot be physical volumes include floppy disks, CD-ROM discs, and all types of network-attached devices.

## Logical volumes

After you create a volume group, you can create logical volumes within that volume group. A *logical volume* is a collection of logical partitions that are grouped as a single storage entity. Logical volumes can be used for storage or as the base for a file system. (Logical partitions and file systems are discussed in the following sections.)

When you install the operating system, you automatically create one volume group (the root volume group) consisting of a base set of logical volumes required to start the system plus any other volume groups you specify. The root volume group contains such things as paging space, the journal log, boot data, and root file system, each in its own separate logical volume.

The maximum number of user-defined logical volumes per volume group is 255, but the actual limit is determined by the total size of the combined physical volumes assigned to the volume group.

Logical volumes can also be copied, removed, and have the number of copies they maintain increased or decreased (mirrored copies). They can also be relocated through a reorganization of their volume groups. However, there are some restrictions concerning the use of copied logical volumes. For example, a primary dump device cannot be a copied logical volume. Any dumps attempted to a copied logical volume will fail, and no error message will be displayed.

When you create a logical volume, you can choose to create a striped logical volume. A *striped logical volume* evenly allocates data on each disk that you specify. For example, if you had three hard disks to use for a striped file system, each hard disk would have the same number of blocks of data. When you create a striped logical volume, you need to ensure that the size of the logical volume is evenly divisible by the partition size to ensure that the data can be stored equally. You need more than one hard disk to create a striped file system.

## Logical partitions

When you create a logical volume, you specify the number of logical partitions for the logical volume. A *logical partition* is one, two, or three physical partitions, depending on the number of copies you specify for the logical volume. Specifying one copy means there is only the original copy of the logical volume. Therefore, if you specify only one copy of the logical volume, there is a direct mapping of logical partitions to physical partitions.

### Mirroring

The ability to specify more than one copy of the logical volume data through logical partitions is called *mirroring*. Mirroring decreases data access time by allowing the LVM to choose which copy (physical partition) of the data can be accessed first. Mirroring increases data availability and helps you recover data after a system error.

### File systems

The final step in the evolution of a disk is the creation of file systems. You can create one file system per logical volume.

### The advantages of logical storage

As described in the previous sections, the LVM controls disk resources by mapping data between logical and physical storage. This section explains some aspects of logical volume storage that may not be readily apparent from the previous discussion.

To put it simply, physical storage specifies where the data resides on the disk itself. Logical storage controls what data is presented to the user. Data in a file system appears to be contiguous to the user, but can be located on disk partitions that are not side by side (contiguous) on the disk and might not be on the same disk. Logical storage makes it easy to expand the file system as needed and to make copies of it on other disks to protect against disk failure. These features provide you with increased availability of data and flexible management of the disk subsystem.

Logical storage is mapped to physical storage when the LVM references data represented in the logical partition. The data is stored in either one, two, or three physical partitions. A logical volume can span physical volumes because it is composed of logical partitions allocated onto physical partitions within the volume group.

Any available physical volume attached to the system can be grouped into a volume group. The user sees each volume group as a set of one or more logical volumes. The operating system uses separate logical volumes for specific purposes, such as page space, file systems, journal log, boot data, or dump storage.

Because a logical volume is just a collection of one or more physical partitions within a volume group, the location, number of copies, and size of the logical volume can be easily changed after the logical volume is created.

Through mirroring, you can keep copies of the user data and file-system superblock data on different physical volumes (optionally on a different adapter), providing up-to-the-last-second protection against hardware failure.

*Note:* While mirroring improves storage system availability, it is not intended as a substitute for conventional tape backup arrangements.

## Overview of the Disk Management Utility

The Disk Management Utility provides access to storage management on systems running the AIX operating system. Users manage disk storage through menus and by clicking and dragging icons that correspond to storage objects on an AIX server. The Disk Management Utility lets you

- configure, group, ungroup, and format physical volumes

- create, rename, and remove volume groups

- create, rename, and remove logical volumes and file systems

The Disk Management Utility consists of a Mac OS application and an AIX daemon process. The two components communicate by exchanging Apple events.

You start the Disk Management Utility by starting the Disk Management Utility Macintosh component from the Finder of a remote Mac OS client.

## Setting up the Disk Management Utility

Follow these steps to set up the Disk Management Utility.

**1    Install and activate AppleTalk on the server.**

For information about setting up AppleTalk, see Chapter 7, "Setting Up AppleTalk and AppleTalk Services."

**2    Start the PPC daemon on the server.**

For information about starting the PPC daemon, see Chapter 7, "Setting Up AppleTalk and AppleTalk Services."

**3    Run the AppleTalk services program on the remote Mac OS client and ensure you install the Disk Management Utility and Network Server Passwd Tool.**

Use the *Mac OS Utilities for the Network Server With AIX* disk provided with AIX to install the Disk Management Utility. For complete installation instructions, see "Installing Mac OS Utilities on a Mac OS Client" in Chapter 2, "Installing AIX on Your Network Server."

**4    Ensure that you have an account on the server.**

You can log on as Guest if you do not have an account, but you cannot make changes to the file system structure.

Once you have satisfied these requirements, you are ready to use the Disk Management Utility.

## Starting the Disk Management Utility

To start the Disk Management Utility:

**1    On the remote Mac OS client, double-click the Disk Management Utility icon.**



Disk Management Utility

The "Select a UNIX server" dialog box appears.
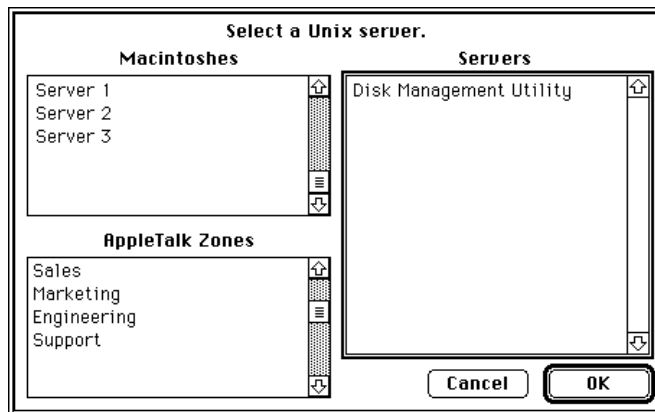


**2    Select connection options.**

In the AppleTalk Zones box, click the zone of the server you want. If you do not have zones configured for your network, the dialog box does not have an AppleTalk Zones box and you do not need to specify a zone.

In the Macintoshes box, click the name of the server that you want to connect to.

In the Servers box, click Disk Management Utility.

**3** **Click OK.**

A user authorization dialog box appears.



**4** **Type your user name and password.**

To manipulate file systems, you must log in as the root user or be specified as a privileged user in the PPCD configuration file (see Chapter 7, "Setting Up AppleTalk and AppleTalk Services" for more information).

If you do not log in as root or a privileged user, you can only view the structure of your file system management.

You can select the Guest button to log in to the server with read-only access.

**5** **Click OK.**

The Disk Management Utility overview window appears and displays your physical volumes, volume groups, and file systems.

```
╔═══════════════════════════ Server 1 ═══════════════════════════╗
                               Select View: [⊡] [▭] [▱] [◲]

Physical Volumes      Volume Groups         Logical Volumes/File Systems
  ▭ hdisk4        1908MB
  ▭ hdisk1        4296MB ┐                          ▱ loglv02        8MB
                         ├ ▱ datavg    5320MB ┤
  ▭ hdisk2        1024MB ┘                          ▱ /data2         –
                                                    ▱ loglv00        4MB
  ▭ hdisk3         404MB — ▱ localvg    404MB ┤     ▱ /local       401MB
                                                    ▱ /FTP           8MB
                                                    ▱ /              8MB
                                                    ▱ /home          4MB
                                                    ▱ /usr         520MB
  ▭ hdisk0        2148MB — ▱ rootvg    2148MB ┤     ▱ /tmp          12MB
                                                    ▱ hd5            4MB
                                                    ▱ hd6           92MB
                                                    ▱ hd8            4MB
                                                    ▱ /var           4MB
```
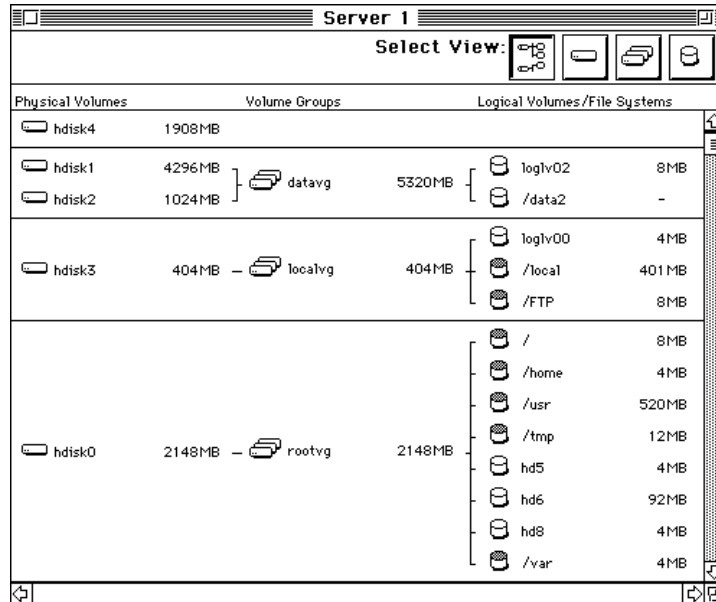
## Using the overview window

When you start the Disk Management Utility, you see an overview window that displays an overview of physical volumes, volume groups, and file systems for your system.
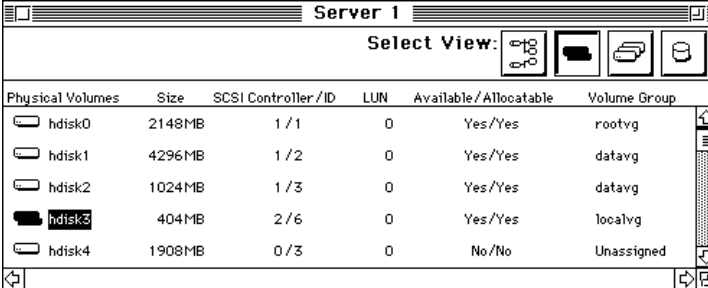
Unassigned physical volumes in this overview window may be manipulated directly by clicking and dragging them with the mouse. You can also use menu commands to perform many tasks. By manipulating objects in this window, you can change the relationships of physical volumes, volume groups, and file systems. For example, you can add an unassigned physical volume to a volume group. You select a physical volume icon and, while holding the mouse button down, drag it to any of the volume group or file system icons. Dragging a physical volume onto a volume group icon adds that physical volume to the volume group.

In the overview window, you can choose to view specific types of components. You can click the buttons in the upper-right corner of the window to change the contents of the overview window to view physical volumes, volume groups, and logical volumes.

*Note:* You can only drag physical volume icons in the overview window. When viewing only physical volumes, volume groups, and logical volumes, you must use menu commands to perform actions.

## Working with physical volumes

You can view physical volumes in the overview window, or you can click the physical volume view icon and see a list of physical volumes, as in the following example.



In this view, you can double-click a physical volume icon to display a configuration dialog box, but you cannot drag icons as you can in the overview window.

## Configuring physical volumes

To configure a physical volume:

■ **Double-click the physical volume icon in the overview window.**

A Physical Volume dialog box appears.
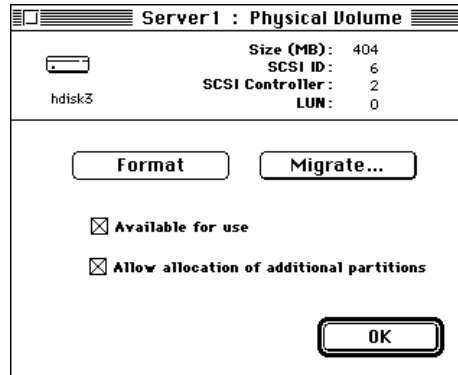


You can also open this dialog box by selecting a physical volume icon in the overview window and choosing Configure from the Configuration menu.

Use this dialog box to make the physical volume available or unavailable for use by the system, allow or disallow allocation of partitions from this physical volume, and perform a low-level format of the physical volume.

*Note:* Only unassigned physical volumes can be formatted. If you select an assigned physical volume, the Format button is unavailable.

You can use the Migrate button in this dialog box to transfer data to other disks in the same volume group. You need to migrate data to clear a disk before you can remove it from a volume group.

By default, physical volumes are available for use, and allocation of partitions is allowed. You rarely need to change these defaults. However, there are occasions when you may need to. For example, when removing a physical volume from a volume group that is in use by the system, you first need to disallow allocation of partitions from that physical volume. Next, you would migrate all data from the physical volume and then you would remove the physical volume from the volume group.

On a rare occasion, you might need to perform a low-level format on an unassigned physical volume. This could be required because you want to "wipe clean" all data from the disk, or perhaps the disk has developed questionable data blocks and you want to use the format process to find the bad blocks and remap them. In any case, if you choose the Format button, the following alert box appears.

```
 /!\   Formatting will erase the disk at SCSI ID "3", LUN "0",
       on SCSI Controller "0". Do you really want to format this
       device?


                          [ Cancel ]    [[  OK  ]]
```
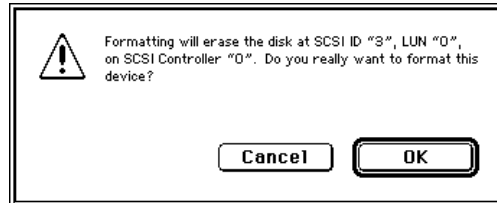
This alert box indicates the name of the physical volume as well as the SCSI device and bus identification numbers. Click Format to confirm this operation. If you click Cancel, you return to the original window without making any changes.

## Grouping physical volumes

In the overview window, you can drag a physical volume icon onto a volume group icon to add it to the group, and you can drag a physical volume onto a file system icon to add the physical volume to the volume group of the file system. If you drag a physical volume to the volume group, the additional space it brings to the volume group is allocated as free space on the volume group. If you drag a physical volume to a file system, the additional space it brings is allocated to the file system, increasing its size by that amount.

# Working with volume groups

You can view volume groups in the overview window, or you can click the volume group view icon and see a list of volume groups, as in the following example.

| | Name | Size | Kind | Type | Status |
|---|---|---|---|---|---|
| ▷ | datavg | 5320MB | Volume Group | – | active |
| ▽ | localvg | 404MB | Volume Group | – | active |
| | hdisk3 | 404MB | Physi‹ | | available – allocatable |
| | loglv00 | 4MB | Logical Volume | jfslog | Read-Write |
| | /local | 401MB | File System | jfs | mounted Read-Write |
| | /FTP | 8MB | File System | jfs | mounted Read-Only |
| ▷ | rootvg | 2148MB | Volume Group | – | active |
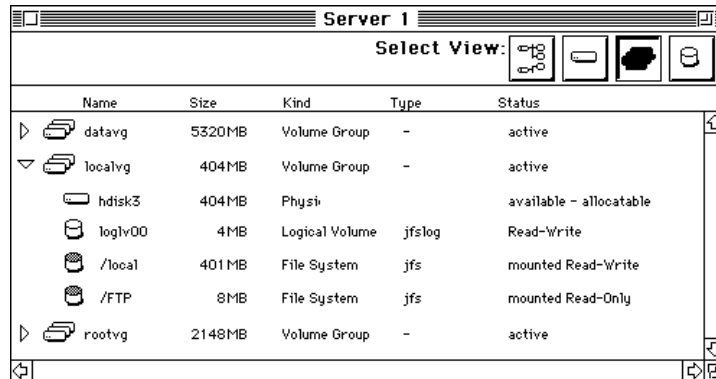
In this view, you can double-click a volume group icon to display a configuration dialog box, but you cannot drag icons as you can in the overview window. Each volume group icon is preceded by a triangle. If you click the right-pointing triangle, it rotates downward, and the physical and logical volume elements associated with the volume group are displayed.

## Creating new volume groups

Use the New Volume Group command in the Configuration menu to create new volume groups. To use this command, you must be connected to a Network Server and have unassigned physical volumes. When you use this command, a dialog box similar to this one appears.
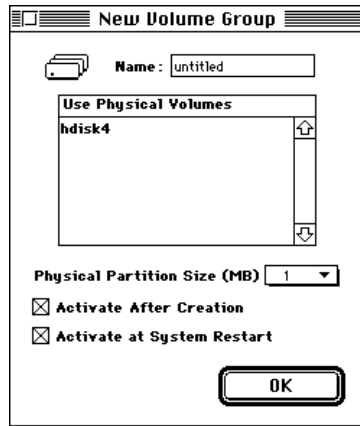
For each volume group you create, you must provide a name. You can also specify the size of the physical partitions, when to make the volume group active, and the disks to use.

## Configuring a volume group

To configure a volume group:

■   **Double-click the volume group icon in the overview window.**

A Volume Group dialog box appears.
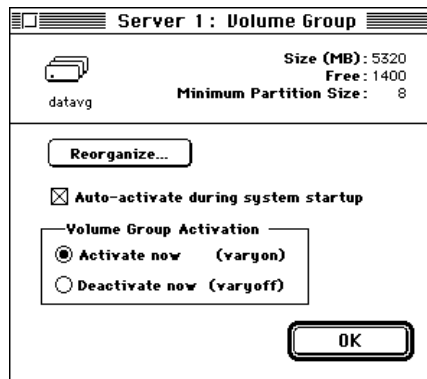


You can also open this dialog box by selecting a volume group icon in the overview window and choosing Configure from the Configuration menu.

Use this dialog box to set the volume group for activation each time the system starts, activate the volume group, deactivate the volume group, and reorganize the volume group.

When you activate a volume group, you make it usable by the operating system, and when you deactivate a volume group, you make that volume group unusable by the operating system.

Volume group reorganization relocates logical volumes and their data on the volume group. This is done by changing the desired location on the volume group that a logical volume occupies.

You usually change the position of a logical volume before reorganizing the volume group. This type of change is done in the dialog boxes that correspond to logical volumes and file systems (see the next section "Working With File Systems and Logical Volumes").

For reorganization, you select one of three location values: center, middle, and edge. These locations specify where the logical volume will reside on the hard disk—near the center, midway between the center and the edge, or near the edge of the disk. Volumes near the center of the disk can be accessed faster. Large and heavily used file systems, such as `/`, `/usr`, and `/home` are candidates for center. Small and seldom-used logical volumes that contain file systems like `boot` and `sysdump` are good candidates for edge. Set logical volumes with file systems of moderate size and activity to middle.

Additionally, a flag for each logical volume indicates if the logical volume can be relocated. This flag must be set in order for volume group reorganization to have any effect on that logical volume.
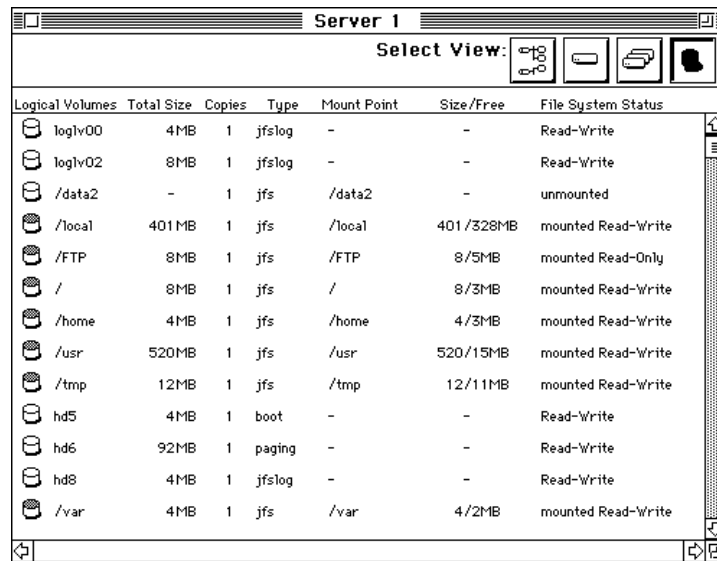
When you click Reorganize, an alert box appears.
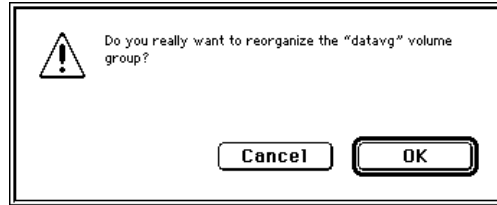


Click Cancel to stop the reorganization process without changing the volume group or any of its logical volumes. Click OK to start the reorganization process. The reorganization process can take a long time and cannot be stopped once it begins.

## Working with file systems and logical volumes

You can view file systems and logical volumes in the overview window, or you can click the view icon for file systems and logical volumes and see a list of file systems and logical volumes, as in the following example.

In this view, you can double-click icons for file systems and logical volumes to display a configuration dialog box, but you cannot drag icons as you can in the overview window.

In the Disk Management Utility overview window, logical volumes have the following types of icons and information.

| Logical volume | Size | Meaning |
| --- | --- | --- |
| loglv00 | 4MB | The logical volume is without an associated file system. The size of the logical volume appears after the icon. On systems with a color display, the top of this icon is gray. |
| /FTP | 8MB | The logical volume has a mounted file system. The size of the file system appears after this icon. On systems with a color display, the top of this icon is green. |
| /data2 | - | The logical volume is associated with a file system that is not mounted. On systems with a color display, the top of this icon is orange. |

## Creating new file systems

Use the New File System command in the Configuration menu to create new file systems. To use this command, you must be connected to a Network Server and you must select a volume group for the file system. When you use this command, Disk Management Utility displays a New File System dialog box.

For each file system you create, you must specify a volume group, a mount point, a size, and a type. The type can be any of the following:

■ JFS. Journaled File System, the standard file system for AIX.

■ Raw. Use this type of logical volume for application-specific file systems such as databases.

■ Paging. This type of logical volume frees memory by rotating tasks in memory.

■ Boot. This is a special type of logical volume used for starting the Network Server.

■ Sysdump. This type of logical volume is used to store data during a system failure.

**New File System**

Volume Group: datavg
Mount Point: /untitled
Size (MB): 8    (1400MB Available)
Type: jfs

**jfs Settings**
Fragment Size: 4096
Bytes per Inode: 4096
☐ Automatic Data Compression
☒ Auto-Mount at System Startup
☒ Mount Now

**Striping Policy**
☒ Striped
Stripe Size: 64K

**Use Physical Volumes**
hdisk1
hdisk2

OK
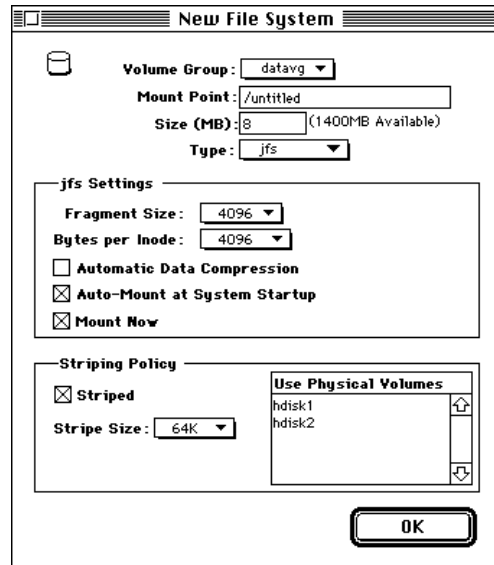
- JFSlog. Each volume group has one JFSlog file system. This logical volume tracks system actions. This logical volume is created automatically when you create the first JFS file system on a volume group.

You may also specify settings for the JFS file system such as fragment size and bytes per inode. The fragment size is the smallest unit of disk space that can be allocated to a file. If your file system won't change often, use a smaller fragment size for more efficient storage. If you have an active file system, use a larger number so a file can be stored all in one area of memory. You also need to determine the bytes per inode. This number can limit the size of your file system. If you choose a large number, you reduce the number of inodes available. If you use all of your inodes, you may not be able to use all of your disk space.

You can also use the New File System dialog box to create a striped logical volume or file system. A striped logical volume evenly allocates across several hard disks. If you choose to create a striped file system, you need to ensure that the size of the file system is evenly divisible by the number of disks and the physical partition size so each disk can have the same amount of data. For a striped file system, you also need to have more than one physical volume in the volume group.

## Configuring logical volumes and file systems

To configure a logical volume:

■ **Double-click a logical volume icon in the overview window.**

If the logical volume has a file system associated with it, a dialog box similar to this one appears.
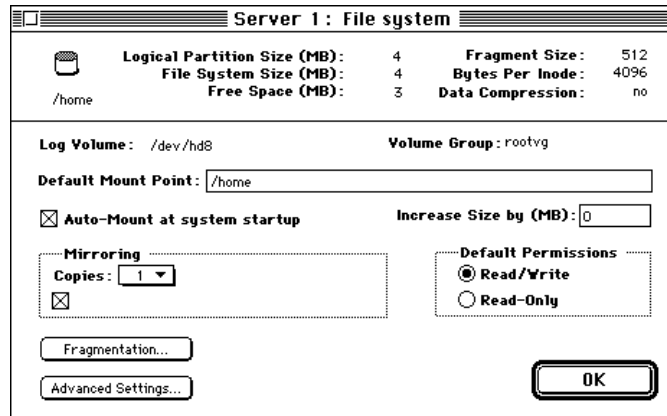


You can also open this dialog box by selecting a logical volume icon in the overview window and choosing Configure from the Configuration menu.

You can use this dialog box to

■ examine information about the logical volume, such as size, amount of free space, name of volume group, and size of logical partitions

■ change the mount point of the file system

■ increase the size of the file system (in multiples of the physical partition size)

■ set the file system to be automatically mounted at system startup

■ set read and write permissions for the file system

■ set mirroring characteristics for the file system

■ display a dialog box to configure attributes for logical volumes (by clicking the Advanced Settings button)

When you have made your selections, click OK.

If you click the Advanced Settings button or if you double-click a logical volume that does not have a file system associated with it, the following dialog box appears.
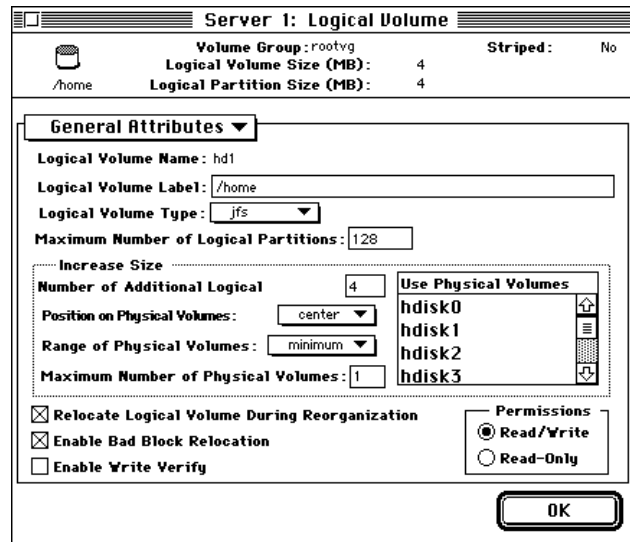


This dialog box contains information about the logical volume and many configuration options.

For the configuration section, you can choose from the pop-up menu either General Attributes or Allocation Policy to change the related settings. The dialog box displays the General Attributes settings.

When you choose Allocation Policy, the dialog box looks like this.

```
┌──────────────────────────────────────────────────────────────┐
│▣□═════════════ Server 1: Logical Volume ═══════════════════│
│   ╔═╗          Volume Group: rootvg          Striped:    No   │
│   ╚═╝          Logical Volume Size (MB):   4                  │
│  /home         Logical Partition Size (MB): 4                 │
│ ┌──────────────────────┐                                     │
│ │ Allocation Policy  ▼ ├─                                     │
│ ┌┴──────────────────────────────────────────────────────────┐│
│ │ ┌─Mirroring ─────────────────────────────────────────────┐ ││
│ │ │                              ┌────────────────────────┐ │ ││
│ │ │              Copies: │ 2 ▼ │ │Use physical volumes    │ │ ││
│ │ │   Scheduling Policy: │parallel ▼│ hdisk0            ⬆ │ │ ││
│ │ │                                  │ hdisk1              │ │ ││
│ │ │                                  │ hdisk2              │ │ ││
│ │ │  ⊠ Mirror Write Consistency Checks│ hdisk3             │ │ ││
│ │ │  ⊠ Copies on Separate Physical Volumes│ hdisk7        ⬇ │ │ ││
│ │ │                                  └────────────────────┘ │ ││
│ │ └────────────────────────────────────────────────────────┘ ││
│ │                                                            ││
│ │     Position on Physical Volumes: │ center  ▼ │            ││
│ │      Range of Physical Volumes: │ minimum ▼ │              ││
│ │   Maximum Number of Physical Volumes: │32│                 ││
│ │                                          ┌────────────┐    ││
│ │                                          │     OK     │    ││
│ │                                          └────────────┘    ││
│ └────────────────────────────────────────────────────────────┘│
└──────────────────────────────────────────────────────────────┘
```

You may then configure the attributes of the logical volume that pertain to the allocation policies.

By default, logical volumes are not mirrored, so the operating system keeps one copy of the logical volume on the disk. You can change this setting so that the operating system keeps two or three copies of the logical volume on disk. If copies span physical volumes, you can specify that copy updates be done in parallel or sequentially. You can also specify that whenever multiple copies are being kept, the operating system must perform write consistency checks and keep each copy on a separate volume. You can also specify the physical volumes that the logical volume should mirror.

General allocation attributes of the logical volume the user may alter include

■ where the logical volume should reside on each physical volume

■ whether the operating system should perform allocations across the minimum or maximum number of physical volumes possible

■ the maximum number of physical volumes the operating system should use when allocating space for the logical volume

When you have made your changes, click OK.

# 9 Remote Access With CommandShell

This chapter describes how to use CommandShell to interact with AIX.

The CommandShell application lets you log in to AIX from a Mac OS client over an AppleTalk network. CommandShell provides a VT100-compatible terminal emulation environment to run AIX commands. With CommandShell, you can open more than one window to run commands.

This chapter describes how to set up and use the CommandShell application to perform remote system administration using a command line and traditional UNIX commands.

The topics covered in this chapter include:

- overview of CommandShell
- setting up CommandShell
- using CommandShell windows
- customizing CommandShell windows
- using Mac OS editing tools in a CommandShell window
- exiting CommandShell

## Overview of CommandShell

CommandShell is an application provided by Apple Computer to let you communicate with a Network Server running AIX from a remote Mac OS client. From the Mac OS client, you can send commands to the AIX system to perform such tasks as system administration and troubleshooting.

The CommandShell application consists of a Mac OS client component and an AIX server component. These components exchange information through Apple events and let you run commands on the AIX server from a remote Mac OS system.

From CommandShell, you can run any standard AIX administration command, such as `smit` or `info -a`.

## Setting up CommandShell

To use CommandShell with AIX, you must complete the following steps.

1   **Install and activate AppleTalk on the server.**

For information about setting up AppleTalk, see Chapter 7, "Setting Up AppleTalk and AppleTalk Services."

2   **Start the PPC daemon on the server.**

3   **Run the AppleTalk Services program on the remote Mac OS client, and ensure that you install CommandShell, CommandShell VT102, and Network Server Passwd Tool .**

Use the *Mac OS Utilities for the Network Server With AIX* disk provided with AIX to install CommandShell. For complete installation instructions, see "Installing Mac OS Utilities on a Mac OS Client" in Chapter 2, "Installing AIX on Your Network Server."

4   **Ensure that you have an account on the server.**

Once you have satisfied these requirements, you are ready to use the CommandShell application.

# Starting CommandShell

To start a CommandShell session:

**1 On the remote Mac OS client, double-click the CommandShell icon.**



CommandShell

The menu bar changes to display the CommandShell menu and the "Select a CommandShell Server" dialog box appears.
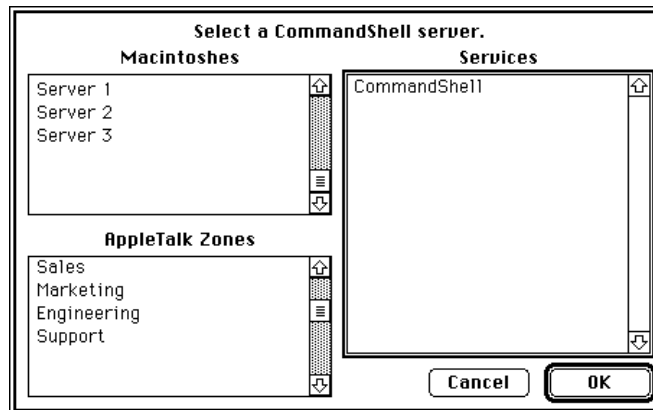


**2 Select connection options.**

In the AppleTalk Zones box, click the zone of the server you want. If you do not have zones configured for your network, the dialog box does not have an AppleTalk Zones box and you do not need to specify a zone.

In the Macintoshes box, click the name of the server that you want to connect to.

In the Services box, select the CommandShell application.

**3**  **Click OK.**

A user authorization dialog box appears.



**4**  **Type your user name and password.**

**5**  **Click OK.**

A window for CommandShell appears.
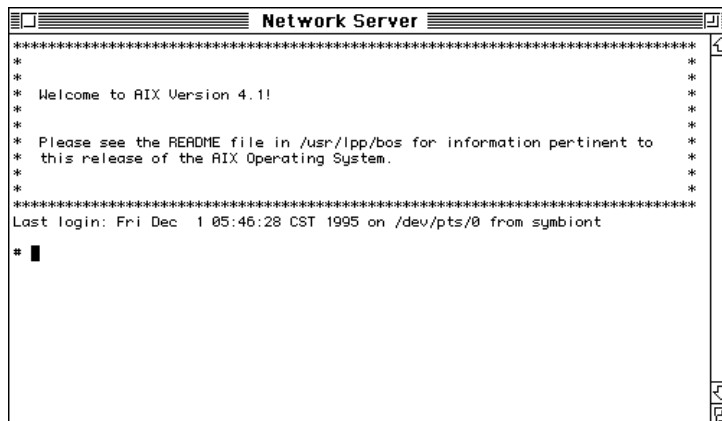
# Using CommandShell windows

The following sections describe how to use the windows in CommandShell.

## Displaying CommandShell windows

When you create a CommandShell connection, a window appears. You can display additional windows by

- choosing New Connection from the File menu
- pressing Command-N

The windows are numbered in the order in which they are created.

## Arranging CommandShell windows

There are three ways to arrange CommandShell windows on the screen. Use the Window menu to choose window options.

- Standard position. When you create a new window, it appears in front of and slightly below the previously created window.

- Tiled. You can tile the windows to arrange them alongside each other with their edges touching. Tiling windows reduces the size of the windows so they fit on the screen. You can tile windows horizontally and vertically.

- Resizing and dragging. You can arrange CommandShell windows by using their resize boxes and by clicking on their title bars to drag the windows to new locations on the desktop.

### Recording the contents of a window

As new lines are added to a CommandShell window, the top lines may scroll past the top edge of the window. CommandShell automatically records a preset number of these lines. This allows you to view them by scrolling upward. By default, CommandShell records 300 lines.

CommandShell does not save any lines after you close a window. If you are working with text that you don't want to lose, save the information to a file.

You can stop CommandShell from recording the top line of the active window by choosing the Don't Record Lines Off Top command from the Commands menu.

If you want to erase lines that have been recorded, choose the Clear Lines Off Top command from the Commands menu. This command operates on the active window only.

### Saving a CommandShell connection

You can save all of your current connections with the Save Connections command from the File menu. This command saves all of your current connections in a file. You can open this document to restore your connections.

### Closing a CommandShell window

There are three ways to close a window:

- Choose Close from the File menu.
- Press Command-W.
- Click the close box of the window.

*Note:* Before you can close a window, it must be the active window.

If you close a window in which a process or program is running, the process stops. An alert box warns you of this and gives you the option of keeping the window open.

# Customizing CommandShell windows

If you use CommandShell windows often, you may find it convenient to establish an ideal arrangement of windows so they are always set up the way that you want.

## Presetting window defaults

The Active Window Settings command in the Preferences menu lets you

- specify window position
- save an initial command to execute on login
- change the title of the window
- change the number of lines to record
- select terminal settings

## Presetting the appearance of new windows

You can change the default settings that control the appearance of new windows before you create them.

- **Choose New Window Settings from the Preferences menu.**

The New Window Settings dialog box appears.

```
              New Window Settings

Window Title Prefix:  [CommandShell            ]

              [ Use Active Window Settings ]

Window Cascade Origin:     Window Size:
            Top:  [40]         Rows:  [24]
           Left:  [2]       Columns:  [80]

Font: [ VT100 ]   Size:  [ 9 ]

Maximum number of lines recorded off top:  [300]

[ Terminal Settings... ]      [ Cancel ]  [ OK ]
```

You can decide to extend the active window settings to all new windows by selecting Use Active Window Settings.

This dialog box also allows you to preset the window size, the screen font, and the maximum number of lines to save.

### Using Mac OS editing tools in CommandShell windows

You can use standard Mac OS editing tools such as copy and paste while working in CommandShell windows. These commands allow you to paste a series of commands or a long, complex command into another window without having to retype it. When you press Return, AIX runs the pasted command.

## Exiting CommandShell

To exit CommandShell:

■ **Choose Quit from the File menu.**

# 10 Troubleshooting

This chapter describes how to solve problems that you may encounter when using AIX. This chapter is not a complete troubleshooting reference. This chapter provides information to help you when you cannot get to InfoExplorer to examine the complete list of error messages, LCD display codes, and problem-solving suggestions.

The topics covered in this chapter include

- starting your Network Server from maintenance mode and displaying a prompt to examine your root volume group

- correcting an unresponsive system

- responding to error messages during installation, both three-digit error codes on the LCD display and text messages on your screen

For information about solving problems related to your hardware, refer to *Setting Up Your Network Server*.

The *AIX Version 4.1 Messages Guide and Reference* includes reference and recovery information for seven-digit error messages and three-digit error codes in the LCD display. You can access this guide through InfoExplorer.

# Booting from maintenance mode

If you cannot start your Network Server from your hard disk, you can access system information from maintenance mode.

To use maintenance mode to examine and restore information:

**1  Insert the Installation CD or a bootable backup tape.**

**2  Shut down the Network Server.**

Enter the command `shutdown -F`.

**3  Turn the front key switch to the left (service) position.**

**4  Turn on your Network Server.**

The computer starts from the CD or backup tape.

A message appears asking you to define the system console.

**5  Press F1 and then the Enter key to use the local display as your console.**

You need an extended keyboard to identify your console unless you are installing with a terminal connected to the modem port.

**6  When prompted, select  a language for installation instructions.**

For English, type `1` and press Enter.

The following message appears on your screen.

```
Welcome to the Base Operating System
Installation and Maintenance


Type the number of your choice and press Enter.
Choice is indicated by >>>.


     1    Start install now with default settings
     2    Change/show installation settings and install
>>>  3    Start maintenance mode for system recovery


     88   HELP ?
     99   PREVIOUS MENU
```

**7**   **Type 3 and press Enter.**

A menu appears that lists options for system maintenance.

```
          Maintenance


Type the number of your choice and press Enter.
Choice is indicated by >>>.


>>>  1     Access a Root Volume Group
     2     Copy a System Dump to Removable Media
     3     Access Advanced Maintenance Functions
     4     Install from a System Backup


     88    HELP ?
     99    PREVIOUS MENU
```

**8**   **Type 1 and press Enter.**

The choice indicated by 1 lets you access a root volume group.

When you choose 1, the system warns you that you might overwrite existing information and then lists the available volume groups.

**9**   **Type the number of the volume group that you want to examine and press Enter.**

A menu appears that lists the file systems on this volume group.

**10**  **Type the number of the file system that you want to mount and examine and press Enter.**

Your system lists options for mounting the file system.

**11**  **Choose Mount File System and Start Shell.**

Your system mounts the file system and provides a shell for you to enter UNIX commands. You can use UNIX commands in this shell to examine the file system for problems and restore corrupted information.

## Correcting an unresponsive system

A hardware or software problem can make your Network Server unresponsive. The suggestions in this section might help you correct the problem and restart your Network Server. If your Network Server is still unresponsive, refer to *Setting Up the Network Server*.

For an unresponsive system, first check your hardware.

■ Verify that the power light is on.

  If not, see the hardware guide.

■ Check for a three-digit code on the LCD panel on the front of your Network Server.

  If the display is not blank, look up the three-digit code in the next section, "System Error Messages."

■ Ensure your cable connections are securely attached.

■ Ensure that your terminal is on and the brightness is properly adjusted.

If your Network Server is still unresponsive, check for software problems. Often, a stopped or stalled process may make your Network Server unresponsive.

■ Use Control-D or Control-C to cancel a stalled process.

■ Restart your Network Server.

  Before you restart, ensure the front key is turned to the upright (unlocked) position and the boot device is on. To restart, press the reset button.



Reset button
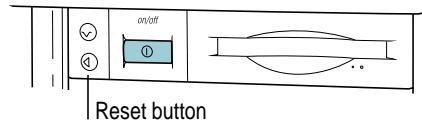
## System error messages

Most error messages you see can be looked up in InfoExplorer. This section lists messages and recommended actions for situations when you cannot access InfoExplorer, such as during installation.

## Three-digit display error codes during system startup

For most problems with the booting process, a three-digit error code appears on the LCD panel on the front of your Network Server. This section lists the possible error codes and recommended action. For the procedures in this section, you must have root privileges.

This section describes the display values for system startup.

The error codes in the following table require you to run a hardware diagnostic program to isolate and correct the problem. This table tells you what device is causing the problem and at what point in the boot cycle.

| Display value | System action |
|---|---|
| 510 | The system has started the Configuration manager. |
| 511 | The Configuration manager has completed. |
| 517 | The system is attempting to mount the `/` (root) and `/usr` file systems. These file systems are of type `bootfs`. If the mount does not successfully complete during a network boot, the system changes the three-digit display value to 518. |
| 585 | The system is configuring the network. |
| 591 | The system is configuring the Logical Volume Manager (LVM). |
| 594 | The system is configuring an asynchronous I/O. |
| 704 | The system is configuring the 2.2 GB 16-bit SCSI disk drive. |
| 723 | The system is configuring an unknown CD-ROM or SCSI device driver. |
| 727 | The system is configuring an asynchronous device. |
| 731 | The system is configuring an unknown PTY. |
| 811 | The system is configuring the processor complex or the standard input/output. |
| 812 | The system is configuring the memory. |
| 814 | The system is configuring the NVRAM. |
| 821 | The system is configuring the standard keyboard adapter. |
| 823 | The system is configuring the standard mouse adapter. |
| 828 | The system is configuring the standard floppy disk adapter. |
| 831 | The system is configuring the serial port 2. |
| 868 | The system is configuring the integrated SCSI adapter. |
| 871 | The system is configuring the graphics subsystem adapter. |
| 921 | The system is configuring a keyboard. |
| 925 | The system is configuring a three-button mouse. |
| 935 | The system is configuring a 3.5-inch diskette drive. |
| 9002 | The system is configuring the 825 SCSI card. |

### Error Code 522

The display value 522 indicates that the `/etc/inittab` file has been incorrectly modified or is damaged and the configuration manager was started from the `/etc/inittab` file with conflicting options. This causes the system to stop.

You can solve this problem by entering maintenance mode and either correcting the damaged file or replacing it with a copy from the installation media or another system.

### Error Code 551

If the boot process halts with a display value of 551, there may be a problem with any of the following.

| Problem | Solution |
| --- | --- |
| `/dev` is missing or corrupted | `mkdir /dev` |
| bad boot logical volume | `bosboot -a` |
| `/etc` problems | restore selective files (if possible) or reinstall |

If these solutions do not correct the problem, try the following command from maintenance mode:

`fsck hdisk`*n*

where *n* is the number of the hard disk that contains the root volume group. The `fsck` command checks file system consistency and repairs the file system.

### Error Code 552

The 552 error code indicates that the Network Server is in an infinite loop. To fix the problem, clean up the file system (using the `fsck` command) and examine the log volume.

To examine the log volume, run the following command at the maintenance mode prompt for the root volume:

`/etc/aix/logform /dev/hd8`

This command reformats your log logical volume. After you run this command, restart your Network Server.

## Error Code 553

If the Network Server stops at display value 553 during the boot process, it may be due to a problem running or reading the `/etc/inittab` file. The `/etc/inittab` file controls the initialization process. This problem occurs when `/tmp` or root (`/`) file systems are full.

To solve this problem:

1 **Boot from maintenance mode and access the root volume group.**

2 **Check for available space on the file system.**

   Use the `df` command to check for space. For example, enter

   ```
   df -l /dev/hdisk0
   ```

3 **Erase files as necessary to get disk space.**

   Often the `/smit.log` and `/smit.script` files cause the problem. Remove them with the following command:

   ```
   rm /smit.log /smit.script
   ```

4 **Examine the `/etc/inittab` file for corruption.**

   The file may be empty or missing or it may have an incorrect entry. You may have to recreate this file or fix an entry.

5 **If the `/etc/inittab` file is not corrupt, look for modification or permissions problems with the following files: `/etc/environment`, `/bin/sh`, `/bin/bsh`, `/etc/fsck`, `/etc/profile`, `/.profile`.**

6 **Return the front key to the upright (unlocked) position and restart your Network Server.**

## Error Code c31 or c32

If the Network Server stops at value c31 or c32, it is trying to locate the system console. The Network Server may not locate the console if the console is defined but not enabled or if the console is a TTY that cannot be reached.

First, look for loose cables. If the cable connections are correct, boot into maintenance mode and enter a shell for the root volume group. Enter the following command to enable the console:

```
chcons -a login=enable /dev/hft/0
```

Restart your Network Server.

## System messages during installation

This section lists the messages that can appear during the installation of AIX. In this section, the messages that appear on your screen are in the Courier font; recommended actions follow the messages.

```
0516-404 allocp: Not enough resources available to fulfill
allocation. Either not enough free partitions or not
enough physical volumes to keep strictness. Try again with
different allocation characteristics.
```

```
0516-788 extendlv: Unable to extend logical volume.
```

```
0503-008 installp: There is not enough free disk space in
file system /usr. An attempt to extend this file system
was unsuccessful. Make more space available, then retry
this operation.
```

These messages indicate that there is not enough space to complete the installation. To solve the problem, do one or more of the following:

- Select fewer file sets than the number originally selected for installation.

- Extend the root volume group to another disk. Enter

  ```
  extendvg rootvg hdiskn
  ```

  where *n* is the number of the specified disk.

- Remove user-defined file systems to free space in the rootvg file system.

  ```
  BOS install: After saving all the data from the previous
  system in /tmp, it was discovered that there will not be
  enough free space in /tmp to make the boot image. Please
  reboot in normal mode and increase the size  of /tmp or
  reduce the number of files to save as listed in the
  /etc/preserve.list file.
  ```

During a preservation install, files listed in `/etc/preserve.list` were copied into `/tmp`. After doing this, there was not enough room in `/tmp` to create the boot image. Reboot your Network Server in normal mode and increase the size of `/tmp` or reduce the number of files to be saved.

```
BOS install: Could not create boot image.
```

The `bosboot` command failed. Check the `/var/adm/ras/devinst.log` file for errors.

```
The following disks failed the preliminary diagnostic
tests: <disk name>.
```

The installation disk failed the diagnostic pretest. Run full diagnostics on the specified disk.

```
image.data file contains no vg_data stanza for rootvg.
The installation cannot continue.
```

```
image.data has invalid logical volume data. Cannot
continue.
```

```
image data has invalid file system data. Cannot
continue.
```

Use the default `image.data` file on the Installation CD.

```
0516-366 putlvodm: Volume group rootvg is locked. Try
again.
```

```
0516-788: extendlv: Unable to extend logical volume.
```

```
0503-008 installp: There is not enough free disk space
in the file system /usr. An attempt to extend this file
system was unsuccessful. Make more space available, then
retry this operation.
```

One of these messages might occur if you have interrupted the installation of your optional software. When you interrupt an installation, the Network Server sometimes locks the root volume group. To unlock the root volume group:

**1**  **Log in as root.**

**2**  **Enter `chvg -u rootvg`.**

**3**  **Enter `smit_install` and attempt to install your optional software again.**

```
installp: An error occurred during bosboot processing.
Please correct the problem and rerun.
```

```
0301-152 bosboot: not enough file space to create:
/tmp/unix.
```

The `bosboot` command is unable to finish because of insufficient space in `/tmp`. Extend the `/tmp` file system (use `smit chfs`), or free some space and restart your Network Server.

```
installp: An error occurred during bosboot processing.
Please correct the problem and rerun.
```

```
301-155 bosboot: Invalid or no boot device specified.
```

An invalid device is specified. The `bosboot` command could not complete because it could not locate the required boot device. To solve the problem, determine if the link to the boot device is missing or incorrect. Correct the error and complete installation.

**1**  **To identify the book disk, enter**

```
lslv -m hd5
```

The Network Server displays the name of the boot disk.

**2**  **Create a link between the boot device indicated and the `/dev/ipldevice` file by entering**

```
ln /dev/boot_device_name /dev/ipldevice
```

An example of the `boot_device_name` is `hdisk0`.

**3** **Rerun or continue the installation.**

```
No disks are available.
```

No hard disks are configured on the Network Server. You can only use the maintenance option of the installation program. You can view the devices file from the maintenance shell by entering the following command:

```
cat /etc/objrepos/devs
```

Turn off your Network Server and examine devices to ensure that all SCSI devices are unique and that SCSI devices are properly terminated. Also, check the physical connections between devices. Then, restart and try the installation again.

If these steps do not work, run diagnostics on your hard disk.

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