

System Guide



Microsoft **WINDOWS NT**

System Guide

Microsoft® Windows NT™

Version 3.1

Microsoft Corporation

Information in this document is subject to change without notice. Companies, names, and data used in examples herein are fictitious unless otherwise noted. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of Microsoft Corporation.

© 1985-1993 Microsoft Corporation. All rights reserved.

Soft-Art Dictionary and Soft-Art Dictionary program: © Copyright 1984-93, Trade Secret, Soft-Art Inc. All rights reserved.

Microsoft, MS, MS-DOS, XENIX, CodeView, and QuickC are registered trademarks and QBasic, Windows, Windows NT, and Win32 are trademarks of Microsoft Corporation in the U.S.A. and other countries.

U.S. Patent No. 4955066

3Com, EtherLink, and EtherLink II are registered trademarks of 3Com Corporation.

Adaptec is a trademark of Adaptec Inc.

ArcNet is a registered trademark of Datapoint Corporation.

Banyan and VINES are registered trademarks of Banyan Systems, Inc.

CompuServe is a registered trademark of CompuServe, Inc.

Corel is a registered trademark of Corel Systems Corporation.

DEC is a registered trademark of Digital Equipment Corporation.

GENic is a trademark of General Electric Corporation.

Hewlett-Packard, LaserJet, HP, and PCL are registered trademarks of Hewlett-Packard Company.

IBM and OS/2 are registered trademarks of International Business Machines Corporation.

Intel is a registered trademark and i386 and i486 are trademarks of Intel Corporation.

Lotus, Lotus Notes, and 1-2-3 are registered trademarks of Lotus Development Corporation.

MIPS is a registered trademark and R4000 is a trademark of MIPS Computer Systems Inc.

Novell and NetWare are registered trademarks of Novell, Inc.

NT is a trademark of Northern Telecom Limited in the USA and other countries.

Olivetti is a registered trademark of Ing. C. Olivetti.

PostScript is a registered trademark of Adobe Systems, Inc.

SCSI is a registered trademark of Security Control Systems, Inc.

SideKick is a registered trademark of Borland International, Inc.

SMC is a registered trademark of Standard Microsystems Corporation.

Tandy is a registered trademark of Tandy Corporation.

TrueType is a registered trademark of Apple Computer, Inc.

Western Digital is a trademark of Western Digital Corporation.

UNIX is a registered trademark of UNIX Systems Laboratories.

Ungermann-Bass is a registered trademark of Ungermann-Bass, Inc.

XyWrite is a registered trademark of XYQUEST, Inc.

Contents

Welcome	xvii
What Is Windows NT?	xviii
Windows NT Compared with Windows for MS-DOS	xix
System Requirements	xx
Finding Information About Windows NT	xxi
Additional Information	xxi
Microsoft Support Services	xxi
Conventions	xxii
Accessibility for People with Disabilities	xxiii
Microsoft Support Services for People Who Are Deaf or Hard-of-hearing	xxiii
Keyboard Layouts for Single-Handed Users	xxiii
Documentation on Audio Cassette and Floppy Disk	xxiv
Customizing Windows NT	xxv
Getting More Information	xxvi
Chapter 1 Introducing Windows NT	1
Starting and Quitting Windows NT	2
Starting Windows NT	2
Logging On to a Domain from a Remote Access Service Workstation	3
Using Windows NT Help	4
Starting and Quitting the Online Demonstration	4
Quitting Windows NT	5
What to Do After Setup	6
Using Windows NT Applications	6
Setting Up Your Personal Working Environment	7
Configuring the Network	8
Browsing Other Computers and Resources on the Network	9
Managing Files and Disks	10
Setting Up to Print	11
Configuring Your System	12
Setting Up User Accounts and Groups	14
Managing Security	15

Chapter 2 Windows NT Basics	17
Selecting Items for Action	18
Managing Windows	19
Starting Applications in Program Manager	19
Moving and Sizing Windows	20
Using Document Windows	21
Choosing Commands in Windows NT	21
Using the Control Menu and Task List	23
Using Help	25
Using Dialog Boxes	27
Responding to Messages	30
Cutting and Copying Information	30
Transferring Information Between Windows-Based Applications	30
Transferring Information Between MS-DOS-Based Applications	31
Copying Screen Images	32
Using the Keyboard	32
Using the Keyboard for Common Actions	33
Keyboard Shortcut Reference	34
Chapter 3 Program Manager	37
Overview	38
Quitting Windows NT Using Program Manager	39
What Are Groups and Program Items?	40
Opening Group Windows and Reducing Them to Icons	41
Arranging Group Windows	41
Arranging Group and Program-Item Icons	42
Saving Program Manager Settings	43
Creating Groups	44
Creating Program Items	45
Deleting Groups and Program Items	48
Changing the Description of a Group	49
Copying a Program Item to Another Group	49
Moving a Program Item to Another Group	50
Changing an Icon	51
Starting an Application from a Group	51
Starting an Application When You Start Windows NT	52
Returning to Program Manager from an Application	52

Chapter 4 File Manager	53
Overview	54
Starting and Quitting File Manager	55
Customizing the Toolbar	55
Working with Directory Windows	56
Opening and Closing Directory Windows	57
Selecting and Arranging Directory Windows and Icons	58
Displaying the Directory Tree or Contents	59
Changing the Font in File Manager	60
Navigating Drives and Directories	61
Changing Disk Drives	61
Changing Directories	62
Expanding and Collapsing the Directory Tree	63
Showing Which Directories Expand	63
Connecting to and Disconnecting from a Network Drive	64
Working with Directory Information	67
Displaying Information on Files	67
Sorting the Contents of a Directory	68
Limiting the Files to Display	69
Working with Files and Directories	70
Naming a File or Directory	70
Selecting Files or Directories	71
Creating a Directory	73
Moving and Copying Files and Directories	74
Deleting a File or Directory	76
Renaming a File or Directory	77
Searching for a File or Directory	77
Associating Files with an Application	78
Starting an Application from File Manager	81
Printing a File from File Manager	82
Turning Off Confirmation Messages	83
Setting File Attributes	83
Viewing a File's Version Information	84
Working with Shared Directories and Files	85
Sharing a Directory	85
Stopping Directory Sharing	87
Changing Share Properties	88
Viewing or Closing Shared Files	89

Securing Directories and Files	90
Setting Directory Permissions	91
Setting File Permissions	94
Setting Special Access Permissions	96
Setting Permissions Through Shared Directories	98
Auditing Files and Directories	100
Adding Users and Groups to Permissions and Auditing Lists	102
Taking Ownership of Files or Directories	104
Maintaining Disks	105
Formatting a Floppy Disk	105
Copying a Floppy Disk	106
Labeling a Disk	107
Chapter 5 Control Panel	109
Overview	110
Changing the Desktop	112
Customizing Desktop Colors	112
Configuring Desktop Appearance	115
Switching Between Applications	119
Working with Screen Savers	119
Setting Serial Port Communications Options	120
Working with Fonts	121
Adding Screen Fonts and TrueType Fonts	122
Removing a Font	124
Working with Date, Time, and International Settings	125
Configuring Date and Time	125
Working with Other International Settings	127
Customizing the Keyboard, Cursor, and Mouse	129
Adjusting the Keyboard Delay and Repeat Rate	129
Adjusting the Cursor Blink Rate	130
Changing the Cursor Appearance	130
Customizing Your Mouse or Other Pointing Device	131
Working with Printers	132
Working with Device Drivers	132
Installing and Configuring Drivers	132
Using Audio and MIDI Sounds in Windows NT	135
Managing Devices	138
Starting and Stopping Devices	138
Configuring Device Startup	139

Defining Options for the Operating System	140
Changing the Environment Variables	141
Changing the Virtual-Memory Paging File	142
Changing Application Response Time	144
Setting Up the Uninterruptible Power Supply	145
Using UPS with Other System Services	148
Testing Your UPS Configuration	149
Configuring the Network	150
Changing the Computer Name	151
Installing Network Adapter Cards	152
Installing Network Software	153
Updating or Removing Network Components	154
Configuring Network Software and Adapter Cards	155
Choosing and Configuring Protocol Software	156
Joining a Workgroup or Domain	157
Joining a Domain from a Remote Access Workstation	159
Configuring Network Bindings	160
Configuring the Remote Procedure Call Service	162
Setting Network Provider Search Order	162
Managing Server Properties	163
Viewing User Sessions	164
Viewing Shared Resources	166
Viewing Resources In Use	168
Managing Directory Replication	169
Managing Administrative Alerts	173
Managing Services	175
Starting and Stopping Services	176
Configuring Service Startup	177
Chapter 6 Print Manager	179
Overview	180
Starting and Quitting Print Manager	181
Installing a Printer	181
Installing a Printer Driver	184
Connecting to a Network Printer	185
Removing a Printer	186
Changing a Printer's Properties	187
Sharing a Printer	188
Setting Printing Options	188
Setting Job Defaults	189

Setting Printer Details	191
Setting Time-outs	195
Securing a Printer	195
Auditing a Printer	198
Taking Ownership of a Printer	200
Using Forms	201
Printing Documents	202
Setting the Default Printer	203
Viewing Documents at the Printer	203
Pausing and Resuming Printing	204
Changing Printing Order	205
Restarting Documents	205
Removing Waiting Documents	205
Displaying or Changing Document Details	206
Administering Network Print Servers Remotely	207
Chapter 7 Mail	209
Overview	210
Starting and Quitting Mail	211
Using Mail	216
Sending a Message	216
Reading a Message	219
Replying to a Message	221
Deleting a Message	222
Advanced Features of Mail	222
Setting Up the Mail System	226
Planning a Workgroup Postoffice	226
Creating a Workgroup Postoffice	228
Managing Your Workgroup Postoffice	232
Starting the Postoffice Manager	232
Adding a User	233
Modifying a User Account	233
Removing a User	234
Managing Disk Space	234
Managing the Mail System Files	236
Restoring a User's Password	237
Using Mail with Other Networks and Other Messaging Systems	238
Using Mail with a NetWare Network	238

Chapter 8 Schedule+	239
Overview	240
Starting and Quitting Schedule+	240
Organizing Your Screen	241
Using the Appointment Book	243
Adding an Appointment	244
Adding a Tentative Appointment	246
Adding a Recurring Appointment	246
Using the Task List	248
Adding a Task to the Task List	248
Scheduling Time in the Appointment Book for a Task	250
Using the Planner to Schedule Meetings	251
Scheduling Attendees	251
Scheduling Resources	253
Using the Messages Window to Schedule Meetings	254
Advanced Features of Schedule+	256
Chapter 9 Command Prompt	259
Overview	260
Starting and Quitting the Command Prompt	260
Changing the Command Prompt Display	261
Getting Help for the Command Prompt	266
Command Prompt Commands	266
Native Commands	267
Subsystem Commands	272
Configuration Commands	273
TCP/IP Utilities and Services	274
Special Purpose Utilities	275
Command Symbols	275
Command Syntax	276
Command Names	277
Parameters	277
Switches	278
Values	278
Using the Command Prompt	279
Starting Programs at the Command Prompt	279
Batch Programs	280
Transferring Information to or from a Command Prompt Window	280
Editing Commands with Doskey and Editing Keys	282
Pausing or Canceling a Command	283

Differences from MS-DOS Commands	283
New Windows NT Commands	283
Changes to MS-DOS Commands	284
Unavailable MS-DOS Commands	285
MS-DOS Version 6.0 Commands	286
Differences from LAN Manager Commands	287
New Windows NT Network Commands	287
Changes to LAN Manager Commands	288
Unavailable LAN Manager Commands	289
Chapter 10 Object Linking and Embedding	291
Overview	292
File Security and Linked Objects	296
Linking or Embedding an Object with Menu Commands	296
Creating a Linked or Embedded Object	297
Linking or Embedding Objects with OLE Applications in Windows NT	298
Using ClipBook Viewer	299
Viewing the Contents of the Clipboard	306
Embedding a Package	306
Maintaining Linked or Embedded Objects	309
Editing an Object	309
Solving Problems with Linked or Embedded Objects	310
Chapter 11 Other Application Environments	313
How Windows NT Runs Applications	314
Supported Applications	314
Windows 3.1 Environment	315
Configuring the Windows 3.1 Environment	315
MS-DOS Environment	316
Configuring the MS-DOS Environment	316
Running Memory-Resident Programs	319
OS/2 Environment	320
Configuring the OS/2 Environment	321
Setting Up and Starting Applications	322
Creating Program Information Files	324
Specifying PIF Options	326
Chapter 12 System Maintenance with Windows NT Setup	337
Starting and Quitting Windows NT Setup	338
Changing System Configuration Settings	338
Setting Up Applications to Run from Program Manager	339

Installing a New Device Driver	341
Obtaining New Device Drivers	341
Setting Up New or Revised Device Drivers	341
Correcting a Faulty Device-Driver Installation	342
Adding and Removing Drivers for SCSI Adapters and Tape Drives	343
Adding and Removing Windows NT Components	343
Deleting User Profiles	345
Repairing Your System	346
Using the Last Known Good Configuration	346
Using the Emergency Repair Disk	347
Chapter 13 User Manager	349
Overview	350
Starting and Quitting User Manager	350
Who Can Use User Manager?	351
Managing User Accounts	351
Built-In User Accounts	352
Adding User Accounts	353
Managing User Account Properties	356
Disabling or Deleting User Accounts	364
Renaming User Accounts	365
Managing Groups	366
Built-In Groups	367
Adding Local Groups	371
Managing Local Group Properties	373
Deleting Groups	374
Managing the Security Policies	374
Managing the Account Policy	374
Managing the User Rights Policy	376
Managing the Audit Policy	379
Chapter 14 Backup	381
Overview	382
Starting and Quitting Backup	382
Selecting Your Hardware	384
Backing Up Disk Files to Tape	385
Choosing Files to Back Up	385
Setting the Tape Options	387
Setting the Backup Set Options	389
Setting the Log Options	390

Checking the Backup Status	391
Using Batch Files to Do Backups	392
Restoring Tape Files to Disk	394
Choosing What You Want to Restore	394
Building Partial Tape and Backup Set Catalogs	396
Setting the Restore Options	397
Setting the Log Options	398
Checking the Restore Status	399
Maintaining Tapes	400
Chapter 15 Event Viewer	401
Overview	402
Starting and Quitting Event Viewer	404
Viewing Event Logs	404
Selecting a Log for Event Viewing	404
Selecting a Computer for Event Viewing	404
Refreshing the View	405
Setting Options for Logging Events	405
Viewing Specific Logged Events	407
Sorting Events	407
Filtering Events	407
Searching for Events	410
Viewing Details About Events	411
Using Archived Log Files	412
Archiving a Log	412
Viewing a Log Archived in Log File Format	413
Using Logs Archived in a Text Format	414
Chapter 16 Disk Administrator	415
Overview	416
Starting and Quitting Disk Administrator	416
Organizing Your Screen	418
Managing Disks	418
Partitioning Disks	419
Creating and Deleting Volume Sets	430
Extending Volumes and Volume Sets	432
Creating and Deleting Stripe Sets	433

Chapter 17 Performance Monitor	435
Overview	436
Starting and Quitting Performance Monitor	436
Organizing Your Screen	439
Monitoring Performance	440
Understanding Objects, Counters, and Instances	442
Working with Information on Current Activity	444
Working with Information from Log Files	448
Charting Current Activity	449
Adding Chart Selections	450
Changing Chart Selections	451
Changing the Chart Options	452
Logging Current Activity	454
Adding to a Log	455
Changing the Log Options	456
Adding Bookmarks	457
Setting Alerts on Current Activity	457
Adding Alert Selections	458
Changing Alert Selections	460
Changing the Alert Options	461
Creating Reports on Current Activity	462
Adding to a Report	463
Changing the Report Option	464
Working with Existing Log Files	465
Charting Input Log Files	467
Setting Alerts on Input Log Files	468
Relogging Input Log Files	469
Reporting Based on Input Log Files	470
Chapter 18 Troubleshooting	471
Hardware Configuration Problems	472
SCSI Drives	472
Network Adapter Cards	473
Video Display Drivers and Adapter Cards	473
Installing Windows NT	473
Installing Using WINNT.EXE	473
Starting Windows NT	474
Starting an Alternate Operating System	476
Logging On	476
Performance Problems	477

Network Problems	477
Duplicate Computer Names	478
Network Adapter Card Settings	478
Services or Subsystems Not Starting	482
Removing an NTFS Partition	482
Chapter 19 Installing Windows NT	483
Things You Need to Know Before Running Setup	484
Starting Setup on an x86-Based Computer	485
Starting Setup on a RISC-Based Computer	487
Choosing Express vs. Custom Setup	487
Preparing the Computer for Windows NT	488
Specifying the Disk Partitions	489
Selecting a File System for the Windows NT Partition	490
Selecting a Directory for Windows NT Files	493
Configuring Windows NT	493
Setting Up a Local Printer	494
Setting Up a Network Adapter Card	494
Joining a Workgroup or Domain	496
Setting Up a Local Account	497
Setting Up Virtual Memory	498
Setting Up Applications to Run from Program Manager	498
Completing Setup and Starting Windows NT	499
Migrating Windows 3.1 Settings	500
Setting Up Windows NT Master Files on a Server	500
Appendix A Network Protocols	503
Overview	504
NetBEUI	504
DLC	505
NWLink	505
What Is NWLink?	505
How Does NWLink Work?	507
Installing and Configuring NWLink	507
Configuring NWLink for Token Ring Networks with Ipxroute	509
TCP/IP	510
What Is TCP/IP for Windows NT?	511
How Does TCP/IP Work?	511
Installing and Configuring Microsoft TCP/IP and SNMP	515
Using the Microsoft FTP Server Service	527

Appendix B Remote Access Service	533
Overview and Planning	533
Features	536
Setting Up the Remote Access Service	537
Allowing Others to Connect to Your Workstation	537
X.25 Support	538
X.25 Configurations	538
Accessing X.25 Through Dial-up PADs	538
Connecting to the X.25 Network Directly	543
Callback	544
Setting Up the Remote Access Server for an X.25 Network	544
Setting Up a Remote Access Client	544
Connecting Through Dial-up PADs	545
Connecting Directly	545
Configuring Remote Access Software for X.25	546
PAD.INF Format	546
Support for Security Hosts and Switches	546
Connecting Through Intermediary Devices	547
Writing Scripts	548
Security Hosts	549
Customizing the Remote Access Server's MODEM.INF File	550
Activating Terminal Mode on the Client	551
ISDN Wide Area Network	552
Installation	552
 Appendix C Limited Warranties	 553
 Glossary	 559
 Index	 573

Welcome

Welcome to the Microsoft® Windows NT™ operating system, the powerful platform for client-server computing. It is the high-end member of the family of Windows™ operating systems—the advanced operating system designed to make the most of today's powerful machines.

Windows NT is a powerful, reliable, and open operating system, ready for the demands of client-server computing and the advancing power of personal computers in the 1990s and beyond.

Incorporating the benefits of the family of Windows operating systems—ease of use, application integration, and choice of leading applications—the Windows NT operating system extends these benefits in a powerful platform for client-server computing.

You can run powerful new 32-bit applications created for Windows NT, which is also compatible with existing environments. So you can run applications created for other versions of Microsoft Windows, MS-DOS®, and character-based MS® OS/2® 1.x as well as POSIX-compliant applications.

The *Windows NT System Guide* is for new and experienced users of Windows NT. This manual describes the features in Windows NT and presents step-by-step procedures for using the applications and tools provided in your product package.

This introduction provides:

- A description of Windows NT, including its benefits and a comparison to Microsoft Windows for MS-DOS.
- The Windows NT system requirements.
- A summary of the resources available for learning and using Windows NT.
- A list of the conventions used in the Windows NT document set.
- Accessibility information for people with disabilities.

What Is Windows NT?

Complex business applications place high demands on computing technology. Windows NT is designed to support these applications with:

- *Power on the desktop* Windows NT is a full 32-bit, preemptive multitasking operating system with a huge capacity to enable power users to fully exploit line-of-business and personal productivity applications as well as the latest generations of microprocessors including Intel® and RISC systems and symmetric multiprocessing systems.
- *Reliability* Windows NT provides the reliability required by MIS professionals and other power users to run line-of-business applications. The advanced microkernel design of Windows NT, along with integrated security and manageability, provide a more reliable platform than other operating systems.
- *Open operating system* Windows NT gives you better access to information throughout the enterprise and flexibility in choosing computing solutions. It has integrated networking and support for industry standard protocols, for easy access to resources in a heterogeneous computing environment.

Windows NT will run existing applications for the MS-DOS and Windows operating systems as well as new 32-bit applications being developed by corporations and independent software vendors. It makes it easy for users to integrate information between applications. Windows NT also gives you flexibility in choosing hardware for your computing needs. It scales to run on single and multiprocessor-based systems and is portable to a variety of hardware platforms based on both Intel and RISC technology.

Windows NT provides networking and workgroup support, with built-in file-sharing and print-sharing capabilities for workgroup computing, and an open network system interface that includes built-in support for NetBEUI, TCP/IP, and other transports. Windows NT is compatible with existing networks such as Banyan® VINES® and Novell® NetWare®.

With Windows NT, you can run a host of applications on both x86 and RISC machines, including the following:

- New, powerful Win32™-based applications (32-bit Windows)
- Programs created for the MS-DOS and Microsoft Windows for MS-DOS operating systems
- MS OS/2 version 1.x character-based programs
- POSIX-compliant programs

Windows NT Compared with Windows for MS-DOS

If you are familiar with versions of the Microsoft Windows operating system that run with MS-DOS, you will quickly understand how to use Windows NT. Windows NT shares these same features:

- Mouse and keyboard techniques for working with windows, menus, and icons
- Desktop tools such as Program Manager, File Manager, and Print Manager
- Accessories, games, and other components, with an extended set in Windows NT
- The complete object linking and embedding (OLE) capabilities supported by applications created for versions of Windows for MS-DOS

Windows NT, however, is a complete operating system with powerful additions to support file and system security, networking capabilities, and high-end, 32-bit computing. Windows NT is designed to take full advantage of the advanced computing capabilities of x86 and RISC processors to provide a platform for advanced line-of-business computing solutions and for applications requiring sophisticated system software.

You will find these additional features in Windows NT:

- Advanced built-in network support, including complete security features.
- Applications in the new Administrative Tools group for managing user accounts, controlling network services, auditing system events, managing and backing up disks, and more.
- Tools in File Manager, Control Panel, and Print Manager for security, hardware configuration, and network management.
- A new file system—the Windows NT file system (NTFS)—that provides security and automatic error-correction capabilities. NTFS allows file and directory names of up to 256 characters.
- A command prompt where you can start programs and batch files, or issue all Windows NT commands and most commands for MS-DOS, MS OS/2, and POSIX.

System Requirements

The following table describes the system requirements for Windows NT.

Category	Requirement
Hardware	32-bit x86-based microprocessor (such as Intel 80386/25 or higher), or supported RISC-based microprocessor such as the MIPS® R4000™ and DEC® Alpha VGA, or higher resolution, video display adapter One or more hard disks, with 75 MB minimum free hard disk space on the partition that will contain the Windows NT system files (92 MB minimum for RISC systems) For x86-based computers, a high-density floppy disk drive For RISC-based computers, a SCSI® CD-ROM drive
Memory	12 MB RAM recommended minimum for x86 systems; 16 MB minimum for RISC systems
Optional components	Mouse or other pointing device One or more SCSI CD-ROM drives (required for RISC-based computers) One or more network adapter cards, if you want to use Windows NT with a network

The Windows NT package supports computers with up to two microprocessors. Support for additional microprocessors is available from original equipment manufacturers.

Finding Information About Windows NT

The *Windows NT System Guide* presents information for both new and experienced users who are installing and using Windows NT. Read this book for a description of the applications and tools provided in your Windows NT package. This manual presents procedures for completing common tasks such as organizing the desktop, managing files and directories, printing, using applications, administering the network, and more.

Your product package also includes README text files that are copied to the \WINNT directory when you install Windows NT. These files contain up-to-date information about specific hardware, printers, and networks. To see this information, choose the Read Me icon in the Main program group.

The following section describes other sources of information for learning and using Windows NT.

Additional Information

Three other key sources of information included in the Windows NT package will help you plan for and use Windows NT:

Online demonstration

Covers the basics of Windows NT. View it at the conclusion of Windows NT Setup, or at any time by choosing the Introducing Windows NT icon in the Main program group.

Online Help

Always available when you press F1 while working in Windows NT. Or at the command prompt, type **help** or **net help** and then press ENTER.

Windows NT messages database



This database is provided on the Setup CD-ROM disk. It contains explanations of error and system information messages. For instructions on using the database, choose the Read Me icon in the Main program group.

Microsoft Support Services

Microsoft offers a variety of support options to help you get the most from your Microsoft product. For information on these options, refer to the *Guide to Service and Support* included in your Microsoft Windows NT package.

Conventions

The following conventional terms, text formats, and symbols are used throughout the printed documentation for Microsoft Windows NT.

Convention	Meaning
Bold	Indicates the actual commands, words, or characters that you type in a dialog box or at the command prompt.
<i>Italic</i>	Indicates a placeholder for information or parameters that you must provide. For example, if the procedure asks you to type <i>filename</i> , you must type the actual name of a file. Italic also indicates new terms and the titles of other books.
ALL UPPERCASE	Indicates a directory, filename, or acronym. You can use lowercase letters when you type directory or filenames in a dialog box or at the command prompt, unless otherwise indicated for a specific application or utility.
Monospace	Represents examples of screen text or entries that you might type at the command line or in initialization files.
▼	Indicates a procedure with sequential steps.
•	Indicates a procedure with only one step.
■	Indicates a list of related information, not procedural steps.
\\WINNT	Refers to the Windows NT system tree. All references to files in the Windows NT operating system assume that you installed Windows NT in this directory.
	Indicates the group membership required for the account used to log on to Windows NT in order to complete the task described.
	Indicates a special note for RISC-based computers.

Guidelines for mouse and keyboard actions are described in Chapter 2, “Windows NT Basics.”

Accessibility for People with Disabilities

Microsoft is committed to making its products and services easier for everyone to use. This section provides information about the following products and services:

- Microsoft support services for people who are deaf or hard-of-hearing
- Keyboard layouts designed for people who type with only one hand or a wand
- Microsoft software documentation on audio cassette and floppy disk
- Hints for customizing Microsoft Windows NT
- Products and services from other organizations

Note The information in this section applies only to Windows NT users in the United States. If you are outside the United States, your Windows NT package contains an information card listing product support telephone numbers and addresses of Microsoft subsidiaries. You can contact your subsidiary to find out whether the type of products and services described in this appendix are available in your area.

Microsoft Support Services for People Who Are Deaf or Hard-of-hearing

Through a TDD/TT (text telephone) service, Microsoft provides people who are deaf or hard-of-hearing with complete access to Microsoft Product Support Services.

You can contact Microsoft Product Support Services using a text telephone by dialing 206-635-4948 between 6:00 A.M. and 6:00 P.M. Pacific time. Microsoft support services are subject to Microsoft prices, terms, and conditions in place at the time the service is used.

Keyboard Layouts for Single-Handed Users

Microsoft supports Dvorak keyboard layouts that make the most frequently typed characters on a keyboard more accessible to people who have difficulty using the standard QWERTY layout. There are three Dvorak layouts: one for two-handed users, one for people who type only with their left hand, and one for people who type only with their right hand. The left- or right-hand keyboard layouts can also be used by people who type with a single finger or a wand. You do not need to purchase any special equipment in order to use these features.

Microsoft Windows NT already supports the Dvorak keyboard layout, which can be useful for coping with or avoiding types of repetitive-motion injuries associated with typing. You can select this layout through the International option in Control Panel.

The two layouts for people who type with only one hand are distributed as Microsoft Application Note GA0650. The Application Note is also contained in the file GA0650.ZIP on most network services or GA0650.EXE on the Microsoft Download Service. If you have a modem, you can download Microsoft Application Notes from network services, including the following:

- CompuServe®
- GENie™
- Microsoft OnLine
- Microsoft Download Service (MSDL), which you can reach by calling 206-936-MSDL (936-6735) any time except between 1:00 A.M. and 2:30 A.M. Pacific time. Use the following communications settings:

For this setting	Specify
Baud rate	1200, 2400, or 9600
Parity	None
Data bits	8
Stop bits	1

- Various user-group bulletin boards (such as the bulletin-board services on the Association of PC User Groups network)

People within the United States who do not have a modem can order disks by calling Microsoft Product Support Services at 206-637-7098 or 206-635-4948 (text telephone).

Documentation on Audio Cassette and Floppy Disk

People who cannot use printed documentation can obtain most of Microsoft's publications from Recording for the Blind, Inc. Recording for the Blind distributes these documents to registered members of their distribution service, either on audio cassette or on floppy disk. Recording for the Blind's collection contains more than 80,000 titles, including Microsoft product documentation and books from Microsoft Press. You can contact Recording for the Blind at the following address.

Recording for the Blind, Inc.
20 Roszel Road
Princeton, NJ 08540

Phone within the United States: 1-800-221-4792
Phone outside the United States: 609-452-0606
Fax: 609-987-8116

Customizing Windows NT

You can adjust the appearance and behavior of Windows NT to suit your eyesight and motor skills. These adjustments do not require any additional software or hardware.

You can use the following methods to adjust the appearance of Windows NT:

- If you have trouble differentiating the system colors, or if they cause eyestrain, adjust them using the Colors option in Control Panel.
- If the desktop pattern or wallpaper causes eyestrain, adjust them using the Desktop option in Control Panel.
- If you have trouble locating the text selection cursor (also known as the caret or insertion bar), adjust the rate at which it flashes using the Desktop option in Control Panel.

You can use the following methods to adjust the behavior of the mouse:

- If you have trouble positioning the mouse on a window frame in order to adjust the size of a window, increase the window border width using the Desktop option in Control Panel.
- If you have trouble using the keyboard because of the speed at which it repeats or the delay time before it begins repeating, adjust these using the Keyboard option in Control Panel.

You can use the following method to decrease the amount of typing you have to do:

- Assign application shortcut keys to each application you run so that you can launch the application or switch to it with a single key combination. Assign an application shortcut key in a program information file using the PIF Editor, which is located in your Main program group.

Getting More Information

For more information on Microsoft products and services for people with disabilities, contact Microsoft Customer Sales and Service at 1-800-426-9400 (voice) or 206-635-4948 (text telephone).

The Trace R&D Center at the University of Wisconsin produces a book and a compact disc that describe products that help people with disabilities use computers. The book, titled *Trace ResourceBook*, provides descriptions and photographs of about 2,000 products. The compact disc, titled *CO-NET CD*, provides a database of more than 17,000 products and other information for people with disabilities. It is issued twice a year and is available in many public libraries.

You can contact the Trace R&D Center at the following address:

Trace R&D Center
S-151 Waisman Center
1500 Highland Avenue
Madison, WI 53705-2280

Voice telephone: 608-263-2309
Text telephone: 608-263-5408
Fax: 608-262-8848

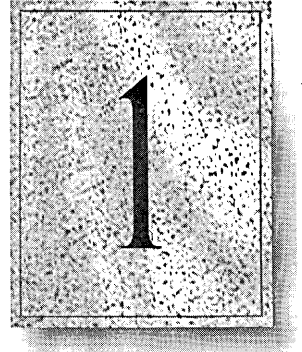
For general information and recommendations about how computers can help specific individuals, consult a trained evaluator who can best match individual needs with the available solutions. An assistive technology program in your area will be able to provide referrals to programs and services. Within the United States, you can locate the nearest assistive technology program by contacting:

National Information System (NIS)
Center for Developmental Disabilities
University of South Carolina, Benson Bldg.
Columbia, SC 29208

Voice/text telephone outside South Carolina: 1-800-922-9234 ext. 301
Voice/text telephone in South Carolina: 1-800-922-1107
Voice/text telephone outside the United States: 803-777-7826
Fax: 803-777-6058

CHAPTER 1

Introducing Windows NT



After you install Windows NT, you can begin working right away. Windows NT takes care of most configuration tasks automatically, including preserving settings for other operating systems such as MS-DOS, if you maintain dual-boot capabilities. You can run your applications and manage files immediately, without editing special configuration or initialization files.

This chapter presents the basic information you need to get started with Windows NT and explains what you can do with the Windows NT operating system.

If you are new to using a graphical user interface such as Microsoft Windows or if you want a quick review, see Chapter 2, “Windows NT Basics,” for a summary of the basic procedures you need to know.

Starting and Quitting Windows NT

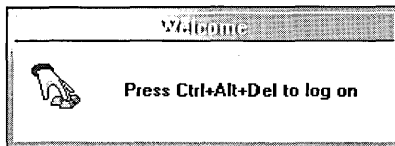
This section describes how to start Windows NT and log on to your computer, and also describes how to use online Help and the Windows NT introductory demonstration.

Starting Windows NT

Because Windows NT is a secure system, you must identify yourself, or “log on,” and enter a password each time you start Windows NT.

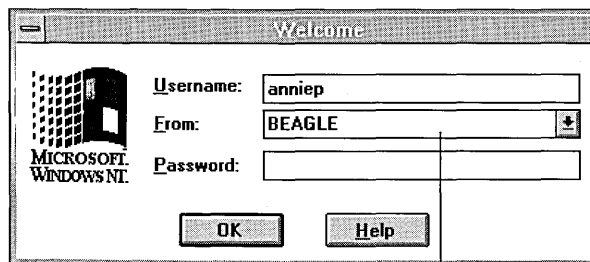
To start Windows NT

1. Turn on your computer.
2. If your computer is configured to start more than one operating system, press an arrow key at the startup screen to choose Windows NT, and then press ENTER.
3. When the logon message appears, press CTRL+ALT+DEL to log on.



Important The CTRL+ALT+DEL sequence ensures the security of your system. Even if you see a message already displayed that asks you to enter your password, always press CTRL+ALT+DEL before you type your password.

4. In the Welcome dialog box, type your username and password, and also select either your local computer name or the name of a Windows NT Advanced Server domain, and then choose the OK button.



In this box, choose either your computername or a Windows NT Advanced Server domain name.

Your username and password are unique identifiers defined while running Setup. If you do not know the correct entries for logging on a computer, ask your network administrator.

- The entry in the Username box is the name you entered while running Setup to identify your local user account, or it is the domain username assigned by the network administrator. Each time you log on, Windows NT proposes the username for whoever last logged on at this computer.
- The entry in the From box is either a local computer name or the name of a Windows NT Advanced Server domain. For example, if you are logging on using an account stored locally at the workstation, select the workstation name in the From box. If your username corresponds to a domain account, select the domain name in the From box. Note that you can only log on to a domain at a computer that belongs to a domain.
- The entry in the Password box is the one you defined while running Setup or that the network administrator defined for you. Leave this box blank if there is no password defined for your user account.

As soon as you log on, you can run applications, share files with other users on the network, connect to a printer, and control who has access to your computer and its files, as summarized in “What to Do After Setup,” later in this chapter.

Logging On to a Domain from a Remote Access Service Workstation

You can log on to a domain from a remote workstation domain accounts exist for your computer and username. (For information on joining a domain, see “Configuring the Network” in Chapter 5, “Control Panel.”) After logging on to a domain from a remote computer, you can improve system response time by turning off domain browsing. This keeps File Manager from browsing the domain whenever you try to connect to a network drive.

- ▶ **To log on to a domain from a remote workstation**
 1. Log on to your computer.
 2. Start the Remote Access Service.
 3. Connect to the network.
 4. From the File menu in Program Manager, choose Logoff.
 5. Choose the OK button.
 6. Press CTRL+ALT+DEL to log on.

7. In the Welcome dialog box, type your domain username and password, and also select the domain name in the From box.
8. Type your password and then choose the OK button.

► **To turn off domain browsing**

1. From the Main group, start File Manager.
2. From the Disk menu, choose Connect Network Drive.
3. From the Connect Network Drive dialog box, clear the Expand By Default box.
4. Choose the OK button.

Using Windows NT Help

Online Help in Windows NT is a convenient, quick way to look up information about a task you are performing or a feature or dialog box you would like to know more about.

Windows NT Help includes the following:

- Full-text search capability that enables you to find Help information quickly and an explanation of how to use full text search
- A description of each command available from the command prompt
- A glossary of Windows NT terms
- Information about Microsoft Product Support Services
- Information about accessibility for users with disabilities

Starting and Quitting the Online Demonstration

The online demonstration installed with Windows NT introduces the built-in networking security and workgroup features of Windows NT. The topics include the following:

- Logging on to Windows NT
- Connecting to other computers and sharing files on a network
- Creating user accounts and setting file permissions
- Connecting to a printer
- Using ClipBook to share information over the network
- Communicating with other users

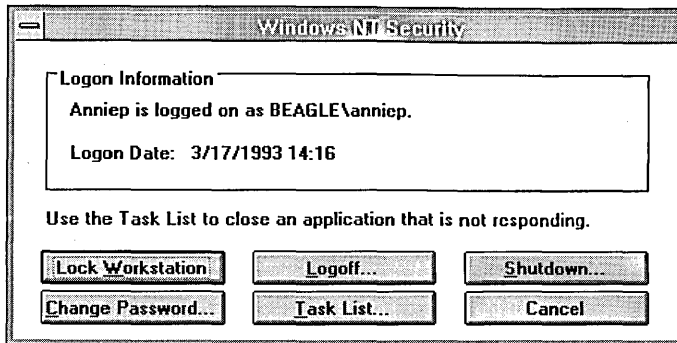
Although it should not be a problem in Windows NT, the demonstration requires 450K of memory when running in MS-DOS or Windows 3.1.

- ▶ **To run the “Introducing Windows NT” online demonstration**
 1. Choose the Introducing Windows NT icon in the Main group.
 2. To quit, press the ESC key once if you are viewing the main menu, or press ESC twice if you are viewing a topic.

Quitting Windows NT

When you are working in Windows NT, you can press CTRL+ALT+DEL to change your password, to lock or secure the computer, or to log off so that you can restart your computer or log on using another user account.

- ▶ **To log off the current session**
 - From the File menu in Program Manager, choose Logoff. Or press ALT+F4.
 - Or–
 - Press CTRL+ALT+DEL, and then choose the Logoff button in the Windows NT Security dialog box.



- ▶ **To turn off your computer**
 - From the File menu in Program Manager, choose Shutdown.
 - Or–
 - Press CTRL+ALT+DEL, and then choose the Shutdown button in the Windows NT Security dialog box.

Caution Never use the computer’s power switch to quit Windows NT, or you may lose data. Always use Shutdown to quit, so Windows NT can save changes in all working files and properly close applications and services.












What to Do After Setup

The Windows NT operating system affects every aspect of your work on the computer. Although Windows NT takes care of most configuration tasks automatically, you might want to modify your working environment or add elements to your system. This section suggests activities for using and modifying your system after installing Windows NT.






Using Windows NT Applications

Program Manager is the application that runs each time you start Windows NT. You can use Program Manager to organize and start applications and tools. The first time you start Windows NT, Program Manager shows the Main group window open on the desktop, plus icons for several built-in program groups. For more information, see Chapter 3, "Program Manager." The following tables list the applications provided with Windows NT.

Main Group

Application	Used to
 File Manager	Manage files and directories, share files on the network, and connect to shared directories on other computers. See Chapter 4.
 Control Panel	Customize the fonts, color, and desktop, and configure hardware devices and the network. See Chapter 5.
 Print Manager	Connect to, configure, and share printers, and control printing of documents. See Chapter 6.
 Mail	Send and receive electronic mail. See Chapter 7.
 Schedule+	Maintain a personal calendar and schedule meetings automatically. See Chapter 8.
 Command Prompt	Start programs or run batch files for MS-DOS, MS OS/2 version 1.x, and POSIX. See Chapter 9.
 ClipBook Viewer	Store clippings from data files and share that information over the network. See Chapter 10.
 PIF Editor	Create or change program information files for running MS-DOS-based applications. See Chapter 11.
 Windows NT Setup	Install device drivers and Windows NT components. See Chapter 12.
 Introducing Windows NT	View an online demonstration of the networking, security, and workgroup features of Windows NT.
 Windows NT Help	Look up information about a task, feature, or dialog box.

Administrative Tools Group

Application	Used to
 User Manager	Create user accounts and groups, and define policies for users and groups. See Chapter 13.
 Backup	Back up and restore files on a tape drive for NTFS, FAT, or HPFS file systems. See Chapter 14.
 Event Viewer	View and manage event logs for system, security, and application events. See Chapter 15.
 Disk Administrator	View and manage hard disk partitions and other disk resources. See Chapter 16.
 Performance Monitor	Measure CPU use and other data on system performance. See Chapter 17.

Setting Up Startup Applications

You can specify which applications will start automatically whenever you log on. These changes will only be saved for your user account. If another user logs on to your computer, or if you log on to another user account, the startup applications defined for that user account will appear.

► **To define startup applications**

- In Program Manager, open the Startup group and add a program item for each application that you want to start each time you log on, following the procedures in “Creating Program Items” in Chapter 3, “Program Manager.”

Setting Up Your Personal Working Environment

You will probably want to configure the appearance and content of your basic workspace, the desktop.

Note If your computer is a member of a Windows NT Advanced Server domain, the network administrator might have created a user profile for you. Ask your network administrator if a user profile controls your personal working environment. Changes you make to your workspace may not be retained the next time you log on if a user profile controls your workspace.

- ▶ **To configure how your workspace looks and sounds**
 1. In Control Panel, double-click the Color, Desktop, and Sound icons to define how your desktop looks and sounds, following the procedures in Chapter 5, “Control Panel.”
 2. In the command prompt window, choose commands from the Control menu to configure fonts, screen size, position, and color, following the procedures in Chapter 9, “Command Prompt.”

- ▶ **To set up custom program groups for running applications**
 - In Program Manager, create program groups and add program-item icons, following the procedures in “What Are Groups and Program Items?” in Chapter 3, “Program Manager.”

- ▶ **To change your password**
 1. Log on to Windows NT in the usual way, and then press CTRL+ALT+DEL.
 2. In the Windows NT Security dialog box, choose the Change Password button.
 3. In the Change Password dialog box, type your old password, a new password, and a confirmation in the appropriate boxes, and then choose the OK button.

Configuring the Network

Windows NT provides network services so that users can connect computers to share files, printers, and other resources. The following tools in Windows NT help you configure and monitor the network.



To install, configure, or remove any network component and to join a workgroup or domain, you must be logged on as a member of the Administrators group.

Use	To
Network in Control Panel	Install and configure software to support the network, and to join workgroups or domains.
Event Viewer	View the system, security, and application events on a computer to monitor how the computer is being used.
File Manager	Share files and directories on the network, and connect to shared directories.
Print Manager	Share printers on the network, and connect to shared printers.
Server in Control Panel	View connected users, shared resources, and open resources; manage directory replication and designate recipients of administrative alerts.
Services in Control Panel	Start and stop network services.
User Manager	Manage user accounts, group members, and security policies.

Joining a Workgroup or Domain

Note You do not need to complete this procedure if your computer joined the correct workgroup or domain when you ran Setup.

In Windows NT, a *workgroup* is a collection of computers that appear under the same workgroup name on the network. This grouping makes it easy to find directories or printers shared by people you work with. Besides providing the same network browsing capabilities as a workgroup, a Windows NT Advanced Server *domain* is a collection of computers that can recognize the same user accounts. Membership in a domain is assigned by the domain administrator in a Windows NT Advanced Server network.

▶ **To join a workgroup or a Windows NT Advanced Server domain**

1. At the computer which will join the workgroup or domain, log on as a member of the Administrators group. For example, you might be able to log on under the username "Administrator" and use this account to make changes.
2. In the Network option of Control Panel, choose the Change button beside the Workgroup or Domain name at the top of the dialog box, and then follow the procedure as described in "Configuring the Network" in Chapter 5, "Control Panel."

Browsing Other Computers and Resources on the Network

In Microsoft Windows-based networking you can browse domains, workgroups, and computers to look for shared directories and printers.

▶ **To browse for shared directories on the network**

1. In File Manager, choose Connect Network Drive from the Disk menu, or choose the Connect Drive button on the toolbar.
2. The networks, domains and workgroups, computers, and shared directories are organized in a tree structure. From the Shared Directories box, choose an item to expand the list. Choose a network name to display available domains and workgroups, a domain or workgroup name to display available computers, or a computer name to display its shared directories.

► **To browse for shared printers on the network**

1. In Print Manager, choose **Connect to Printer** from the Printer menu, or choose the **Connect to Printer** button on the toolbar.
2. From the **Select Printer** box, choose an item to expand the list. Choose a network name to display available domains and workgroups, a domain or workgroup name to display available computers, or a computer name to display its shared printers.
3. To connect to a printer, double-click a printer name.

Managing Files and Disks

A key function of any operating system is to provide a file system for storing and managing your application and data files. The tools for file management in Windows NT include the following.

Use	To
File Manager	Create and delete directories, manage files stored in directories, and define file attributes.
Server in Control Panel	View and remotely manage other computers.
Convert utility	Change a FAT or HPFS file system to NTFS for a disk partition after Setup. Run CONVERT.EXE from the command prompt.

Managing Files

When you format a hard disk, you prepare it to store files using a particular file system. Most operating systems require a specific file system to store files on a hard disk. Windows NT automatically supports the following three file systems:

- The Windows NT file system (NTFS) is a new advanced file system that supports file recovery, extremely large storage media, and long filenames. NTFS is required if you want maximum data security for your installation, and is recommended if Windows NT is the only operating system on your computer.
- The file allocation table (FAT) is the file system used by the MS-DOS operating system, limited to eight-character filenames with three-character extensions. FAT does not provide security. FAT is required for the system partition if you also use MS-DOS on your computer.
- The high-performance file system (HPFS) is the file system used with the OS/2 operating system version 1.2 or later, which supports long filenames. HPFS does not provide security.

If you choose to install Windows NT on a disk partition formatted for FAT or HPFS, Windows NT automatically observes all the file-naming conventions of those file systems. For more information, see “Working with Files and Directories” in Chapter 4, “File Manager”; see also the online Command Reference and your documentation for Microsoft MS-DOS or Microsoft OS/2.

If you choose to use NTFS with Windows NT, these new file-naming conventions apply:

- File and directory names can each be up to 256 characters, including extensions, and a name can have multiple extensions separated by periods.
- Names can contain any uppercase or lowercase characters except the following:
? \ * " < > | / :
- If you mix uppercase and lowercase characters in a filename, Windows NT preserves the case when it displays the name. However, Windows NT does not regard case when distinguishing filenames you enter in dialog boxes or at the command prompt.
- You can search for filenames or perform other multiple-file operations in Windows NT using wildcards, where an asterisk (*) stands for a whole word or group of characters, and a question mark (?) represents a single character.

When you create a file with a long name under NTFS, Windows NT also automatically creates a filename that is compatible with MS-DOS, so that computers running MS-DOS or applications that don't support long filenames can still identify the file.

Setting Up to Print

Windows NT provides several advantages in printing:

- If you use Windows NT printers on the network, separate printer drivers do not have to be installed on each workstation, because the printer driver is stored on a single computer.
- You can browse for available printers on the network.
- You do not have to redirect a port for the printer—you just connect to a printer using Print Manager.
- You can manage your print job from your local computer.

You can choose Print Manager in the Main program group of Program Manager to install and configure printers.

▶ **To connect to, install, or configure a network printer**

- If the network printer is on a Windows NT network, follow the procedures in “Connecting to a Network Printer” in Chapter 6, “Print Manager.”
Or, if the printer is on another kind of network, follow the procedures in “Installing a Printer” in Chapter 6.

Configuring Your System

What happens when you start your computer depends on various elements:

- The defaults you define for the boot loader and any user environment variables you define for applications
- The services you configure to start automatically
- The applications you specify in the Startup group in Program Manager
- The contents of your logon script
- Any user profile that might be assigned by the administrator for a Windows NT Advanced Server domain

This section describes how to get started defining each of these elements.



You can change some system settings only if you are logged on as a member of the Administrators group or if you belong to another group that can configure the computer. If you cannot change system settings, ask your network administrator for assistance. For more information, see “Managing the Security Policies” in Chapter 13, “User Manager.”

In Windows NT, you define all elements of your system configuration using graphical tools such as Control Panel and Windows NT Setup. Windows NT automatically stores values that define the working environment for Windows NT, plus the information for running applications or for using alternate operating systems.

Control Panel is probably the main tool you will use to change your system configuration. For example, you can choose the Fonts option to install or remove screen fonts, including TrueType® fonts. Also, some configuration values change automatically when you install new software or when you define your workspace in an application such as Microsoft Excel.

The following key tools can be used to configure system hardware and software.

Use	To
Windows NT Setup	Install drivers for the video display, mouse, and keyboard for the computer. Install or remove supporting components for Windows NT.
Control Panel	Define desktop appearance and configure hardware and software for the computer and for the network.
PIF Editor	Change the memory settings required for running MS-DOS-based applications.
Print Manager	Install and configure printers to be used with your computer.
System in Control Panel	Define environment variables and preferences for alternate operating systems.

Defining the Boot Loader and Other Operating System Variables

You can specify the default operating system that your system proposes at startup, define user environment variables, and add or configure virtual-memory paging files to optimize performance in Windows NT.

- ▶ **To configure boot loader, user environment variables, or virtual memory**
 - In the System option of Control Panel, specify the settings you want, following the procedures in “Defining Options for the Operating System” in Chapter 5, “Control Panel.”

The *boot loader* defines the information needed for system startup, such as the location for the operating system’s files. Windows NT automatically creates the correct configuration and checks this information whenever you start your system. How this configuration information is stored depends on your system’s microprocessor:

- For an x86-based computer, Windows NT saves your startup preferences in the BOOT.INI file in the root directory on your main hard drive. Configuration files such as AUTOEXEC.BAT and CONFIG.SYS are used only to specify memory and other parameters for MS-DOS-based applications that you might run under Windows NT.
- For a RISC-based computer, your startup preferences and all other system configuration information are stored in nonvolatile RAM.

You don’t have to keep another operating system such as MS-DOS on your computer to run applications created for that operating system. For information about running applications created for other operating systems, see Chapter 11, “Other Application Environments.”

Setting Up Startup Network Services

Windows NT starts several network services automatically, so that the capabilities of the Windows NT network are automatically available as soon as you want to work with the system. For example, the Computer Browser, Event Log, Workstation, and Net Logon services start each time you log on. You might also want to start other services automatically at system startup, depending on your system needs. For example, to share local files and printers on the network, you need to start the Server service by using the Services option in Control Panel.

- ▶ **To start network services automatically when you log on**
 - In the Services option of Control Panel, set up services that you want to start automatically, following the procedures in “Managing Services” in Chapter 5, “Control Panel.”

Setting Up User Accounts and Groups

If your computer is not a member of a Windows NT Advanced Server domain, you must create local user accounts and specify user groups. You might want to create user accounts and groups for everyone who will use your computer.

A *user account* consists of all the information that Windows NT uses to allow someone to use a computer, including the username, a description, a password, and the groups to which that user belongs.

A *group* is an account that contains other accounts, which are called members. Groups provide an easy way to grant common capabilities to several users, because all rights and permissions assigned to a group are provided to its members.

- ▶ **To set up user accounts and groups for a single computer**
 1. In the Administrative Tools group in Program Manager, double-click the User Manager icon.
 2. Create the user accounts you want, following the procedures in “Managing User Accounts” in Chapter 13, “User Manager.”
 3. Create the groups you want, following the procedures in “Managing Groups” in Chapter 13, “User Manager.”

Task	Configuration application
Set up user accounts	User Manager
Set up local groups	User Manager
Set up shared resources	File Manager, Print Manager

Managing Security

The security provided through Windows NT when you use NTFS, combined with regular use of the Backup utility, can eliminate almost all possibility of data loss. Security in Windows NT consists of two basic elements: preventing data loss resulting from unauthorized access or preventing data loss resulting from file damage.



For most actions related to security, you must log on as a member of the Administrators group.

Controlling Unauthorized Access

To control unauthorized access, Windows NT includes tools for limiting initial access to the system itself, to specific files and directories, and to resources such as printers. Windows NT also includes tools for monitoring security events.

The tools for controlling access to the system include the following.

Use	To
CTRL+ALT+DEL	Change your password.
File Manager	Share resources and establish permissions to protect specific files and directories.
Network in Control Panel	Define limits for sharing a computer's resources with other users on the network.
User Manager	Create user accounts for identification and authentication when the user logs on, and authorize the specific actions a user can perform on the system.

You can also change your password by pressing CTRL+ALT+DEL and then choosing the Change Password button in the Windows NT Security dialog box.

The tools for auditing security transactions in Windows NT include the following.

Use	To
Event Viewer	Define the size and management of the security event log.
File Manager	Define the files, directories, and users to be audited.
Print Manager	Define printers to be audited.
User Manager	Define the kinds of events to be audited.

Preventing File Damage and Data Loss

When you use NTFS, Windows NT logs all file transactions, replaces bad sectors automatically, and stores copies of all vital information. Therefore, Windows NT can preserve disk integrity and ensure complete, rapid recovery after power failure or other system failures.

No matter which file system you use, Windows NT also automatically preserves a previous working configuration to ensure that you can always start Windows NT, in spite of any changes to the system configuration that may occur during a work session. Windows NT also requires that you create an Emergency Repair disk while running Setup so that your system can be repaired if system files are corrupted at startup. For information on repairing your system, see “Repairing Your System” in Chapter 12, “System Maintenance with Windows NT Setup.”

Setting Up Security Policies

You can define three basic security policies for your computer:

- The Account policy controls how passwords are used by user accounts.
 - The Audit policy controls what types of events are recorded in the security log (which you can view in Event Viewer).
 - The User Rights policy controls the rights assigned to groups and user accounts for your computer. We do not recommend that you change these default settings.
- ▶ **To manage security policies for your computer**
- From the Policy menu in User Manager, choose Account or Auditing, and then follow the procedures in “Managing the Security Policies” in Chapter 13, “User Manager.”

CHAPTER 2

Windows NT Basics



This chapter reviews the basics for working in Windows NT. These features and the related procedures in the graphical user interface of Windows NT are identical to those in versions of Windows for MS-DOS. If you are familiar with Windows, you can skip this chapter. You can practice any of the basic procedures described here without fear of harming your system.

This chapter emphasizes using the mouse to complete tasks. For information about using the keyboard to work with windows and dialog boxes, see “Using the Keyboard,” later in this chapter. The following topics are included in the chapter:

- Selecting items for action
- Managing windows
- Choosing commands
- Using the Control menu and Task List
- Using Help
- Using dialog boxes and responding to system messages
- Copying and pasting information between applications
- Using keyboard shortcuts

Selecting Items for Action

In Windows NT, you can use a mouse or other pointing device such as a pen to select items and carry out actions. For example, you select an icon, window, or other element by pointing to it with the mouse and clicking.






The following terms are used to describe mouse actions.

Mouse term	Meaning
Point	Move the mouse until the tip of the mouse pointer rests on what you want to choose on the screen.
Click	Press and release the mouse button without moving the mouse. Clicking an item selects it. For many actions, you can select multiple items by holding down SHIFT while clicking.
Double-click	Click the mouse button twice in rapid succession.
Drag	Hold down the mouse button while you move the mouse. For some actions, you can extend a selection by pressing SHIFT while dragging. For other actions, you can move a copy of a selection to another location by pressing CTRL while dragging.

Guidelines for Selecting Items and Using the Mouse

To use Windows NT efficiently, use the mouse to select items and initiate commands. The following list presents basic guidelines for using the mouse:

- When you select an icon, dialog box option, or other item, the selection is highlighted. For example, selected text or the label on a selected icon appears in reverse color.
- To cancel a selection, click another item.
- Double-clicking usually initiates the same action as selecting the item and then choosing a command. For example, double-clicking an icon in Program Manager is the same as selecting the icon and then choosing the Open command from the File menu.
- When you move the mouse, the mouse pointer shows your location on the screen and often changes shape when the pointer crosses different areas on the screen. The following table shows some examples.

This pointer	Appears
	Where you can click to select items.
	Where you can drag the window border to size a window.
	Where you can draw or paint.
	Where you can enter text in a window or dialog box.
	When you start an application and can continue working while Windows NT completes a background task.

Managing Windows

All Windows NT operations take place on the desktop, the area of the screen where elements such as windows, icons, and dialog boxes appear. When you first start Windows NT, the Program Manager application window appears on the desktop, showing the Main group window and group icons for the other applications installed with Windows NT.

You can move windows and icons around on the desktop. When you click a window to begin working, the title bar changes color to show that it's the active window, and the window automatically becomes the active window.

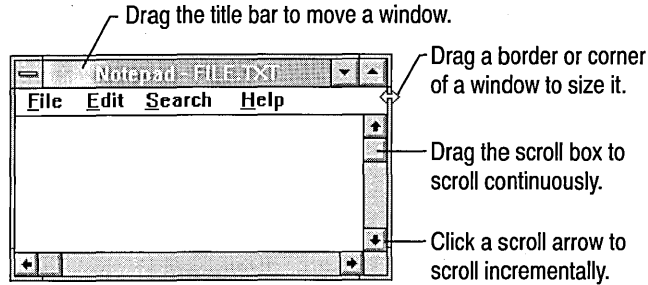
You can switch to other windows on the desktop by clicking the window you want, or by pressing ALT+TAB to cycle through the running applications. You can also use the Task List to switch windows, as described in "Using the Control Menu and Task List," later in this chapter.

Starting Applications in Program Manager





Program Manager is a Windows NT application that you use to start applications and also to organize applications and working files in logical groups. Applications and files are represented in Program Manager as program-item icons, and organized in groups that appear as windows or icons within the Program Manager window. You start an application by choosing its icon. For more information, see Chapter 3, "Program Manager."

Moving and Sizing Windows

You can move or size most windows in Windows NT, or scroll the contents of the window with the basic mouse actions shown in the following illustration.

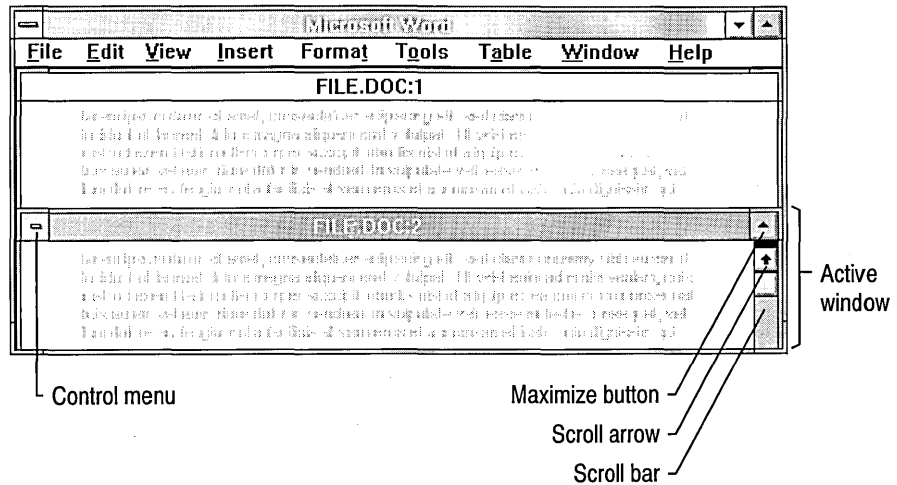


The following list shows how to use the buttons in the window frame to manage the size and position of the window.

Choose	To
	Display the Control menu (this is the same as pressing ALT+SPACEBAR).
	Reduce the application to an icon (this is the same as choosing Minimize from the Control menu).
	Enlarge the application window to full screen (this is the same as choosing Maximize from the Control menu).
	Return the application window to its previous size (this is the same as choosing Restore from the Control menu).

Using Document Windows

Some Windows-based applications also present document windows so that you can view more than one document simultaneously. You can size, scroll, and arrange document windows, but you cannot move them outside the application window.



Choosing Commands in Windows NT

When you work with applications in Windows NT, you choose commands to complete actions. The applications and tools included with Windows NT provide several ways to choose commands. You can:

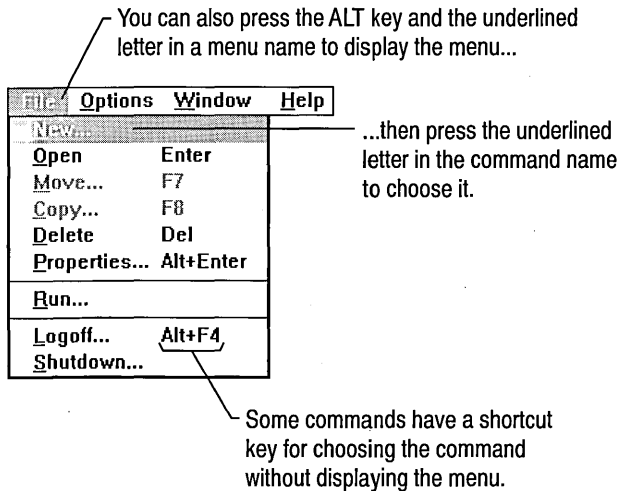
- Use the mouse or keyboard to choose commands from the menu bar.
- Choose buttons on toolbars (where available).
- Use the drag-and-drop features in Program Manager or File Manager to move, copy, and print files, or to start applications.

This section describes how to choose commands from the menu bar in all Windows-based applications. For information about using drag-and-drop in Windows NT, see “Working with Files and Directories” in Chapter 4, “File Manager.” For information about using a toolbar, see the documentation for your application.

In all Windows-based applications, commands are grouped on menus, with the menu names displayed in the menu bar across the top of the application window. Each application has different menus, but most applications include at least a File menu, Edit menu, and Help menu.

► **To choose a menu command**

1. To display the menu, point to the menu name in the menu bar and hold the mouse button down.
2. Drag to select the command you want, and then release the mouse button.



Guidelines for Working with Menus in Windows NT

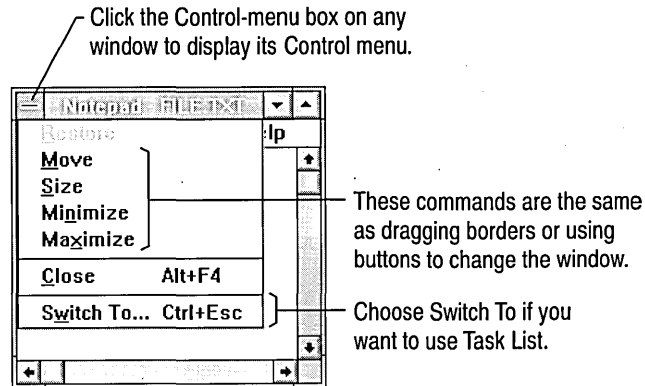
The following list presents some basic guidelines for menus:

- When the menu is displayed, you can also press an arrow key to highlight a command name and then press ENTER to choose the command.
- When you choose a command that ends in an ellipsis (...), the application displays a dialog box that asks you to supply more information.
- If a command turns a feature on and off, a check mark (✓) appears by the command name when the feature is on.
- When you choose a command that ends with an arrow (►), the menu cascades to display more command names.
- If a command name is dimmed, it indicates that the command does not apply to the current situation or that you need to make a selection or complete another action before choosing the command.

Using the Control Menu and Task List

All windows have a Control menu. You can use it to switch to another running application; close the window or quit the application; change the size and position of a window; or minimize or maximize it.

Most dialog boxes and messages also have a Control menu, usually with commands for moving or closing the dialog box.



► To use a window's Control menu

1. Click the Control-menu box in a window, or click an application icon on the desktop. Or press ALT+SPACEBAR to display the Control menu for an application window or for a dialog box. Press ALT+HYPHEN (-) to display the Control menu for a document window.
2. Choose a command for the action you want.

The commands available on the Control menu vary for different applications, but most Control menus include at least the Move and Close commands.

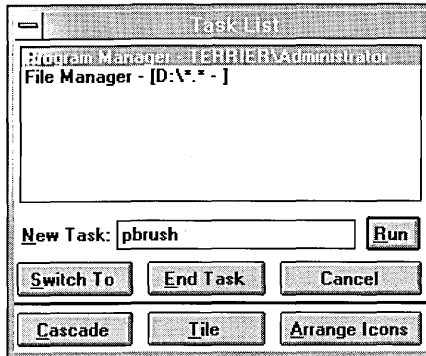
The Control menu for each application window includes the Switch To command, which displays Task List. You can use Task List to switch to other currently running applications, or to manage windows and icons on the desktop.

Although it is usually easiest to switch to another window by clicking that window, your current application may fill the screen, or some of the windows may not be visible. With Task List, you can switch windows quickly without having to search for the window you want.

► **To use Task List**

1. From the Control menu, choose Switch To; or press CTRL+ESC.
2. In the task list, select the name of the application you want to work with.

To switch to a task not on the list, in the New Task box, type the executable name for the task you want. Choose the Run button.



3. Choose one of the following buttons for the action you want.

Choose	To
Switch To	Switch to the application selected in the list.
End Task	Quit the selected application.
Cancel	Close Task List. You can also press ESC or double-click the Control-menu box to quit.
Cascade	Display windows in layers, showing the title of each window.
Tile	Resize all windows and arrange them side by side.
Arrange Icons	Rearrange application icons on the desktop.

► **To switch applications without using Task List**

- Press ALT+TAB.

Continue pressing ALT+TAB until the window you want is displayed.

If you do not want to use ALT+TAB for switching between windows, you can turn off this capability by choosing the Desktop icon in Control Panel and then selecting the Fast ALT+TAB Switching check box in the Desktop dialog box.

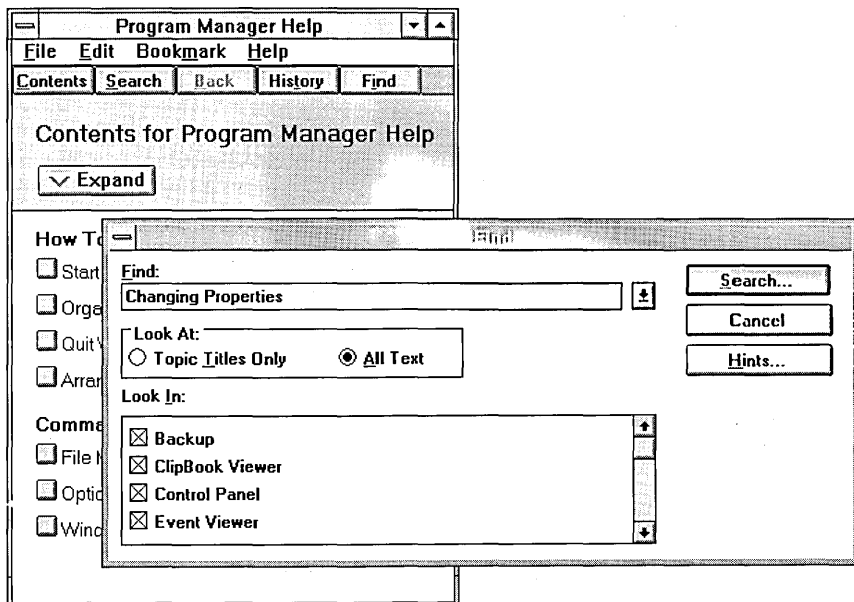
Using Help

Windows NT provides Help so that you can get useful information quickly while you are working. Help contains a description of each command and dialog box, and explains procedures for most tasks.

► To get Help

- Press F1 wherever you are working.

The following illustration shows the Help Contents window for Program Manager. The Help Contents lists the major topics for the current application. From this window you can move to more specific information, in this example, to a full text search.



► **To run a full text search for a Help topic**

1. In the Help window, choose the Find button.
2. In the Find dialog box, type the word or phrase you're looking for. To find an exact match for a phrase, place quotes around it.
Without quotes, the search will locate instances of words within the phrase as well as the phrase itself.
3. Select All Text under Look At.
4. Choose the Search button to perform the search.

The following table summarizes the actions you can take while using Help.

To	Do this
Get help in a Windows-based application	Press F1 for context-sensitive Help, or choose a command from the Help menu.
Get help in a dialog box or message box	Press F1, or choose the Help button in the dialog box.
Get help on using Help	From the Help menu, choose How To Use Help.
See a list of Help topics	Choose the Contents button.
Get help on a specific topic	Choose the Search button and select a topic to view, or choose the Find button and enter text to search for.
Go back to a previous topic	Choose the Back button, or choose the History button and double-click any listed topic.
Jump to another Help topic	Click the underlined jump term, or choose a "hot" button in the Contents topics.
Display a definition	Click the term with the dotted underline, and then click anywhere on the screen to close the definition.
Continue working with Help displayed	From the Help menu in the Help window, choose Always On Top.
Minimize Help to an icon	Choose the Minimize button in the Help window.
View another Help file	From the File menu in Help, choose Open and select another .HLP filename.
Exit Help	Double-click the Control-menu box.

You can also set bookmarks for frequently used Help topics, and annotate any Help topic. These and other Help features are explained in Help.

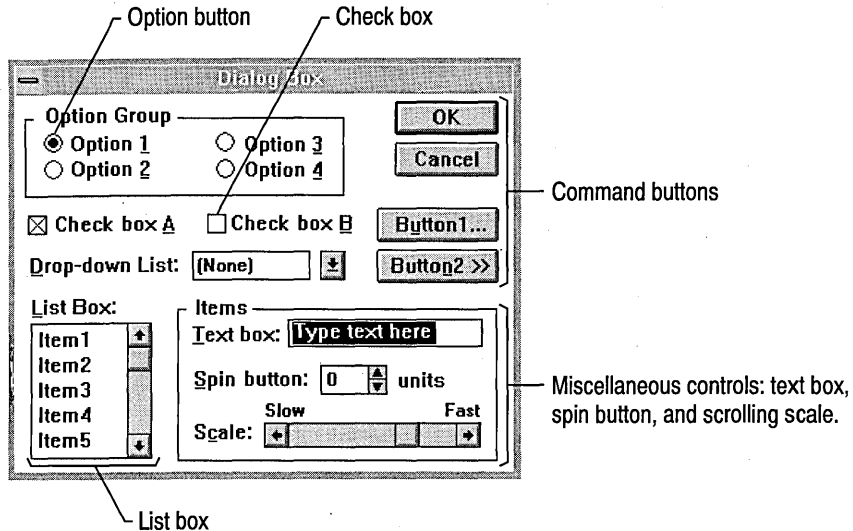
Help is also available at the command prompt for all Windows NT commands. The following table shows the syntax for Help at the command prompt.

Syntax	Information provided
help	Available native system commands.
<i>command /?</i>	Description, syntax, parameters, and switches for native system commands, plus help for MS-DOS subsystem commands not listed when you type help .
help command	Description, syntax, parameters, and switches for native system commands.
net help	Available network commands.
<i>net command /?</i>	Syntax only for network commands.
<i>net command /help</i>	Syntax and description for network commands.
net help command	Syntax and description for network commands.
net help command /options	Parameters and switches for network commands.

You can also use the online Command Reference, which displays additional details, examples, and conceptual information for the system or network command you typed. To start the Command Reference, double-click the Help icon in the Main program group.

Using Dialog Boxes

Windows NT displays a dialog box to ask for information and to provide information you need to proceed. When you choose a command that displays a dialog box, that dialog box may include areas where you type numbers or text. You may also see various options to change or view settings related to the command.



► **To use a dialog box**

1. Select options or type text to specify the information you want in a dialog box.

Click an option to select it, or press ALT plus the underlined letter in the option name. If any item in a dialog box is dimmed, it is unavailable because it requires a selection or some previous action.

To see a description of the options, press F1 or choose the Help button in the dialog box.

2. To move the dialog box in the window, drag its title bar.
3. When you finish with the dialog box, choose the appropriate command button to carry out the command.

Usually, clicking the OK button carries out the command. Sometimes the button that carries out the command has a label such as Open or Find Next.

► **To close a dialog box without completing the command**

- In the dialog box, choose the Cancel button, or double-click the Control-menu box.

Guidelines for Buttons and Miscellaneous Items

The following list presents some basic guidelines for using buttons and other items in dialog boxes.

Option buttons and check boxes:

- Click a round option button to select it and to turn off any other option in the group. You can select only one option button in a group.
- Click a check box to turn that option on or off. You can select as many check boxes as you want.
- When an option button or check box is selected, it's filled—a selected option button contains a dot and a selected check box contains an X.

Command buttons:

- If you choose a button with an ellipsis (...), another dialog box appears.
- If you choose a button with double arrows (>>), the dialog box expands.

List boxes:

- Click an item in any kind of list to select it, or scroll to see more items.
- In a drop-down list box, click the arrow to display a list of options to select.
- In some lists, you can select multiple items. In such a list, click a selection a second time to turn it off.

Miscellaneous items:

- Type, edit, and paste text in any text box. If a text box contains text when you move to it, all the text is selected and any text you type replaces it. Press DEL or BACKSPACE to edit the text.
- Scroll a spin button or type in the box to select a number.
- Drag a scroll box to select a range in a scale.

Responding to Messages

Windows NT displays messages or warnings if you should know about possible consequences of a command action, or if Windows NT requires more information or cannot complete a command for any reason. Most messages explain the problem and what you should do to continue working.

▶ **To dismiss a message**

- Choose the OK button.

If the message contains two or more command buttons, choose the OK button to proceed, or choose the Cancel button to cancel the action and dismiss the message.

Cutting and Copying Information

When you cut or copy information from an application, it is placed onto the Clipboard, which is a temporary storage area in your computer's memory. You can then paste that information from the Clipboard into other documents or applications. You can also use the Clipboard to transfer information between Windows-based applications and some MS-DOS-based applications.

In some Windows-based applications, you can also paste information from the Clipboard to create a linked or embedded object. For more information, see Chapter 10, "Object Linking and Embedding."

You can use the ClipBook Viewer to view and save the contents of the Clipboard. For more information, choose the ClipBook Viewer icon in Program Manager, and then press F1 to get help.

Transferring Information Between Windows-Based Applications

You can use the Cut, Copy, and Paste commands in most Windows-based applications to copy or move information within a document, between documents, or between Windows-based applications.

- ▶ **To copy or move information with the Clipboard**
 1. In your document, select the information you want to copy or move.
 2. To copy the information, choose Copy from the Edit menu. To move the information, choose Cut from the Edit menu.

- ▶ **To paste information from the Clipboard**
 1. If necessary, switch to the document or application that will receive the information from the Clipboard.
 2. Place the insertion point where you want the information to appear.
 3. From the Edit menu, choose Paste.

Transferring Information Between MS-DOS–Based Applications

When you are running an MS-DOS–based application under Windows NT, you can copy selected information or the entire screen onto the Clipboard. You can paste only text into an MS-DOS–based application, not a graphic or screen capture.

- ▶ **To copy information from an MS-DOS–based application**
 1. To open the application’s Control menu, click the Control-menu box or press ALT+SPACEBAR.
 2. From the Control menu, choose Edit.
 3. From the cascading Edit menu, choose Mark.
 4. In the document, select the information you want to copy.
 5. From the application’s Control menu, choose Edit, and then from the cascading Edit menu, choose Copy.
In the command prompt window, the text is copied automatically.

- ▶ **To paste text into an MS-DOS–based application**
 1. Copy the information onto the Clipboard.
 2. Switch to the application into which you want to paste the information.
 3. Place the insertion point where you want the information to appear.
 4. From the application’s Control menu, choose Edit, and then from the cascading Edit menu, choose Paste.

Copying Screen Images

For both Windows-based applications and MS-DOS-based applications, you can copy an entire screen onto the Clipboard. For Windows-based applications, you can copy an image of the active window onto the Clipboard. You can place this image in any file that can save or display bitmap images.

▶ **To copy the entire screen onto the Clipboard as text**

- Press PRINT SCREEN.

To copy a screen image for a non-Windows-based application, the application must be running in text mode, not graphics mode.

▶ **To copy an image of the active window onto the Clipboard**

- Press ALT+PRINT SCREEN.

Using the Keyboard

Microsoft Windows NT and Windows-based applications provide a set of common keyboard shortcuts that you can use to carry out commands and select options in dialog boxes. You can use these *shortcut keys* to bypass the menus.

The key names in the Windows NT documentation appear in small capital letters. For example, the Shift key appears as SHIFT, and the Control key appears as CTRL. The following conventions are used to describe keyboard actions in Windows NT.

Convention	Meaning
KEY1+KEY2	A plus sign (+) between key names means that you must press the keys at the same time. For example, “Press ALT+F4” means you press and hold down ALT while you press F4.
KEY1, KEY2	A comma (,) between key names means that the keys must be pressed sequentially. For example, “Press ALT, HYPHEN (-)” means you press and release ALT, and then press the hyphen.
Keypad	The numeric keys to the right of the standard alphanumeric keys. Press NUM LOCK to toggle between numbers or arrow keys.
Arrow keys	The keys labeled UP, DOWN, LEFT, RIGHT, HOME, END, PAGE UP, and PAGE DOWN on the extended keyboard or on the keypad; used to move or scroll in a document, window, or list.

Each shortcut key may also work with the SHIFT, CTRL, and ALT keys for different actions. The following list shows the general uses for shortcut keys, either individually or in combination with other keys.

Key	Used to
ENTER	Confirm or carry out an action.
ESC	Cancel an action.
F1, F2, F3, ...	Provide shortcuts for commands. If your keyboard has only 10 function keys, press ALT+F1 for F11, ALT+F2 for F12, and so on.
INS, DEL, BACKSPACE	Edit—insert, delete, or clear an item.
TAB or arrow keys	Move the cursor, select an item, or scroll in a window or list.
ALT+ <i>key</i>	Choose commands or dialog box options, or perform other actions related to application windows.
SHIFT+ <i>key</i>	Extend the selection.
CTRL+ <i>key</i>	Choose a command, apply an action in a dialog box, or perform an alternate action on a selected object.

Using the Keyboard for Common Actions

You can use standard keyboard procedures for many of the common tasks throughout Windows NT. The following procedures summarize how to start an application in Program Manager and open a file in an application.

► To start an application in Program Manager

1. Press CTRL+TAB to select the group you want to open, and then press ENTER to open that group window.
2. Press an arrow key to select the program-item icon for the application you want, and then press ENTER to start the application.
Or press SHIFT+ENTER to start the application as an icon.

► **To open a file in an application**

1. Press ALT to select the menu bar.
2. To choose Open from the File menu, press F,O (the direct-access keys, which are indicated by the underlined letters in the menu bar and in the menus).
Or press the RIGHT ARROW and DOWN ARROW keys to select and open the menu. Press the DOWN ARROW key to select Open, and then press ENTER to choose it.
3. In the Open dialog box, press TAB to move between the list of files, directories, and drives, and then press an arrow key to select the filename or directory you want.
4. To choose the OK button, press ENTER.

To cancel your selection and close the dialog box, press ESC.

This same series of keyboard actions works everywhere in Windows NT for choosing menu items and for selecting options in dialog boxes.

Keyboard Shortcut Reference

The following tables summarize common keyboard shortcuts in Windows NT. Keys that must be pressed sequentially are separated by a comma; keys that must be pressed at the same time are separated by a plus sign.

Basic Windows NT Keyboard Shortcuts

To	Press
Help:	
Open or switch to the Help window	F1
Move to and view the next jump term or definition	TAB, ENTER
Using Program Manager and File Manager:	
Open the selected icon	ENTER
Move a selected group or item	F7
Copy a selected item	F8
Clear a selected group or item	DEL
Edit properties of a selected group or item ¹	ALT+ENTER
Cascade the windows on the desktop	SHIFT+F5
Tile the windows on the desktop	SHIFT+F4

¹ This shortcut also toggles between full-screen and window display for the command prompt and non-Windows-based applications.

Basic Windows NT Keyboard Shortcuts *(continued)*

To	Press
Using File Manager:	
Expand the directory tree one level in File Manager	+ (keypad)
Expand a directory branch in File Manager	* (keypad)
Expand all branches in File Manager	CTRL+* (keypad)
Collapse a directory branch in File Manager	- (keypad)
Refresh the display	F5
Scrolling in a window or a dialog box:	
Scroll up or down one line, or left or right one item	Arrow keys
Scroll up one window	PAGE UP
Scroll down one window	PAGE DOWN
Scroll left one window	CTRL+PAGE UP
Scroll right one window	CTRL+PAGE DOWN
Moving and selecting in a window or a dialog box:	
Move to an item in a dialog box and select it	TAB or arrow keys
Move left, right, up, or down in a window or dialog box	Arrow keys
Move to the beginning of a line	HOME
Move to the end of a line	END
Move up or down one window	PAGE UP or PAGE DOWN
Move left one window	CTRL+PAGE UP
Move right one window	CTRL+PAGE DOWN
Extend the selection left, right, up, or down	SHIFT+arrow keys
Extend the selection to the beginning of the line	SHIFT+HOME
Extend the selection to the end of the line	SHIFT+END
Extend the selection up one window	SHIFT+PAGE UP
Extend the selection down one window	SHIFT+PAGE DOWN
Extend the selection left one window	CTRL+SHIFT+PAGE UP
Extend the selection right one window	CTRL+SHIFT+PAGE DOWN

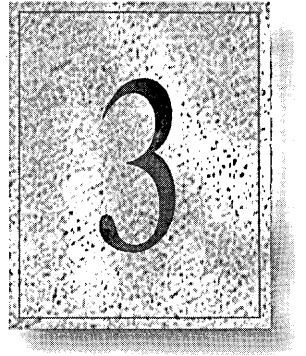
Basic Windows NT Keyboard Shortcuts (continued)

To	Press
Editing in dialog boxes or applications:	
Undo the last action	CTRL+Z or ALT+BACKSPACE
Delete the selection	SHIFT+DEL
Clear the selection	DEL
Copy the selection	CTRL+INS
Paste the selection	SHIFT+INS
Clear the preceding character	BACKSPACE
Working with a window:	
Select the menu bar	ALT or F10
Carry out a command or action	ENTER
Cancel a command or action	ESC
Toggling full-screen and window display for non-Windows-based applications ²	ALT+ENTER
Select an application's Control menu	ALT+SPACEBAR
Select the Control menu in a document window	ALT, HYPHEN (-)
Display the Task List	CTRL+ESC
Move to the next application	ALT+TAB
Quit the current application	ALT+F4
Working with multiple document windows:	
Move a document window	CTRL+F7, arrow keys
Size a document window	CTRL+F8, arrow keys
Maximize a document window	CTRL+F10
Minimize a document window	CTRL+F9
Restore a document window	CTRL+F5
Close a document window	CTRL+F4
Move to the next document window	CTRL+F6
Switch to the previous document window	CTRL+SHIFT+F6
Move to the next pane	F6
Move to the previous pane	SHIFT+F6

² This shortcut also allows you to edit properties of a selected group or item in Program Manager and File Manager.

CHAPTER 3

Program Manager



Use Program Manager to organize your applications and files in groups and to easily start applications.

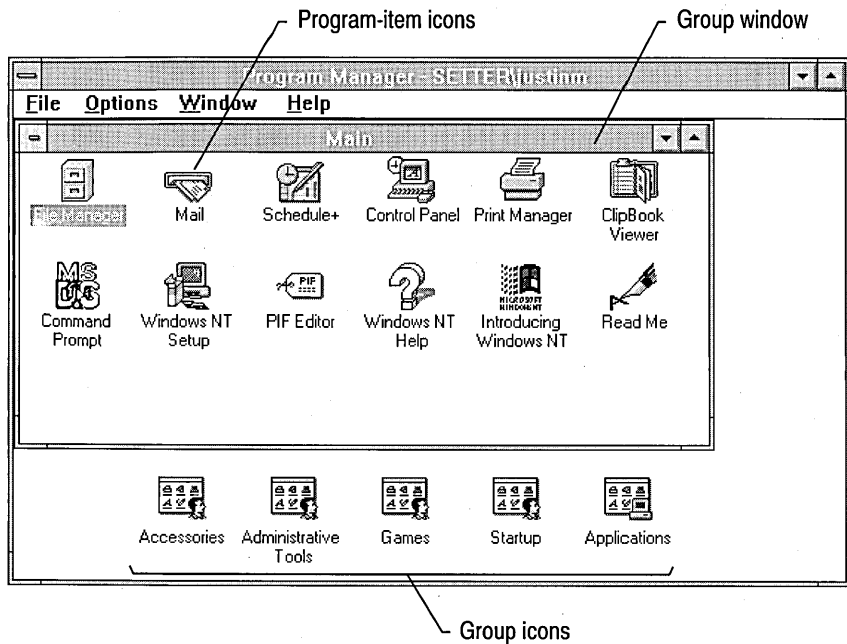
This chapter explains how to use Program Manager, including the following topics:

- Quitting Windows NT
- Working with group windows and icons
- Creating and deleting groups
- Creating, copying, moving, and deleting program items
- Changing program item icons
- Starting applications from Program Manager
- Starting applications automatically when you log on to Windows NT

Overview

Use Program Manager to start applications and to organize applications and files on the Windows NT desktop. Program Manager starts when you log on to Windows NT. The name of the computer or domain that you specified when you logged on and your username appear in the title bar of the Program Manager window. When you want to leave Windows NT, use Program Manager to log off or shut down your computer.

The first time you log on to Windows NT, Program Manager opens on your desktop with the Main group window open inside the Program Manager window.



Program Manager lets you organize your applications so that you can easily find and run them. To get working quickly, you can have an application open a document automatically when it starts. Or you can start applications automatically when you log on to Windows NT. Use groups and program items to organize your applications. Groups can be displayed as windows or icons.

Program-item icons appear inside a group window and represent the applications, accessories, and documents you can start from Program Manager. Double-clicking a program-item icon starts the application that the icon represents. Program-item icons can be moved between groups but not outside of them.

A *group window* is a separate window inside the Program Manager window that contains program-item icons. Each group window has its own Control menu in the upper left corner, but no menu bar. You can control group windows using commands from the Program Manager menu bar. Group windows cannot be moved outside the Program Manager window.

A *group icon* is a minimized group window. Group icons appear along the lower edge of the Program Manager window. Each is labeled to indicate what sort of program items are in the group. Like group windows, group icons cannot be moved outside the Program Manager window.

Quitting Windows NT Using Program Manager

Program Manager runs as long as you are running Windows NT. To end your Windows NT session when you want to leave your computer running, return to Program Manager and log off. When you want to turn off your computer, return to Program Manager and use the Shutdown option.

▶ To log off from Windows NT

1. From the File menu, choose Logoff. Or double-click the Control-menu box.
2. Choose the OK button to confirm that you want to log off.

The system closes any running applications and displays the Welcome dialog box. Before closing an application, the system prompts you to save any unsaved work. Running services are not stopped.

▶ To shut down your computer

1. From the File menu, choose Shutdown.
2. Choose the OK button to confirm that you want to shut down your computer.

The system closes running applications and services, and informs you when you can safely switch off your computer.

If you want to restart your computer immediately rather than switch it off, select the Restart When Shutdown Is Complete check box. Windows NT automatically restarts after closing applications and services.

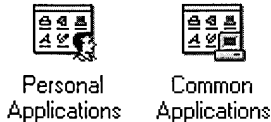
Caution Never use the computer's power switch to quit Windows NT. Always choose the Shutdown command to quit, so Windows NT can save changes in all working files and properly close applications and services.

What Are Groups and Program Items?

A group contains program items. You can display a group as either an icon or a window. When a group window is open, you can work with its program items—icons that represent applications. When you choose a program item, the application it represents starts. If you have specified a document in the program item, the application opens the document for you when it starts.

Groups provide a convenient way to organize your applications, and program items provide an easy way to start your applications. Because you can associate a file with an application when you create a program item, you can create groups that organize files belonging to a project and let you easily switch from one part of the project to the next.

Windows NT provides personal groups and common groups. Personal groups are stored as part of each user's logon information. Each time a particular user logs on, that user's personal groups appear. Common groups appear for all users who log on to the computer. Personal and common groups have different icons:



When you installed Windows NT, the system created groups and program items for applications.

Group	Description
Main	Contains the Windows NT system applications including File Manager, Control Panel, and Print Manager. The Read Me item contains information you should know before you start working with Windows NT.
Applications	Contains applications found on your hard disk.
Administrative Tools	Contains applications for system management including User Manager, Disk Administrator, and Backup.
Accessories	Includes applications for word processing, drawing, and communications, plus several other applications such as a clock and a calculator.
Games	Offers games you can use to practice Windows skills.
Startup	Contains applications that start when you log on to Windows NT. You can add any applications you want to this group; it is empty until you add applications to it.

Opening Group Windows and Reducing Them to Icons

To start an application from a group, first open the group window that contains the program-item icon for that application. Once you have started the application, you can reduce the group window to an icon to free room on your desktop. For more information on starting applications, see “Starting an Application from a Group,” later in this chapter.

▶ **To open a group window**

- Double-click the group icon. Or select the group’s name from the list at the bottom of the Window menu. Or press CTRL+F6 or CTRL+TAB until the group icon you want is selected, and then press ENTER.

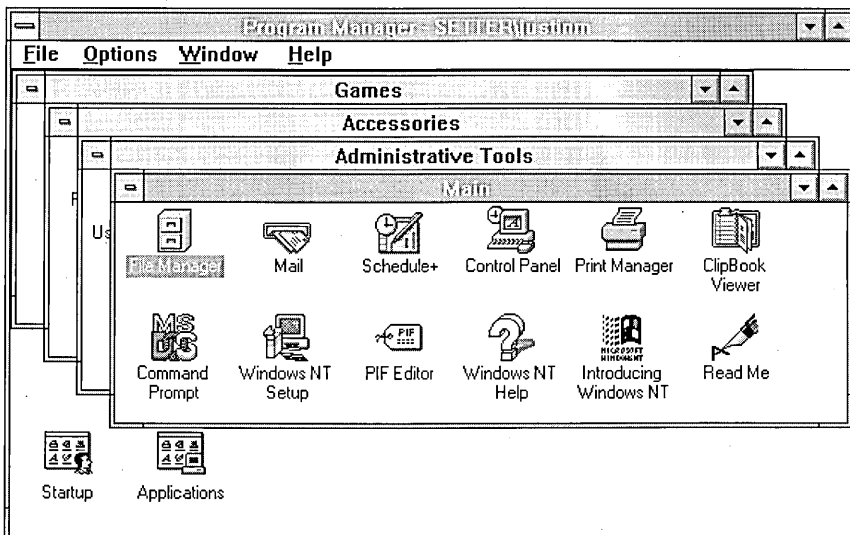
▶ **To reduce a group window to an icon**

- Click the Minimize button, or double-click the Control-menu box for the group.

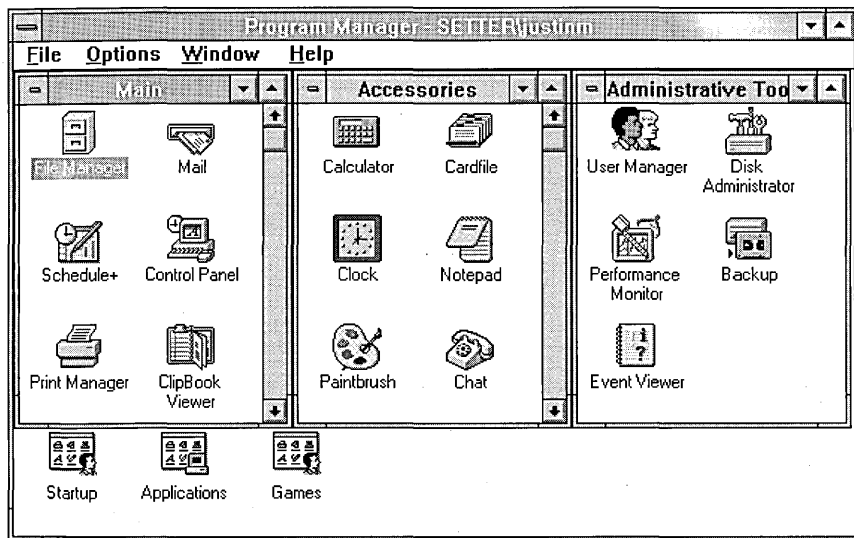
Arranging Group Windows

When several group windows are open, some windows will hide others. Use the Cascade and Tile commands from the Window menu to arrange all the open windows so that some part of each window is visible.

The Cascade command resizes and layers the open group windows within the Program Manager workspace so that each title bar is visible.



The Tile command divides the Program Manager workspace into smaller windows of similar sizes for each group window you have open.



If you open another group window after you use the Cascade or Tile command, it covers the arranged windows. To arrange it with the other windows, choose the Cascade or Tile command again.

- ▶ **To arrange all the open group windows**
 - From the Window menu, choose Cascade or Tile.

Arranging Group and Program-Item Icons

You can arrange icons one at a time, or have Program Manager organize them all at once. When Program Manager arranges group icons, it aligns them along the lower edge of the Program Manager window. When arranging program-item icons, Program Manager distributes them within their group window.

- ▶ **To arrange icons one at a time**
 - Drag each icon to a new location.
- ▶ **To arrange group icons**
 1. Select any group icon.
 2. From the Window menu, choose Arrange Icons to align the group icons along the lower edge of the Program Manager window.

▶ **To arrange program-item icons**

1. Open the group window that contains the program-item icons you want to rearrange.
2. From the Window menu, choose Arrange Icons to distribute the program-item icons evenly within the selected group window.

Windows NT can automatically arrange program-item icons whenever you change the window size, or add, delete, or move program items. You can adjust the spacing between icons by choosing the Desktop icon from Control Panel, and then typing a number in the Icon Spacing box.

▶ **To automatically arrange icons**

- From the Options menu, choose Auto Arrange.
A check mark beside the command means it is in effect.

Saving Program Manager Settings

Once you have set the appearance of your group windows and icons, you can save it. Then each time you log on to Windows NT, they will appear as you set them up. As an alternative, you can choose to save the appearance of group windows and icons as they are when you log off of Windows NT. When you next log on to Windows NT, they will appear as they were when you logged off.

▶ **To save the current settings**

- From the Options menu, choose Save Settings Now.

So that different settings are not saved when you log off from Windows NT, make sure that the Save Settings On Exit command is not checked.

▶ **To save settings when you log off from Windows NT**

- From the Options menu, choose Save Settings On Exit.

A check mark appears next to the command. You can turn this feature off by choosing the command again.

Creating Groups

You can create personal and common program groups using Program Manager. Generally, you will only need to create personal groups. When you log on, the groups you have created are ready for you. When another user logs on to the computer, that user does not see your program groups. You can add any number of groups to Program Manager to organize your applications and documents in a way that makes sense to you. After creating a group, you can add program items to it. For more information, see “Creating Program Items,” later in this chapter.

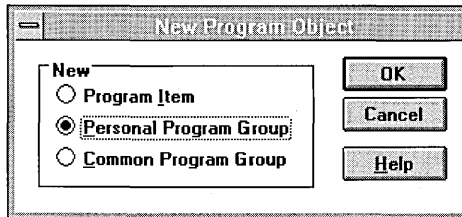
Create a common program group only when you want all users of the computer to have access to the program items in the group. If, for example, you have installed an application that you want to make available to all users of the computer, you can place it in a common program group.



To create a common group, you must be logged on as a member of the Administrators or Power Users group. Users who are not members of one of these groups can copy program items from a common group to their personal groups; however, they cannot delete or move program items from common groups.

► To create a new group

1. From the File menu, choose New.



2. In the New Program Object dialog box, select Personal Program Group or Common Program Group, and then choose the OK button.
3. In the Description box, type a description for the group you want to create and choose the OK button.

This description will appear in the title bar of the group window and below the group icon.

Creating Program Items

To create a program item, define the properties for the item. You can create a program item using Program Manager, File Manager, or Windows NT Setup. If you use File Manager or Windows NT Setup to create a program item, Windows NT will define the item's properties for you. Each method of creating program items has advantages:

- Use Program Manager when you want to specify the program item's properties such as the application's working directory or which document the application will open when it starts. Also use Program Manager when you want to change a program item's properties.
- When you are using a mouse, File Manager provides the most direct way to create a program item and place it in the group you choose.
- Windows NT Setup is fastest when you need to create many program items at one time. For more information on this method, see Chapter 12, "System Maintenance with Windows NT Setup."

Creating or Changing a Program Item Using Program Manager

You can use Program Manager to create a program item for an application or for an application and a document. The following steps guide you through the basics of creating a program item. If you want, you can also specify a working directory, a shortcut key, and that the program start running minimized.



To create or change a program item in a common program group, you must be logged on as a member of the Administrators or Power Users group.

► To create a program item using Program Manager

1. Open the group to which you want to add the item.
2. From the File menu, choose New to display the New Program Object dialog box. Then select the Program Item option and choose the OK button. Or press and hold down ALT while double-clicking in a blank area of the group window.

Program Item Properties

Description:

Command Line:

Working Directory:

Shortcut Key:

Run Minimized

OK

Cancel

Browse...

Change Icon...

Help

3. In the Description box, type a description that identifies the application.

This optional description becomes the label that appears under the icon in the group window. If you leave this box blank, Program Manager labels the icon for you. However, a description of your own can be very useful, especially if you set up multiple program items for the same application.

4. In the Command Line box, type the name of the program file, including its path and extension.

For example, to add Microsoft Excel, located in a directory named C:\EXCEL, you would type:

c:\excel\excel.exe

If you don't know the name of the program file, choose the Browse button to display a list of files and directories. Select the appropriate filename from the list. You can use the directory listing to change to a different directory, if necessary. Choosing the OK button places the selected filename in the Command Line box.

If you want the application to open a document when it starts, after the program name type a space and then the document's filename. Include the path required to locate the document. Be sure to separate the program name from the document name with a space.

For example, to specify a spreadsheet named 92BUDGET.XLS, located in the C:\ADMIN\FY92 directory, as the document to be opened when you start Microsoft Excel, you would type:

c:\excel\excel.exe c:\admin\fy92\92budget.xls

If the document is in the same directory as the application, you can omit the path. For example, to specify a spreadsheet named EXPENSE.XLS, located in the C:\EXCEL directory, you would type:

c:\excel\excel.exe expense.xls.

5. Choose the OK button.

The dialog box closes and the new program item appears in the group.

You can also specify a working directory, a shortcut key, and whether the application starts as an icon in the Program Item Properties dialog box.

► **To specify a working directory**

- In the Working Directory box, type the name of the directory.

When you start the application, the directory you specify as the working directory will become the current directory. It will be the default directory in the application's Open and Save As dialog boxes when you open and save files.

▶ **To specify an application shortcut key**

- Type the key combination in the Shortcut Key box.

A shortcut key allows you to switch quickly to the application when it is running. Valid shortcut-key sequences are CTRL+ALT+*character*, CTRL+SHIFT+*character*, SHIFT+ALT+*character*, and CTRL+SHIFT+ALT+*character*. *Character* can be any letter, number, or special character. When you type a character in the Shortcut Key box, Program Manager adds CTRL+ALT in front of it. To specify a different control-key sequence, you must type the sequence.

You can reserve shortcut keys for an MS-DOS application by using Program Manager or PIF Editor. Shortcut-key settings made in Program Manager override settings made in PIF Editor.

▶ **To run an application as an icon when it starts**

- Select the Run Minimized check box.

When this box is selected, the application is reduced to an icon when it starts. When you want applications you have added to the Startup group to run minimized when you start Windows NT, use this option.

Once you have created a program item, you can change its properties.

▶ **To change a program item**

1. Select the program item and choose Properties from the File menu.
2. Change any of the options in the Program Item Properties dialog box and choose the OK button.

Creating a Program Item Using File Manager

You can also use File Manager to create program-item icons in Program Manager groups. You can move applications and associated documents from File Manager directories to Program Manager group windows or group icons.



To create a program item in a common program group, you must be logged on as a member of the Administrators or Power Users group.

The following steps require a mouse and have no keyboard equivalent.

▶ **To create a program item using File Manager**

1. Arrange your desktop so that you can see both File Manager and the group where you want to place the new program item.

The destination group can be either a window or an icon.

2. Open the File Manager window, and if necessary position and resize it. If no other application windows are open, you can use the Tile button in the Task List to arrange the File Manager and Program Manager windows.
3. Locate and select the program or document file in File Manager that you want to add. You can select multiple items and add them all to a group at the same time.
4. Drag the file from File Manager to Program Manager, and place it in the group window or on the group icon.

As you drag the file, the mouse pointer turns into a replica of a file icon. If you have more than one file or document selected, you see a multiple-file icon.

Once you have created the program item, you can customize its properties by selecting the icon and choosing Properties from the File menu. For more information on program-item properties, see “Creating or Changing a Program Item Using Program Manager,” earlier in this chapter.

Deleting Groups and Program Items

When you no longer need a group or program item, you can delete it. When you delete a group, Program Manager deletes the program items it contains. Deleting program items has no effect on the corresponding application and document files. They are not removed from your hard disk.



To delete a common program group or program items in a common group, you must be logged on as a member of the Administrators or Power Users group.

▶ **To delete a group**

1. If the group contains program items, reduce it to an icon. If the group window is empty, you can delete it without reducing it to an icon.
2. Select the group icon or empty group window.
3. From the File menu, choose Delete. Or press DEL.
4. A dialog box prompts you to confirm the deletion. Choose the Yes button to remove the group.

▶ **To delete a program item from a group**

1. Open the group window that contains the item you want to delete.
2. Select the program-item icon.
3. From the File menu, choose Delete. Or press DEL.
4. A dialog box prompts you to confirm the deletion. Choose the Yes button to remove the program item.

Changing the Description of a Group

You can change the description of any group. The description is the label for the group icon and appears in the title bar of the group window.



To change the description of a common group, you must be logged on as a member of the Administrators or Power Users group.

▶ **To change the description of a group**

1. Make sure the group whose description you want to change is reduced to an icon.
2. Select the group icon.
3. From the File menu, choose Properties. Or press and hold down ALT while double-clicking the program-group icon.
4. In the Program Group Properties dialog box, type a new description, and then choose the OK button.

Copying a Program Item to Another Group

The easiest way to copy a program item from one group to another is to use the mouse to drag the program-item icon onto the other group icon or into the other group window. If you don't have a mouse, you can use the Copy command on the File menu.



You can always copy a program item from a common group to one of your personal groups. However, you must be logged on as a member of the Administrators or Power Users group to copy a program item from a personal group to a common group.

▶ **To copy a program item to another group**

1. If you're not concerned with where the new program-item icon is placed in the group window, open the group window containing the program-item icon you want to copy and leave the destination group reduced to an icon.

If you want to place the new program-item icon in a particular location in a group window, open the group windows for both the source and the destination.

2. Press and hold down CTRL while you drag the program-item icon from its current location to the destination group's icon or window.

The mouse pointer becomes a replica of the program-item icon you are copying.

3. When the copied icon is on top of the destination group's icon or inside the destination group's window, release the mouse button and the CTRL key.

You can create a duplicate program item within a group. Press CTRL while dragging the icon to another place in the window.

► **To copy a program item to another group using the Copy command**

1. Open the group window that contains the program item you want to copy.
2. Select the program-item icon.
3. From the File menu, choose Copy.
4. In the To Group box, select the name of the group you want to copy the program item to.
5. Choose the OK button.

Moving a Program Item to Another Group

Moving a program item is easiest if you have a mouse. You can simply drag the program-item icon onto the other group icon or into a group window. If you don't have a mouse, you can use the Move command on the File menu.



To move a program item from a common group, you must be logged on as a member of the Administrators or Power Users group.

► **To move a program item to another group**

1. Open the group window that contains the program item you want to move.
2. Drag the program-item icon to the destination group's icon or window.
The mouse pointer becomes a replica of the program-item icon you are moving.
3. When the program-item icon is on top of the destination group's icon or inside the destination group's window, release the mouse button.

► **To move a program item to another group using the Move command**

1. Open the group window that contains the program item you want to move.
2. Select the program-item icon.
3. From the File menu, choose Move.
4. In the To Group box, select the name of the group you want to move the program item to.
5. Choose the OK button.

Changing an Icon

When you add a program item to a group, Program Manager selects an icon for that item. You can change the icon displayed in the group window.



To change an icon in a common group, you must be logged on as a member of the Administrators or Power Users group.

► **To change an icon**

1. Select the program item whose icon you want to change.
2. From the File menu, choose Properties.
3. In the Program Item Properties dialog box, choose the Change Icon button.
4. Use one of the following methods to select a new icon:
 - If more than one icon is available, select a different icon in the Current Icon box.
 - If no additional icons are available, Windows NT displays the icons available with PROGMAN.EXE. Select an icon in the Current Icon box.
 - In the File Name box, type the path to either PROGMAN.EXE or MORICONS.DLL, for example `c:\winnt\system32\moricons.dll`, and choose the OK button. Then select an icon in the Current Icon box.
5. Choose the OK button.

Starting an Application from a Group

If an application is represented by a program-item icon in a group, the easiest way to start the application is to choose the program-item icon from the group window. If you included a document with the program item, it appears in the application workspace. For more information, see “Creating or Changing a Program Item Using Program Manager,” earlier in this chapter.

► **To start an application from a group**

1. Open the group window that contains the program-item icon for the application.
2. Double-click the icon.

When you start an application, Program Manager changes the current directory to the directory you specified in the Working Directory box when you added the program item to the group. If you are using an MS-DOS application, you can specify a working directory in either Program Manager or PIF Editor. Settings made in Program Manager override PIF Editor settings.

Use the following steps to run an application as an icon when you start the application.

▶ **To run an application as an icon**

1. Open the group window that contains the program-item for the application.
2. Press and hold down SHIFT while double-clicking the icon.

You can have Windows reduce Program Manager to an icon whenever you start an application. This is useful because the icon remains visible on the lower edge of the desktop when most applications are running, making it easy to find when you want to switch to Program Manager.

▶ **To reduce Program Manager to an icon whenever you run an application**

- From the Options menu, choose Minimize On Use.

A check mark appears beside the command when it is in effect. To cancel the command, choose it again.

Starting an Application When You Start Windows NT

When you install Windows NT using the Setup program, Windows NT creates a Startup group. When you add a program item for an application to the Startup group, the application starts each time you log on to Windows NT.

For example, if you want to start File Manager whenever you log on to Windows NT, move the File Manager icon from the Main group to the Startup group. Program items in the Startup group start in the order their icons appear in the window starting with the top row, and moving left to right.

You can also have Windows NT automatically reduce an application to an icon when it starts. To do this, select the Run Minimized box in the Program Item Properties dialog box for the application's program item.

Returning to Program Manager from an Application

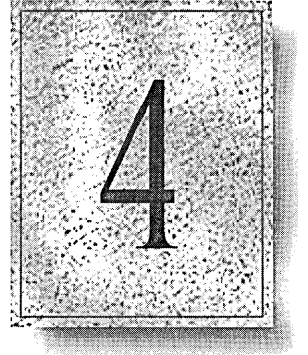
When you are working with an application or document and you want to start a different application, you can do so by returning to Program Manager.

▶ **To return to Program Manager from an application**

- Click the Program Manager window or double-click the Program Manager icon. Or press ALT+TAB repeatedly until the message box shows the Program Manager title and icon. Or press ALT+ESC repeatedly to move through open application windows and application icons until you reach Program Manager.

CHAPTER 4

File Manager



File Manager allows you to organize and work with directories and files.

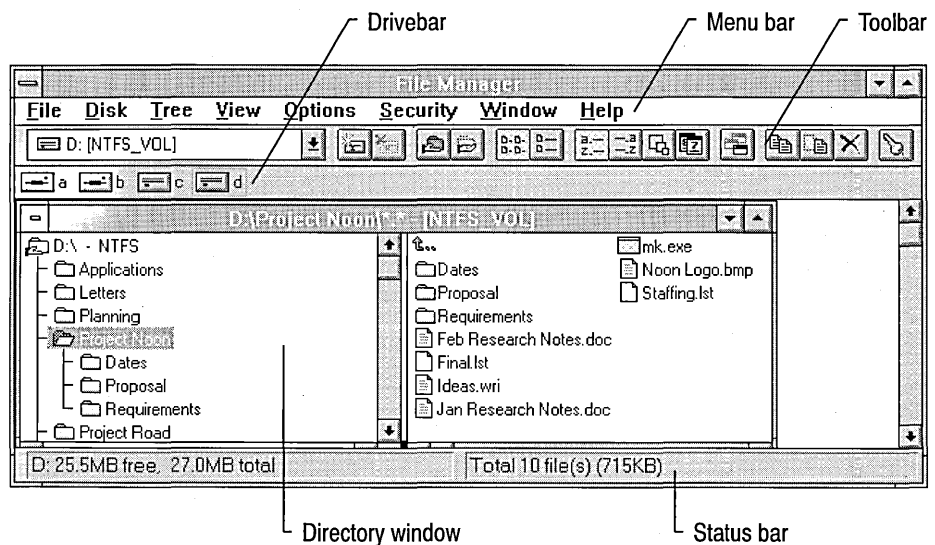
This chapter explains how to use File Manager and includes the following topics:

- Using directory windows to display directories and files
- Navigating drives and directories
- Working with directories and files
- Sharing directories and files
- Securing directories and files
- Maintaining disks

Overview

File Manager displays the organization of the directories and files on your disk drives and on network disk drives. Use File Manager to create and remove directories; move, copy, and delete files; connect to directories shared on the network; share directories; secure files and directories; and perform other disk, directory, and file management tasks.

When you first start File Manager, the File Manager window appears. It contains a menu bar, toolbar, drivebar, status bar, and a directory window that shows the contents of the current drive.



The *toolbar* provides quick access to commands through buttons and allows you to change drives by selecting from a list.

The *drivebar* allows you to change drives by selecting one of the drive icons. Different icons represent the floppy and hard drives on your computer, network drives to which you've connected, and CD-ROM drives.

The *status bar* shows you how much free space remains and total space exists on the current drive. It also shows you how many files are in the current directory and how much space they take up.

The toolbar, drivebar, and status bar are displayed by default. You can remove them from the screen by choosing the Toolbar, Drivebar, and Status Bar commands from the Options menu.

Starting and Quitting File Manager

By default, when you start File Manager, its window appears as it was when you last quit File Manager. Settings you make using the Options menu are always saved when you quit. The positions of directory windows and icons and the settings on the View menu are saved as long as the Save Settings on Exit command is in effect when you quit.

▶ To start File Manager



- Choose the File Manager icon in the Main Group. Or select the File Manager icon and press ENTER.

▶ To quit File Manager

- Choose the Control-menu box. Or, from the File menu, choose Exit.

Customizing the Toolbar

You can add, remove, and rearrange the buttons on the toolbar. Every command available on File Manager menus has an equivalent button.

▶ To add a button to the toolbar

1. From the Options menu, choose Customize Toolbar. Or double-click the background of the toolbar.
2. In the Available Buttons box, select the button that you want to add. Select Separator to add a space between buttons.
3. Choose the Add button.

▶ To move a toolbar button

- Press and hold down SHIFT while dragging the button to a new location on the toolbar.
–Or–
- 1. From the Options menu, choose Customize Toolbar. Or double-click the background of the toolbar.
- 2. In the Toolbar Buttons box, select the button or Separator you want to move.
To move the selection to the left on the toolbar, choose the Move Up button.
To move the selection to the right on the toolbar, choose the Move Down button.
- 3. Choose the Close button.

► **To remove a toolbar button**

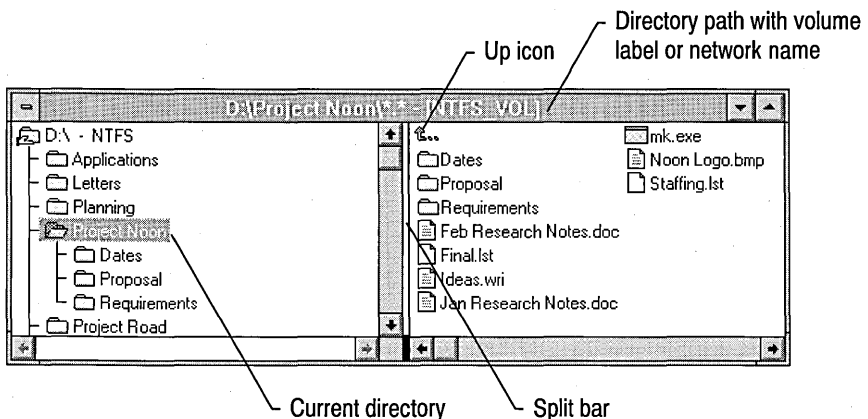
- Press and hold down SHIFT while dragging the button off the toolbar.
- Or–
- 1. From the Options menu, choose Customize Toolbar. Or double-click the background of the toolbar.
- 2. In the Toolbar Buttons box, select the button or Separator you want to remove, and then choose the Remove button.
- 3. Choose the Close button.

► **To restore the default toolbar buttons**

1. From the Options menu, choose Customize Toolbar. Or double-click the background of the toolbar.
2. Choose the Reset button.
3. Choose the Close button.

Working with Directory Windows

Each directory window is divided into two panes: the left pane displays the directory tree, and the right pane lists the contents of the current directory. The *directory tree* shows the structure of the directories on a disk. The directory structure begins at the upper left with the *root directory*, the first directory on a disk. The root directory is created when you format a disk. It is represented by a backslash (\). For example, C:\ is the root directory for drive C. Other directories branch below the root directory. The contents list in the right pane of the directory window shows the names of files and directories within the current directory. Directories within a directory are known as *subdirectories*. The panes are separated by a split bar that allows you to adjust their widths.



The following table describes the elements in a directory window.

Element	Description
Directory path	The name and location of the current directory is displayed in the title bar of the directory window.
Volume label	The name that identifies your disk is displayed in brackets ([]) to the right of the directory path. This information appears only if you have assigned a label to your disk.
Network name	If you have selected a shared directory, its name is displayed instead of the volume label.
File system name	The name of the file system used on the selected drive is displayed next to the root directory.
Directory icons	Icons representing directories and shared directories appear in both panes. In the directory tree, directory icons are connected by a vertical line to the directory level above them. In the contents list, directory icons represent directories in the current directory.
Current directory	The directory you are currently using is represented by an icon that looks like an open directory folder in the directory tree. File Manager commands affect the current directory or files within it.
File icons	Icons next to filenames indicate file type. There are icons to represent program files, document files, and other types of files. For more information, see “Working with Files and Directories,” later in this chapter.
Up icon	Double-clicking the arrow at the top of the contents pane takes you up one level in the directory tree.

Opening and Closing Directory Windows

You can open additional directory windows that display the contents of the same drive or a different drive. Opening multiple directory windows makes it easy to move and copy files.

If you have two or more windows displaying the same drive and directory information, a number appears in the title bar of each window indicating that there is more than one window displaying that directory.

A new directory window inherits its display options from the previous one. For example, if you are working with a directory window that shows only the directory tree, and you open a new directory window, the new window displays only the directory tree.

▶ **To open a new directory window**

To open a window

Do this

That displays information for the selected drive

Double-click the drive icon. Or press TAB to select the drivebar and use the arrow keys to select a drive icon. Then choose Open from the File menu, or press ENTER.

That displays the same information as the previous active window

From the Window menu, choose New Window. Or from the toolbar, click the New Window button.

That displays only the contents pane for the selected directory

In the directory tree, press and hold down SHIFT while double-clicking the directory icon. Or in the directory tree, select the directory icon, and then press SHIFT+ENTER.

When you finish working with a directory window, you can close it to clear space on your screen. If you have only one directory window open, you cannot close it.

▶ **To close the active directory window**

- Double-click the Control-menu box, located in the upper-left corner of the directory window. Or, from the Control menu, choose Close.

File Manager updates open directory windows automatically. For example, when you save a new file from an application, File Manager displays the new file name immediately. Sometimes File Manager cannot complete an update when, for example, you are using network directories or you have changed floppy disks. You can update the active directory window manually when this occurs.

▶ **To update a directory window**

- Click the drive icon for the current drive, or choose Refresh from the Window menu.

Selecting and Arranging Directory Windows and Icons

Before you can work with the files and directories in a directory window, you must select the window. Selecting the window makes it active: the title bar changes color or intensity and the window moves in front of any other open windows.

▶ **To select an open directory window**

- Click anywhere in the window. Or choose a window name from the list at the bottom of the Window menu. Or press CTRL+F6 or CTRL+TAB until the window you want is selected.

If the window you want to select is hidden by another window, you can use the Cascade or Tile commands on the Window menu to rearrange the open directory windows so that all of them are visible.

▷ **To arrange open directory windows**

To	From the Window menu, choose
Overlap windows so that each window's title remains visible	Cascade
Resize and arrange windows without overlap so that each window is wider than it is long	Tile Horizontally
Resize and arrange windows without overlap so that each window is longer than it is wide	Tile Vertically

When you minimize a directory window, it becomes an icon. You can move icons individually by dragging them with a mouse, or File Manager can arrange them evenly all at once. For information about changing the spacing between icons arranged by File Manager, see “Changing the Desktop” in Chapter 5, “Control Panel.”

▷ **To arrange icons**

- From the Window menu, choose Arrange Icons.

Displaying the Directory Tree or Contents

When you first start File Manager, the directory window displays both the directory tree for the current drive and the contents of the current directory. By using commands on the View menu, you can choose to display only the directory tree or only the contents of the current directory. When both panes of a directory window are displayed, they are separated by a split bar that you can move to change the widths of the panes.

▷ **To display the directory tree or directory contents**

To display	From the View menu, choose
Only the directory tree for the current drive	Tree Only
Only the contents of the current directory	Directory Only
The tree and contents for the current directory	Tree And Directory

► **To move the split bar**

1. Point to the split bar.

The pointer turns into a double bar with two arrows.

2. Drag the bar to a new position.

–Or–

1. From the View menu, choose Split to display a vertical bar.
2. Use the arrow keys to move the selection bar to where you want to place the split bar, and then press ENTER.

If you decide you do not want to move the split bar, press ESC to cancel the command.

Changing the Font in File Manager

You can change the font that File Manager uses to display the names of files and directories. When you change the font, it changes in all directory windows.

► **To change the font**

1. From the Options menu, choose Font.

2. In the Font box, select the font you want to use.

When you select a font, a style, or a size, the text in the Sample box changes to reflect your choice.

3. In the Font Style box, select a style option (for example, bold or italic).

4. In the Size box, select a point size: the larger the point size, the larger the character appears on your screen.

5. By default, file and directory names appear in lowercase letters on FAT drives. On drives formatted to use the Windows NT files system (NTFS), names appear as they were typed in uppercase and lowercase.

To display names on FAT drives in uppercase, clear the Display Lowercase For FAT Drives check box.

To display names on all drives in lowercase, select the Display Lowercase For All Drives check box.

6. Choose the OK button.

Navigating Drives and Directories

You can use File Manager to change to different local and network drives and to navigate through the directory structure.

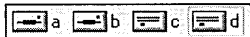
Changing Disk Drives

A directory window shows the directory structure of the current drive. On the drive bar, the icon for the current drive is surrounded by a rectangle. On the toolbar, the current drive is shown in the list box.

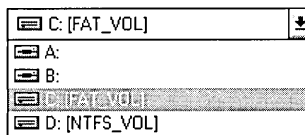
When you change to a different drive, the names of the files and directories on that drive are displayed in the directory window. When File Manager searches the drive to display its contents, you can press ESC to stop the search. If you stop the search, only a partial directory tree is displayed, as indicated by the status bar at the bottom of the File Manager window.

► To select another drive in a directory window

- Click the drive bar icon representing the drive you want to use.



Or choose the drive from the toolbar drive list.



Or press and hold down CTRL while typing the letter of the drive you want to select.

—Or—

1. Press TAB or F6 to move to the drivebar.

To move back to the directory tree or contents area without changing drives, press TAB or F6 again.

2. Use the arrow keys to select the drive icon you want, and then press the SPACEBAR.

► **To change drives by using the Select Drive command**

1. From the Disk menu, choose Select Drive. Or double-click the background of the drive bar to display the Select Drive dialog box.
2. Select the drive you want to change to.
3. Choose the OK button.

Changing Directories

You can change directories using either the directory or the contents list.

In the directory tree, the current directory is marked by the *selection cursor*, a dotted rectangle around the highlighted icon and text. You can select only one directory at a time in the directory tree. To change to a different directory, move the selection cursor.



In the contents list, you can move up or down one level in the directory structure. You can go up one level by choosing the Up icon, and you can change to a subdirectory by choosing its icon in the list.

► **To change to another directory in the directory tree**

- Click the directory name you want to change to. Or use the following keys to change to a different directory.

Press	To change to
UP ARROW or DOWN ARROW	A directory above or below the current directory.
HOME or BACKSLASH (\)	The root directory.
END	The last directory in the list.
RIGHT ARROW	The first subdirectory of the current directory, if one is displayed in the directory tree.
LEFT ARROW or BACKSPACE	The next directory level up from the current directory.
PAGE UP	The directory one screen up from the current directory.
PAGE DOWN	The directory one screen down from the current directory.
CTRL+UP ARROW	The previous directory at the same level.
CTRL+DOWN ARROW	The next directory at the same level.
A character key	The next directory whose name begins with that letter or number.

► **To change directories by using the contents list**

To		Do this
Move down a level		Choose the directory icon next to the subdirectory's name.
Move up a level		Choose the Up icon, or press the BACKSPACE key.

Expanding and Collapsing the Directory Tree

When you first start File Manager, only the first level of directories are displayed in the directory tree.

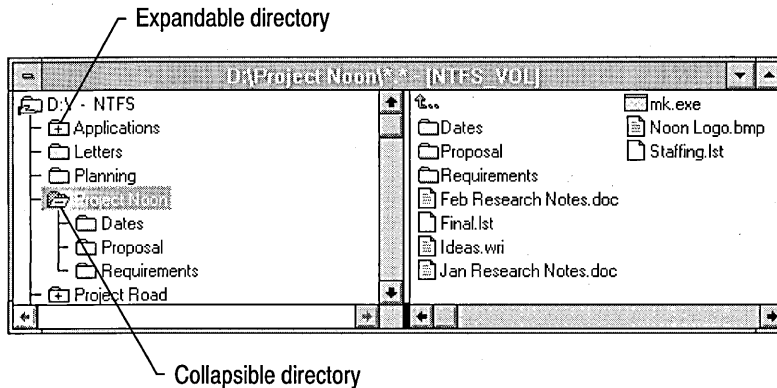
When you *expand* a directory, the directory tree displays the names of the subdirectories in that directory. Like the structure of a tree, subdirectories branch from directories. You can expand an entire directory branch, a single level of the branch, or all branches in the tree. You can also *collapse* a directory so that its branch of subdirectories is not listed in the directory tree.

► **To expand or collapse a directory**

To	Do this in the directory tree
Expand one level of a directory	Choose the icon or name of the directory you want to expand, or select the directory, and then choose Expand One Level from the Tree menu.
Expand an entire branch	Select the directory, and then choose Expand Branch from the Tree menu.
Expand all branches in the directory tree	From the Tree menu, choose Expand All.
Collapse a directory	Choose the icon or name of the directory you want to collapse, or select the directory, and then choose Collapse Branch from the Tree menu.

Showing Which Directories Expand

If you want to know which directories have subdirectories, you can use the Indicate Expandable Branches command on the Tree menu. When you use this command, a plus sign (+) marks each directory that has subdirectories. The plus sign means you can expand the directory to display its subdirectories in the directory tree. After you expand a directory, the plus sign changes to a minus sign (-), indicating that the directory is expanded and can be collapsed. If you choose the Indicate Expandable Branches command, File Manager may take longer to create the directory tree.



- ▶ **To mark expandable directories in the directory tree**
 - From the Tree menu, choose Indicate Expandable Branches.
 - A check mark appears next to the command in the Tree menu.
 - To turn off this feature, choose Indicate Expandable Branches again.

Connecting to and Disconnecting from a Network Drive

You can use File Manager to connect to and disconnect from network drives. When you connect to a network drive, you can specify whether or not to reconnect to the drive each time you log on to Windows NT.

When you connect to a network drive, File Manager opens a new window in which to display the directory information. You can switch this feature off from the Options menu by choosing the Open New Window On Connect command.

Computers in your computer's domain or workgroup are displayed automatically in the Shared Directories box. If you are connecting over a slow network, for example connecting through Remote Access Service, you can switch this off by clearing the Expand By Default check box.

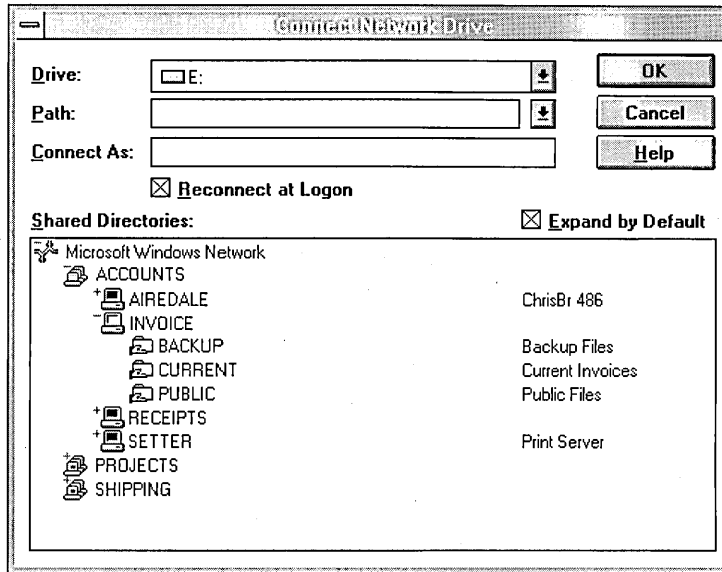


If you are logged on as a member of the Administrators or Backup Operators groups, you can connect to a computer's administrative root shares, for example \\SALESERVER\C\$. Administrative shares are not displayed by the Shared Directories box in the Connect Network Drive dialog box.

► To connect to a network drive



1. Choose Connect Network Drive from the Disk menu, or choose the Connect Drive button on the toolbar.



2. File Manager displays the first free drive letter in the drive box. You can accept the displayed drive letter for the connection, or choose another.
3. Select or type a network path in the Path box. A network path consists of a computer name followed by the name of a shared directory, for example, **\\shipping\public**.
 - If you have connected to the directory before, select the path from the list displayed in the Path box. The Path box displays the previous 10 paths.
 - You can use the Shared Directories box to select a network path. In Microsoft Windows-based networking you can browse domains, workgroups, and computers to look for shared directories. Other networks may contain different resources you can browse.

The networks, domains and workgroups, computers, and shared directories are organized in a tree structure. Choose an item to expand the list. Choose a network name to display available domains and workgroups, a domain or workgroup name to display available computers, a computer name to display its shared directories. When you select a shared directory, File Manager fills in the Path box with the name you selected.

- If you know the name of a computer, but need to see the names of its shared directories, you can type the computer name in the Path box and choose the OK button. Preface the computer name with two backslashes (\). Windows NT adds the name of the computer's first shared directory to the Path box and displays all of the computer's shared directories in the Shared Directories box. To connect to different directory, select it in the Shared Directories box.
 - You can type the name of a network resource in the Path box. On a Microsoft Windows-based network, type the name of a computer and shared directory. Preface the computer name with two backslashes (\) and separate the computer name from the shared directory's name with a single backslash (\), for example **\\shipping\salesq1**.
4. By default, you are connected under the username you used to log on. If you want to connect under a different username, type it in the Connect As box. For example, you may want to connect to a shared directory using a name that allows greater access to files in the directory.

On a Microsoft Windows-based network, you can connect using an account on a different domain by specifying the domain and the username for the account. Separate the domain name from the username with a backslash, for example **projects\chrisbr**.

5. If you do not want to connect to the shared directory each time you log on, clear the Reconnect At Logon box.
6. Choose the OK button.

▶ **To disconnect from a network drive**









1. Choose Disconnect Network Drive from the Disk menu, or choose the Disconnect Drive button on the toolbar.
2. In the Disconnect Network Drive dialog box, select one or more network drives and choose the OK button.

Working with Directory Information

You can control how File Manager displays directory information by using commands on the View menu.

The changes you make by using commands on the View menu affect the active directory window and any new windows you open from that window. Other open windows are not affected. In the contents list, File Manager displays icons next to names so that you can quickly identify directories and files. The following table describes the icons.

Icon	Represents
	Directories. These are listed first, in alphabetical order.
	Shared directories. These are directories you can connect to on the network, or you are sharing on your computer.
	Program files and batch files. Their default filename extensions are .EXE, .CMD, .COM, .PIF, and .BAT. These files start applications.
	Document files. These files are associated with applications. When you open one of these files, the associated application starts automatically. For more information, see “Associating Files with an Application,” later in this chapter.
	System or hidden files. These files have system or hidden attributes. For more information, see “Setting File Attributes,” later in this chapter.
	All other files.

Displaying Information on Files

When you first start File Manager, only the names of directories and files are shown. In addition to names, you can also display size, last modification date and time, and attributes of files in the contents list. On drives formatted to use the Windows NT file system (NTFS), you can display the MS-DOS–style names that Windows NT creates to accompany long filenames.

▶ To display only names of files and directories



- From the View menu, choose Name, or choose the Name button on the toolbar.

▶ To display complete information about each file



- From the View menu, choose All File Details, or choose the All File Details button on the toolbar.

The file size, last modification date and time, and file attributes are displayed next to each filename and directory name in the active directory window. If the directory is on a drive formatted to use the Windows NT file system (NTFS), the short, MS-DOS filename is shown as well as the long filename.

► **To display selected information about each file**

1. From the View menu, choose Partial Details.
2. Select the check boxes of options you want to display, and clear the check boxes of options you don't want to display.

The table that follows describes each option.

3. Choose the OK button.





You can select the following options in the Partial Details dialog box.

Select	To
Size	Display the size in bytes of each file.
Last Modification Date	Display the date each file was last modified, according to the system clock.
Last Modification Time	Display the time of day each file was last modified, according to the system clock.
File Attributes	Indicate whether files are hidden, system, archive, or read-only. For more information, see "Setting File Attributes," later in this chapter.
MS-DOS filenames for NTFS	Display short, MS-DOS-style names for long filenames on drives formatted to use NTFS.

Sorting the Contents of a Directory

When you first start File Manager, it lists directory contents alphabetically, with directories first, followed by filenames. You can sort the files and directories by name, type, size, or the date the file was last modified. Sorting files and directories affects the contents list only.

► **To sort the contents of a directory**

To sort contents by	Use	Or from the View menu, choose
Alphabet: Directories are sorted first, then files.		Sort By Name
Type: Directories and then files are sorted alphabetically by filename extension.		Sort By Type
Size: The largest file is listed first.		Sort By Size
Date: Directories and then files are sorted with the most recent first.		Sort By Date

Limiting the Files to Display

When you first start File Manager, the contents list displays the names of all the files and directories in the current directory, except hidden and system files. (For information about hidden and system files, see “Setting File Attributes,” later in this chapter.) You can specify whether File Manager displays only certain types of files, or groups of files with similar filenames or extensions.

► **To specify which types of files are displayed in a directory window**

1. From the View menu, choose By File Type.
2. In the By File Type dialog box, use the Name box to limit the display to a single filename. Use wildcards to limit the display to files with similar names.
A wildcard substitutes for one or more characters. Use an asterisk (*) to represent a group of characters. Use a question mark (?) to represent a single character. The Name box default, *.* , means all files in the directory are listed. For example, to display only those files with the extension .TXT, you can type *.txt.
3. Under File Type, select the types of files you want to display.

Select	To
Directories	Display the names of directories that are in the current directory.
Programs	Display all filenames that have an .EXE, .COM, .PIF, .CMD, or .BAT extension.
Documents	Display the names of text or graphics files associated with an application. For information about associating files, see “Associating Files with an Application,” later in this chapter.
Other Files	Display all filenames not included in the preceding three options.

4. To display hidden and system files, select the Show Hidden/System Files check box.
5. Choose the OK button.

Caution If you choose to display hidden and system files, be careful not to rename or delete them. Your computer may not start or work properly without them.

Working with Files and Directories

Once you select a file or directory, you can use File Manager to copy, move, delete, or rename it. You can also use File Manager to create a new directory. You can start applications from File Manager, and, once a type of file is associated with an application, you can open a file and start its application at the same time. Use File Manager to set the attributes for files.

Naming a File or Directory

An operating system's file system determines the conventions that apply to file and directory names. When you use Windows NT on drives formatted to use the Windows NT file system (NTFS), you can use long file and directory names. When you create a directory or rename a file and use a long filename, File Manager automatically creates a shorter, MS-DOS-style name. This allows applications that do not support long file names to use the file.

NTFS uses the following naming conventions:

- Names can be up to 256 characters long, including the extension. Separate the extension from the name using a period.
- Names preserve case, but are not case sensitive. When you name a file, your use of uppercase and lowercase letters will be retained. However, Windows NT does not distinguish filenames by their case. For example, Windows NT considers the filenames August Sales and AUGUST SALES to be identical.
- Names can contain any uppercase or lowercase characters except the following:

? " / \ < > * | :

When Windows NT creates a long name, it automatically creates a short, MS-DOS-style name as well. This keeps Windows NT compatible with MS-DOS workstations and applications. For example, a workstation running MS-DOS will use short names to see the shared directories and files on a Windows NT computer. Applications that do not support long file names will be able to work with files by using the short name. However, if you save a file using an application that does not support long filenames, the long filename will be lost and the file will have only a short name.

When you create a long name, Windows NT uses the following rules to create the short name:

- Spaces are removed.
- Periods are removed except for the last period in the filename that is followed by a character. Windows NT interprets this period as marking the start of the filename's extension.

- Characters not allowed in MS-DOS–style names are changed to underscores (`_`).
- The name, not including its extension, is truncated to 6 characters and a tilde (`~`) and a number are appended.
- The name's extension is truncated to 3 characters.

If you are using Windows NT in an environment where long file names are not always supported, you may want to continue using MS-DOS conventions for the first 6 characters of names and use periods only to separate the name from the extension. For example, you could name a file AUGSLs-August 1992 Sales Report.XLS. Then the short name would be AUGSLs-1.XLS.

MS-DOS conventions for naming files are:

- The name of a file or directory can have two parts: a name and an optional extension. The two parts are separated by a period.
- The name can contain up to eight characters, and the extension can contain up to three characters.
- The name must start with either a letter or number. It can contain any uppercase or lowercase characters except the following:

. " / \ [] : ; | = , ? * + < >

If you use these characters in a filename, you may get unexpected results.

- The name cannot contain any spaces.
- The following names are reserved and cannot be used for files or directories:

AUX	COM3	LPT1	NUL
COM1	COM4	LPT2	PRN
COM2	CON	LPT3	

Selecting Files or Directories

Before you can work with a file or a directory, you must select it. When a file or directory is selected, its name and icon are highlighted in the directory window. In the contents list, you can select more than one file or directory at a time in order to perform a task with several files at once. For example, you may want to select several files and move them to another directory. You can select a group of files or directories that appear in consecutive order, or you can select items that are not in sequence.

► **To select files or directories**

To select	Do this
A single file or directory	In the contents list, click the name of the file or directory you want to select. –Or– Press TAB to move the selection cursor to the contents list. Then use the UP ARROW or DOWN ARROW keys to select the file or directory.
Two or more items in sequence	Click the first file or directory you want to select. Then press and hold down SHIFT while you click the last item in the group. –Or– Press TAB to move to the contents list, and then use the arrow keys to select the first item. Then press and hold down SHIFT while selecting the remaining items using the arrow keys.
Two or more items out of sequence	Press and hold down CTRL while you click each item. –Or– Press TAB to move to the contents list, then use the arrow keys to select the first item. Press and release SHIFT+F8, then use the arrow keys to move to each item and press the SPACEBAR to select it. When you finish selecting items, press SHIFT+F8 again.
More than one group of items	Use any method to select the first sequential group of items. Hold down CTRL while you click the first item in the next group, and press and hold down CTRL+SHIFT while you click the last item in the group. –Or– Use the keyboard method with SHIFT+F8 to select the first group, then use the arrow keys to move to the first item in the next group and repeat the process, pressing SHIFT+F8 again when all items are selected.
All files in a directory	Press CTRL+SLASH (/).

When you are selecting files and directories using the keyboard, you can use the following keys.

Press	To select
UP ARROW or DOWN ARROW	A file or directory above or below the current selection.
END	The last file or directory in the list.
HOME	The first file or directory in the list.
PAGE UP	The file or directory at the top of the previous screen.
PAGE DOWN	The file or directory at the bottom of the next screen.
A letter or number	The next file or directory that begins with that letter or number.

▷ **To select a group of items by using the Select Files command**

1. From the File menu, choose Select Files.
2. In the Files box, type the name of the file you want to select.
Use wildcards to specify a group of files: For example, to select all files with a .TXT extension, type *.txt. Or, to select all files in a directory, leave the default *.* in the Files box.
3. Choose the Select button.
The Cancel button changes to the Close button.
4. Repeat steps 2 and 3 until you have selected all the files you want.
You can choose the Deselect button at any time to cancel a selection. The Deselect button cancels the selected files that you specify in the Files box.
5. Choose the Close button.

▷ **To cancel a selection of files or directories**

To cancel	Do this
A single selection	Press and hold down CTRL while you click the item. –Or– Press and release SHIFT+F8, use the arrow keys to move to the selection you want to cancel and press the SPACEBAR. Then press SHIFT+F8 again.
All selections	Press CTRL+BACKSLASH (\).

▷ **To cancel a group of selected files by using the Select Files command**

1. From the File menu, choose Select Files.
2. In the Files box in the Select Files dialog box, type the name of one of the selected files you want to cancel.
You can use wildcards to specify a group of files or all files that are selected in a directory.
3. Choose the Deselect button.
4. Repeat steps 2 and 3 until you finish canceling selections.
5. Choose the Close button.

Creating a Directory

You can create a directory by using the Create Directory command. After you create a directory, you can copy files and directories to it from other locations by using the Move and Copy commands. For more information, see “Moving and Copying Files and Directories,” later in this chapter.

► **To create a directory**

1. In the directory tree, select the directory in which you want the new directory to appear.
2. From the File menu, choose Create Directory.
3. In the Name box, type a name for the new directory.

Use the same conventions for naming directories as you do for naming files. For information, see “Naming a File or Directory,” earlier in this chapter.

If you decide to create the directory somewhere other than in the current directory, you can type the full path of the new directory.

4. Choose the OK button.

Moving and Copying Files and Directories

You can move and copy files and directories from one location to another by dragging them with the mouse or by using the Copy or Move commands. You can copy and move items between directories and between drives. When you move or copy a directory, all the files and subdirectories in it are moved or copied.



On drives formatted to use the Windows NT file system (NTFS), you must have permission to move or copy a file or directory. For more information on file and directory permissions, see “Securing Directories and Files,” later in this chapter.

Important When you copy files or directories, security permissions set on them are discarded as is ownership and auditing information. They will inherit a new set of permissions from the directory into which they have been copied. In the case of files, if the new directory does not specify permissions for files, only the file’s owner (the person who copied the file) will have permission to use the file. When you copy or move files or directories to a disk formatted to use the FAT file system, permissions are discarded and not replaced.

► **To move or copy files or directories by dragging**

1. Make sure the source and destination locations are visible. You can use the Cascade or Tile command on the Window menu to rearrange directory windows. The destination can be a directory icon, directory window, or drive icon. If the destination is a drive icon, the file will be placed in the current directory of that drive.
2. Select the file or directory you want to move or copy. You can select more than one file or directory.

When you drag a selection, Windows NT assumes you want to copy it when the destination is on a different drive and move it when the destination is on the same drive.

To	Do this
Move to a location on the same drive	Drag the selection.
Move to a location on any drive	Press and hold down SHIFT while dragging the selection.
Copy to a location on a different drive	Drag the selection.
Copy to a location on any drive	Press and hold down CTRL while dragging the selection.

3. Release the mouse button. If you are dragging while pressing SHIFT or CTRL, release the mouse button before releasing the key.
4. To complete moving or copying, choose the Yes button in the confirmation message.

You can choose not to receive confirmation messages. For more information, see “Turning Off Confirmation Messages,” later in this chapter.

If the destination directory contains a file with the same name, a dialog box prompts you to verify that you want to replace the existing file. Choose the Yes button to replace the existing file, or if you are moving or copying more than one file, choose the Yes To All button. If you choose the Yes To All button, File Manager does not prompt you for each file that is replaced.

► To move or copy files or directories using commands

1. Select the file or directory you want to move or copy.

You can select more than one file or directory.



2. To move, from the File menu, choose Move. Or choose the Move button on the toolbar.



To copy, from the File menu, choose Copy. Or choose the Copy button on the toolbar.

The name of the selected file or directory appears in the From box of the Move or Copy dialog box.

You can select a different file or directory by typing its name in the From box. If the file or directory is not in the current directory, include the path.

3. In the To box, type the destination drive or directory.

If you type a drive name without including a path, the file or directory will appear in the current directory of the drive.

If you type a new name, the original file or directory will be renamed when it is moved or copied.

4. Choose the OK button.

If the destination directory contains a file with the same name, a message prompts you to verify that you want to replace the existing file. Choose the Yes button to replace the existing file, or if you are moving or copying more than one file, choose the Yes To All button. If you choose the Yes To All button, File Manager does not prompt you for each file that is replaced.

Copying a File to the Clipboard

You can copy a file onto the Clipboard so that the file can be linked to or embedded in another document. For more information about object linking and embedding, see Chapter 10, “Object Linking and Embedding.”

► To copy a file to the Clipboard

1. Select the file you want to copy.
2. From the File menu, choose Copy to Clipboard.

The name of the selected file appears in the Copy to Clipboard box. You can copy a different file by typing its name in the box. If the file is not in the current directory, include its path.

3. Choose the OK button.

Deleting a File or Directory

You can use File Manager to delete files and directories. By selecting multiple files or directories, you can delete them at one time. When you delete a directory, all files and subdirectories in the directory are deleted.



On drives formatted to use the Windows NT file system (NTFS), you must have permission to delete a file or directory. For more information on file and directory permissions, see “Securing Directories and Files,” later in this chapter.

Caution Once you delete files or directories, they cannot be recovered.

► To delete a file or directory



1. Select the file or directory you want to delete.
2. From the File menu, choose Delete, or choose the Delete button on the toolbar. Or press DEL.
3. Choose the OK button to delete the selected file or directory, or type the name of a different file or directory you want to remove. If you type a long name that contains spaces, be sure to enclose the name in quotation marks.

File Manager prompts you to confirm the deletion. (You can choose not to receive confirmation messages. For more information, see “Turning Off Confirmation Messages,” later in this chapter.)

4. To delete a single file or directory, choose the Yes button. To delete more than one file or directory and without confirming each deletion, choose the Yes To All button.

Renaming a File or Directory

You can rename any file or directory by choosing the Rename command from the File menu.



On drives formatted to use the Windows NT file system (NTFS), you must have permission to rename a file or directory. For more information on file and directory permissions, see “Securing Directories and Files,” later in this chapter.

Caution Be careful when you rename files. If you rename a file that your system requires, for example, any file that has an .SYS extension, your system may not start or run correctly.

► To rename a file or directory

1. Select the file or directory you want to rename.
2. From the File menu, choose Rename.

The name of the selected file or directory appears in the From box. If you decide to rename a different file, type the name in the From box. To rename a group of files, use wildcards (for example, *.bak).

3. In the To box, type the new name.

Use a file or directory name that does not already exist in the destination directory. You can specify only one filename in the To box. If you want to rename a group of files, you can only use wildcards (for example, *.txt).

4. Choose the OK button.

Searching for a File or Directory

When you want to find a file or directory, use the Search command. You can select files and directories in the Search Results window and use File menu commands to print, copy, move, delete, and rename them. You can view file details by using commands on the View menu. However, although you can move or copy files from the Search Results window, you cannot move or copy files into it.

► To search for a file or directory

1. Select the directory that you want to start the search from.
2. From the File menu, choose Search.

3. In the Search For box, type the name of the file or directory. Use wildcards to search for a group of files or directories with similar names or extensions. For example, to search for all files with the extension .WRI, you would type ***.wri** in the Search For box.
4. In the Start From box, the current directory is listed. To start the search from a different directory, type the directory name in the Start From box.
5. By default, File Manager searches the directory listed in the Start From box, and all its subdirectories. If you do not want File Manager to search the subdirectories, clear the Search All Subdirectories check box.
6. Choose the OK button.

File Manager searches the directory and subdirectories you specified, displaying its progress in a dialog box. To cancel the search, choose the Cancel button. You can continue working with File Manager while the search continues in the background. To hide the dialog box while the search continues, choose the Hide button. When the search is complete, the Search Results window appears, displaying all the filenames and directories found.

If you modify the drive on which the search was performed and the Search Results window is active (or is made active), a message appears, asking whether you want to update the Search Results window. If you choose the Yes button, the search is performed again on the modified drive.

Associating Files with an Application

A file is associated with an application through the file's filename extension and the application's file type. Once a file is associated with an application, you can choose any file with the same extension in the directory window to start the application and load the file. Associating a file with an application also allows you to print the file from within File Manager if the application supports this feature. A file extension can be associated with only one application; however, an application can be associated with several different file extensions.

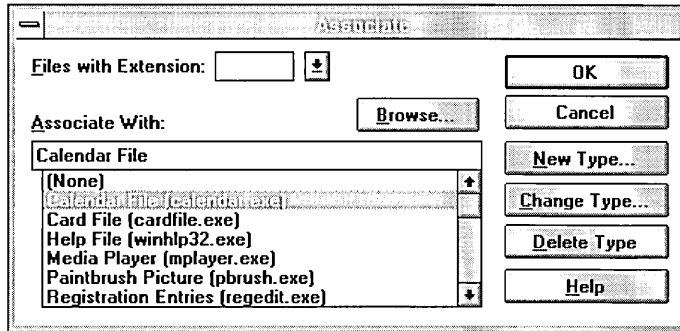
Many applications are associated with files when you install them. If an application does not automatically set up an association, you can associate files with it by using the Associate command.

► To create or change a file association using the Associate dialog box

1. In a directory window, select a file that has the extension you want to associate.

For example, to associate files that have a .DAT extension with an application, select any file that has a .DAT extension.

2. From the File menu, choose Associate.



3. The filename extension of the file you selected appears in the Files With Extension box. To associate a different filename extension, or if no file was selected when you chose the Associate command, type the extension in the Files With Extension box.

The extension's current association is selected in the Associate With list. If the extension is not associated with a file type, (None) is selected.

4. To associate the extension with a file type:

If the file type and program name appear in the Associate With list, select the file type and program name.

If the file type and program name do not appear in the Associate With list, type the program name including its extension in the Associate With box, for example **newapp.exe**. You can also choose the Browse button to search for the program name. In the Browse dialog box, selecting the program filename and choosing the OK button places the program name and its path in the Associate With box.

5. Choose the OK button.

If you specified a program name, File Manager automatically creates a new file type for it.

▷ To remove an association

1. In a directory window, select a file with the extension that you want to remove.
2. From the File menu, choose Associate.
3. In the Associate dialog box, the extension of the selected file appears in the Files With Extension box. To remove the association for a different filename extension, or if no file was selected when you chose the Associate command, type the extension in the Files With Extension box.
4. In the Associate With File Type box, select (None).
5. Choose the OK button.

Working with File Types

From the Associate dialog box, you can create, change, or delete file types. You can also work with file associations. To create a file type, name the file type and then provide the information that File Manager uses when opening or printing a file of that type either by starting the program or by using dynamic data exchange (DDE).

When DDE is used, you can specify the following options:

Option	Purpose
DDE Message	Specifies the DDE command to use if the application is already running
DDE Message Application Not Running	Specifies the DDE command to use if the application is not running
Application	Specifies the DDE application string used to initiate a DDE conversation with the application specified in the Command box
Topic	Specifies the DDE topic string used to initiate a DDE conversation with the application specified in the Command box

► To create a file type

1. In the Associate dialog box, choose the New Type button.
2. In the New File Type dialog box, type the name of the file type in the File Type box.
3. In the Action box, choose Open to specify the command File Manager executes when opening files of that type or Print to specify the command File Manager executes when printing files of that type.
4. In the Command box, type the command for the Open or Print actions.

Commands start with the name of the program file followed by application-specific parameters and the %1 parameter. The %1 parameter represents the filename of the file currently selected in File Manager when the action is performed.

You can choose the Browse button to search for a program name. In the Browse dialog box, selecting the program filename and choosing the OK button places the program name and its path in the Command box.

If the application supports DDE, specify the name of the program file in the Command box. Then select the Uses DDE check box and specify the application-specific DDE commands.

5. To associate an extension with the file type, type the extension in the New Extension box and choose the Add button. You can add multiple extensions.
6. Choose the OK button.

File type information for an application is added when the application is installed. In general, you should not need to change existing file types.



Some file types are protected. To change a protected file type, you must be logged on as a member of the Administrators or Power Users group.

▷ **To change a file type**

1. In the Associate dialog box, select the file type you want to change in the Associate With list, and then choose the Change Type button.
2. In the Change File Type dialog box, make any changes to the file type name or the commands associated with the Open and Print actions.
3. You can also add or remove extensions associated with the file type.

To associate an extension with the file type, type the extension in the New Extension box and choose the Add button. You can add multiple extensions.

To remove an associated extension, select it in the Extensions box and choose the Remove button.

4. Choose the OK button.

▷ **To delete a file type**

- In the Associate dialog box, select the file type you want to delete in the Associate With list, and then choose the Delete Type button.

Starting an Application from File Manager

You can use File Manager to start your applications. You start an application by opening a program file or document file from a directory window. Program files almost always have a .COM, .EXE, .PIF, .CMD, or .BAT filename extension. Document files are associated with applications and are represented by document-file icons in directory windows. For information about the types of file icons, see “Working with Files and Directories,” earlier in this chapter.

When you start an application that runs in a window, the window appears in front of any open File Manager windows. When you start an application that uses the entire screen, the application replaces the File Manager window. If you want to reduce File Manager to an icon each time you start an application, choose the Minimize On Use command from the Options menu.

- ▶ **To start an application from a program file or document file**
 - In the directory window, choose the filename.
 - Or–
 - 1. Select the filename in the directory window.
 - 2. From the File menu, choose Open; or press ENTER.

- ▶ **To start an application and open a file**
 - Drag the icon for the data file onto the icon for the program file.
 - Or–
 - 1. Select the program file for the application you want to use.
 - 2. From the File menu, choose Run.
 - 3. The name of the program file appears in the Command Line box. If you did not select a program file, or if you want to run a different application, type the name (and path, if necessary) of the program file in the Command Line box.
Then, in the Command Line box, add the name of the data file after the program filename. Include the path if the data file is not in the same directory as the program file.
 - 4. If you want the application to start minimized, select the Run Minimized check box.
 - 5. Choose the OK button.

Printing a File from File Manager

Using File Manager, you can print files that are associated with applications. You can use the Print command, or, if you are using a mouse, you can simply drag the file icon onto the minimized Print Manager icon.

Note Some applications do not support printing through File Manager. If this is the case, or if a file is not associated with an application, you must open the application and print the file from there.

- ▶ **To print a file by dragging the file icon**
 1. Make sure Print Manager is started and minimized to an icon on the desktop.
 2. Drag the document-file icon onto the Print Manager icon.

- ▶ **To print a file by using the Print command**
 1. In the directory window, select the file you want to print.
 2. From the File menu, choose Print.
 3. Choose the OK button.

Turning Off Confirmation Messages

If you do not want a confirmation message to appear each time you delete or replace files and directories, you can change the confirmation settings. You can also turn off messages that appear when you perform certain mouse actions, such as moving and copying. If you turn off confirmation messages, File Manager carries out commands as soon as they are issued.

► **To turn off confirmation messages**

1. From the Options menu, choose Confirmation.
2. Clear the check box for each confirmation option you want to cancel, and then choose the OK button.

Clear this option	If you don't want a warning message
File Delete	Before deleting files
Directory Delete	Before deleting directories
File Replace	Before writing over existing files
Mouse Action	Before moving or copying files by dragging
Disk Commands	Before formatting or copying a disk
Modifying System, Hidden, Read Only files	Before deleting, replacing, or moving system, hidden, and read-only files

Caution If you clear the Directory Delete check box, remember that when you delete a directory, all files and subdirectories in that directory are deleted. Also, to avoid accidentally writing over files you want to keep, do not clear the File Replace check box.

Setting File Attributes

File attributes are part of the directory information the operating system maintains for each file. This information helps the operating system identify a file and controls the kinds of tasks you can perform with the file. You can see file attributes in a directory window by choosing the All File Details command on the View menu.



On drives formatted to use the Windows NT file system (NTFS), you must have permission to change file attributes. For more information on file and directory permissions, see “Securing Directories and Files,” later in this chapter.

The four file attributes are described in the following table.

Attribute	Description
Read-only (R)	Prevents a file from being changed.
Archive (A)	Identifies a file that has been modified since it was last backed up. When you use some commands, such as backup , the archive attribute is turned off.
Hidden (H)	Prevents a file from appearing in a directory listing at the command prompt. Files that have a hidden attribute appear in directory windows only if you select the Show Hidden/System Files check box by using the By File Type command on the View menu.
System (S)	Identifies the file as a system file. Files that have a system attribute appear in a directory window only if you select the Show Hidden/System Files check box by using the By File Type command on the View menu.

► **To change file attributes for one or more files**

1. Select the files whose attributes you want to set.
2. From the File menu, choose Properties.

If you are using a network, more options may be available in the Properties dialog box.

3. Select or clear the check boxes for the attribute settings.

When you have selected more than one file, check boxes will appear gray if the attribute for the files is not set alike.

4. Choose the OK button.

Viewing a File's Version Information

File Manager allows you to see version information for files. This is information supplied by the manufacturer of an application including the company name and other comments.

► **To view a file's version information**

1. Select the file whose information you want to see.
2. From the File menu, choose Properties.
3. In the Version Information box, select the subject in the left box.

The information on the subject is displayed in the right box.

Working with Shared Directories and Files

Windows NT allows you to share directories and files over the network. Use File Manager to share and stop sharing directories. File Manager also allows you to monitor and control the use of shared files.

Windows NT automatically creates special shares for administrative and system use. When the Server service starts, an administrative shared directory is created for the root directory of each drive on the computer and for the Windows NT system root, for example C:\WINNT. Administrative shares created for drives are named using the drive letter and a dollar sign, for example C\$. The shared directory created for the system root is called ADMIN\$. Members of the Administrators or Backup Operators groups can connect to these shared directories. Only members of the Administrators group can change properties for them.

Sharing a Directory

Share a directory when you want to make information located there available to others on the network.

Before you can share a directory, the Server service must be running. You can start the server service using the Services option in Control Panel.



To share a directory, you must be logged on as a member of the Administrators or Power Users group.

► To share a directory

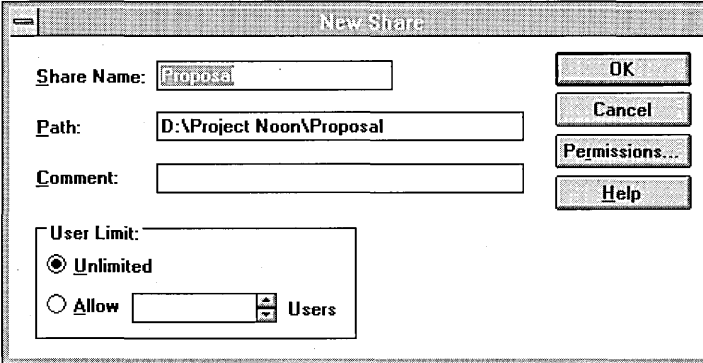
1. Select the directory you want to share in either the tree or contents panes of the directory window.

If you are logged on as a member of the Administrators group, you can share a directory on a remote computer. First connect to the computer's administrative root directory, for example C\$. Then select the directory you want to share



2. From the Disk menu, choose Share As, or choose the Share Directory button on the toolbar.

If the directory you selected is already shared, the Shared Directories dialog box is displayed. Choose the New Share button to create a share using the New Share dialog box.



The screenshot shows a dialog box titled "New Share". It contains the following fields and controls:

- Share Name:** A text box containing the word "Proposal".
- Path:** A text box containing "D:\Project Noon\Proposal".
- Comment:** An empty text box.
- User Limit:** A section with two radio buttons: "Unlimited" (which is selected) and "Allow" (with a small spinner box next to it and the word "Users" to its right).
- Buttons:** Four buttons are located on the right side: "OK", "Cancel", "Permissions...", and "Help".

3. The Share Name box shows the name users will specify to connect to the shared directory. By default, File Manager uses the name of the directory you selected. If you want to share the directory using a different name, type a new share name in the Share Name box. Share names can be up to 12 characters long.
4. The path for the directory you selected appears in the Path box. If you decide you want to share a different directory, you can type a different path.
5. Type a comment in the Comment box.
Users will see the comment when connecting to the directory using the Connect Network Drive dialog box. A comment is optional.
6. Set a limit on the number of users who can connect to the shared directory at one time in the User Limit box.
By default, no limit is set.
7. To set permissions on the shared directory, choose the Permissions button.
For more information on setting permissions, see "Setting Permissions Through Shared Directories," later in this chapter.
8. Choose the OK button.
File Manager shows that the directory is shared by displaying a shared directory icon next to the directory's name.

Stopping Directory Sharing

Once you stop sharing a directory, it is no longer available over the network.

The Stop Sharing Directory dialog box displays shared directories you have created as well as shared directories created by the system. In general, you should not stop sharing directories created by the system, for example C\$ or PRINT\$. Administrative shares that are deleted are re-created automatically the next time the Server service is started.



To stop sharing a directory, you must be logged on as a member of the Administrators or Power Users group.

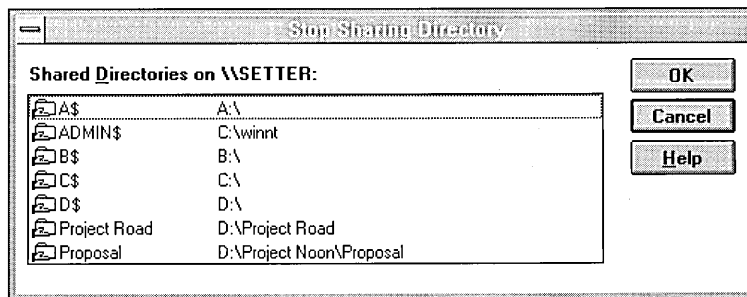
Caution If you choose to stop sharing a directory while users are connected, those users may lose their data.

► To stop sharing a directory

1. Select the drive containing the directories you want to stop sharing by selecting the drive's directory window or drivebar button.



2. From the Disk menu, choose Stop Sharing. Or choose the Stop Sharing button on the toolbar.



3. The Stop Sharing dialog box shows the computer name of the selected drive and, in the Shared Directories On box, the shared directories on the drive. For each share name, the directory path on the computer is shown. Select the directories you want to stop sharing. If you selected a shared directory before opening the Stop Sharing Directory dialog box, the shared directories corresponding to that directory are already selected.

4. Choose the OK button.

If any users are connected to a shared directory, File Manager will warn you before sharing is stopped.

Changing Share Properties

You can change the number of users allowed to connect to a shared directory, a shared directory's comment information, or the shared directory's permissions.



To change a shared directory's properties, you must be logged on as a member of the Administrators or Power Users group. Only members of the Administrators group can change share properties on administrative shares, for example, C\$.

► To change a shared directory's properties

1. Select the shared directory whose properties you want to change in either the tree or contents panes of the directory window.



2. From the Disk menu, choose Share As. Or choose the Share Directory button on the toolbar.

3. If the directory has been shared more than once, select the name in the Share Name box of the shared directory whose properties you want to change. You can then:
 - Change the number of users allowed to connect to the directory at one time by selecting, under User Limit, the Unlimited option or the Users option. When you select the Users option, you can either type a limit or click the scroll arrows to raise or lower the limit.
 - Edit the Comment box to change the description that appears when users see the shared directory listed in the Network Connections dialog box.
 - Choose the Permissions button to change the permissions on the shared directory. For more information on setting permissions, see “Setting Permissions Through Shared Directories,” later in this chapter.
4. Choose the OK button.

Viewing or Closing Shared Files

You can view who is using shared files and stop the use of a file. When you are viewing the status of a shared file, File Manager provides the following information.

Item	Shows
Total Opens	The total number of users who are working with the file
Total Locks	The total number of locks on the file
Open By	The name of the user who has the file open
For	The type of access the user has to the file
Locks	The number of locks the user has placed on the file
File ID	The identification number of the file



To stop the use of shared files, you must be logged on as a member of the Administrators or Power Users group.

► **To view or close a shared file**

1. Choose the file in the contents pane of the directory window.
2. From the File menu, choose Properties.
3. Choose the Open By button in the Properties dialog box.
4. To stop use by one or more users, select the user or users and choose the Close Selected button.

To stop use by all users, choose the Close All button.

Caution When you close a file that is in use, changes made to that file will not be saved.

5. Choose the OK button.

Securing Directories and Files

You can control users' access to directories and files on drives formatted to use the Windows NT file system (NTFS). Drives formatted to use FAT and HPFS do not support Windows NT security. You can, however, secure shared directories no matter what file system is in use.

To secure a directory or file, set permissions on it. Each permission you set specifies the access that a group or user can have to the directory or file. For example, when you set Read permission for the group called coworkers on the file MY IDEAS.DOC, the users in that group can display the file's data and attributes, but cannot change the file or delete it. For more information on how to work with groups and users, see Chapter 13, "User Manager."

Windows NT offers a set of standard permissions you can set on directories and files. The standard permissions for directories are No Access, List, Read, Add, Add & Read, Change, and Full Control. The standard permissions for files are No Access, Read, Change, and Full Control.

The standard permissions are groups of individual permissions. When you set a standard permission, the abbreviations for the individual permissions are displayed beside the standard permission. For example, when you set the standard permission Read on a file, the abbreviation RX appears beside it. The individual permissions and their abbreviations are:

Read (R)	Write (W)	Execute (X)
Delete (D)	Change Permissions (P)	Take Ownership (O)

In addition to setting standard permissions, you can set special access permissions. Special access permissions allow you to define a custom set of individual permissions for directories and files.

To effectively work with NTFS security, keep the following in mind:

- Users cannot use a directory or file unless they have been granted permission to do so or belong to a group that has permission to do so.
- Permissions are cumulative except that the No Access permission overrides all other permissions. For example, if the coworkers group has Change permission for a file while the finance group has only Read permission and John is a member of both groups, John will be granted Change permission. However, if you change the finance group's permission for the file to No Access, John will not be able to use the file even though he is a member of a group that has access to it.

- When you create files and subdirectories in a directory, they inherit permissions from the directory. For example, if you add a file to a directory that allows the coworkers group Change permission and the finance group Read permission, those same permissions will apply to the file.
- The user who creates a file or directory is the owner of that file or directory. The owner can always control access to the file or directory by changing the permissions set on it. Users who are members of the Administrators group can always take ownership of a file or directory.
- The easiest way to administer security is by setting permissions for groups, not individual users. Typically, a user will need access to many files. If the user is a member of a group that has access to the files, you can end the user's access by removing the user from the group rather than changing the permissions on each of the files. Note that setting permission for an individual user does not override the access granted to the user through groups to which the user belongs.

Setting Directory Permissions

When you first display a directory's permissions, the Directory Permissions dialog box shows the permissions that the directory inherited from the directory containing it. The Name box shows the groups and users for whom permissions have been set. If you have selected multiple directories, permissions are shown only if they are the same for all of the directories. You can change permissions, add a group or user to the list, or remove a group or user from the list. For more information on adding users and groups to the permissions list, see "Adding Users and Groups to Permissions and Auditing Lists," later in this chapter.

Setting permissions on a directory controls what users can do in that directory. When you set directory permissions, you are setting permissions on the directory and, by default, all the files that exist in the directory. Existing subdirectories and their files are not changed unless you specify to change them. When you create new files and new subdirectories, they inherit their permissions from the directory.

In some cases, directory permissions for a group or user are not passed on to subdirectories. This occurs, for example, when a group or user has been granted permissions through the CREATOR OWNER special group. Permissions that will not be inherited by subdirectories are marked with an asterisk, for example (All)*.

When you set a standard permission, two sets of individual permissions are displayed next to it: the permissions set on the directory and the permissions set on files in the directory. For example, when you set Add & Read permission on a directory, you see (RWX), signifying Read, Write, and Execute permissions on the directory, and (RX), signifying Read and Execute permission on files in the directory.

Some directory permissions set file permissions to Not Specified. When access to files for a user or group is not specified, that group or user cannot use files in the directory unless access is granted by another means, for example, by setting permissions that grant access on individual files.

When you are setting permissions on a directory, you can use the CREATOR OWNER special group to allow users to control only the subdirectories and files that they create within the directory. Permissions set on CREATOR OWNER are transferred to the user who creates a directory or file within the directory. For example, if you give Everyone Add & Read permission to the directory and CREATOR OWNER Change permission, when Annie adds files to the directory, she will be able to change and delete the files, while other users will only be able to read them.

To change permissions on the directory, you must be the owner of the directory, or have been granted permission to do so by the owner.

The following table shows permissions for directories and the actions on directories available to users for each permission.

	No Access	List	Read	Add	Add & Read	Change	Full Control
● Permission allows use ○ Permission does not allow use							
Display directory filenames	○	●	●	○	●	●	●
Display the directory's attributes	○	●	●	●	●	●	●
Go to the directory's subdirectories	○	●	●	●	●	●	●
Change the directory's attributes	○	○	○	●	●	●	●
Create subdirectories and add files	○	○	○	●	●	●	●
Display the directory's owner and permissions	○	●	●	●	●	●	●
Delete the directory	○	○	○	○	○	●	●
Delete any file or empty subdirectory in the directory	○	○	○	○	○	○	●
Change directory permissions	○	○	○	○	○	○	●
Take ownership of the directory	○	○	○	○	○	○	●

Note Groups or users granted Full Control permission on a directory can delete files in that directory no matter what permissions protect the files.

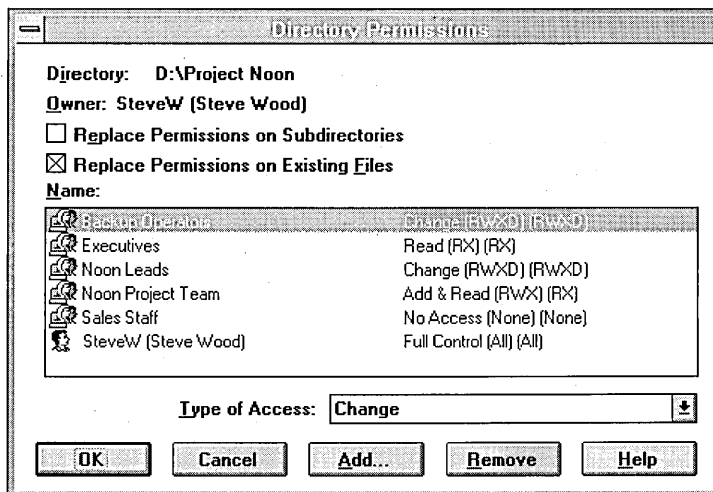
The following table shows permissions for directories and the actions on files available to users for each permission.

- Permission allows use
- Permission does not allow use

	No Access	List	Read	Add	Add & Read	Change	Full Control
Display the file's owner and permissions	○	○	●	○	●	●	●
Display the file's data	○	○	●	○	●	●	●
Display the file's attributes	○	○	●	○	●	●	●
Run the file if it is a program	○	○	●	○	●	●	●
Change the file's attributes	○	○	○	○	○	●	●
Change data in and append data to the file	○	○	○	○	○	●	●
Delete the file	○	○	○	○	○	●	●
Change the file's permissions	○	○	○	○	○	○	●
Take ownership of the file	○	○	○	○	○	○	●

► To view or change directory permissions

1. Select the directory in the directory window. You can select multiple directories.
2. From the Security menu, choose Permissions. Or choose the Permissions button on the toolbar.



3. By default, the Replace Permissions On Existing Files check box is selected, so the changes you make to permissions apply to the directory and its files only.

Select both the Replace Permissions On Subdirectories and the Replace Permissions On Existing Files check boxes to apply changed permissions to the directory and its files, and to existing subdirectories and their files.

To apply changed permissions to the directory only (not to existing files in the directory or to subdirectories and their existing files), clear both the Replace Permissions On Subdirectories and Replace Permissions On Existing Files check boxes.

To apply changed permissions to the directory and subdirectories only (not to existing files in the directory or subdirectories), select the Replace Permissions On Subdirectories check box and clear the Replace Permissions On Existing Files check box.

4. Select the name of a group or user and choose a permission from the Type Of Access box.

You can customize directory and file permissions by choosing Special Directory Access... or Special File Access.... For more information on special access permissions, see “Setting Special Access Permissions,” later in this chapter.

5. Choose the OK button.

▶ **To remove directory permissions for a group or user**

1. In the Directory Permissions dialog box, select the name of the group or user.
2. Choose the Remove button.

Setting File Permissions

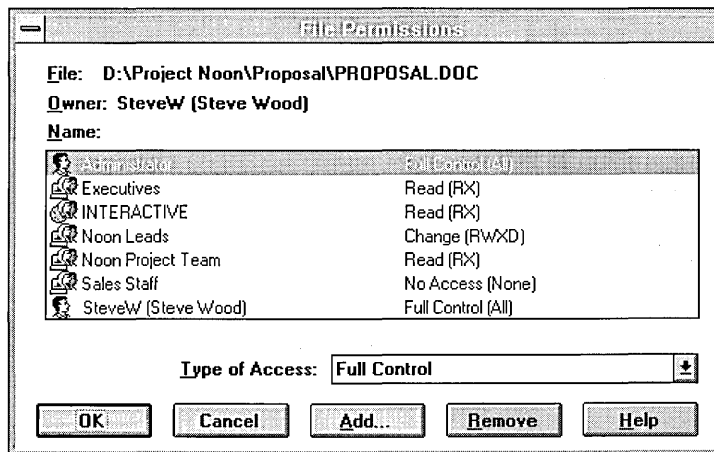
When you first display a file’s permissions, the File Permissions dialog box shows the permissions that the file inherited from the directory containing it. The Name box shows the groups and users for whom permissions have been set on the file. If you have selected multiple files, permissions are shown only if they are the same for all of the files. You can change permissions set for the listed groups and users, add a group or user to the list, or remove a group or user from the list. For more information on adding users and groups to the permissions list, see “Adding Users and Groups to Permissions and Auditing Lists,” later in this chapter.

To change permissions on the file, you must be the owner of the file, or have been granted permission to do so by the owner. The following table shows permissions for files and the actions available to users for each permission.

	No Access	Read	Change	Full Control
● Permission allows use				
○ Permission does not allow use				
Display the file's data	○	●	●	●
Display the file's attributes	○	●	●	●
Run the file if it is a program	○	●	●	●
Display the file's owner and permissions	○	●	●	●
Change the file's attributes	○	○	●	●
Change data in and append data to the file	○	○	●	●
Delete the file	○	○	●	●
Change the file's owner and permissions	○	○	○	●

▷ To change permissions on a file

1. Select one or more files from the contents pane of the directory window.
2. Choose Permissions from the Security menu, or choose the Permissions button on the toolbar.



3. Select the name of the group or user whose permission you want to change.

4. Choose a permission from the Type Of Access box.
 To customize the permissions set for the group or user, choose Special Access... from the Type Of Access box. For more information on special access file permissions, see “Setting Special Access Permissions,” later in this chapter.
5. Choose the OK button.

► **To remove file permissions for a group or user**

1. In the File Permissions dialog box, select the name of the group or user.
2. Choose the Remove button.

Setting Special Access Permissions

In general, the standard directory and file permissions are all you need to secure your directories and files. However, if you need to create a custom set of permissions, you can use special access permissions. You can set special access permissions on directories, on all the files in selected directories, or on selected files. When you set special access permissions on a directory, the permissions affect the directory only.

The following table shows special access permissions for directories and the actions available to users for each directory permission.

	Read	Write	Execute	Delete	Change Permissions	Take Ownership	Full Control
● Permission allows use ○ Permission does not allow use							
Display filenames in the directory	●	○	○	○	○	○	●
Display the directory's attributes	●	○	●	○	○	○	●
Add files and subdirectories	○	●	○	○	○	○	●
Change the directory's attributes	○	●	○	○	○	○	●
Go to the directory's subdirectories	○	○	●	○	○	○	●
Display directory owner and permissions	●	●	●	○	○	○	●
Delete the directory	○	○	○	●	○	○	●
Change the directory's permissions	○	○	○	○	●	○	●
Take ownership of the directory	○	○	○	○	○	●	●

The following table shows special access permissions for files and the actions available to users for each permission.

	Read	Write	Execute	Delete	Change Permissions	Take Ownership	Full Control
● Permission allows use							
○ Permission does not allow use							
Display the file's owner and permissions	●	●	●	○	○	○	●
Display the file's data	●	○	○	○	○	○	●
Display the file's attributes	●	○	●	○	○	○	●
Change the file's attributes	○	●	○	○	○	○	●
Change data in and append data to the file	○	●	○	○	○	○	●
Run the file if it is a program	○	○	●	○	○	○	●
Delete the file	○	○	○	●	○	○	●
Change the file's permissions	○	○	○	○	●	○	●
Take ownership of the file	○	○	○	○	○	●	●

► To set special access permissions

1. You can set special access permissions on directories, all files in directories, or selected files.

To set permissions on directories, select them in the directory window.

To set permissions on all the files in one or more directories, select the files' directories in the directory window.

To set permissions on selected files, select the files in the contents pane of the directory window.



2. Choose Permissions from the Security menu, or choose the Permissions button on the toolbar.
3. In the Permissions dialog box, select the group or user you want to grant special access.

If no groups or users are shown, indicating that the directories or files you selected have differing permissions, add a group or user before setting special access permissions.

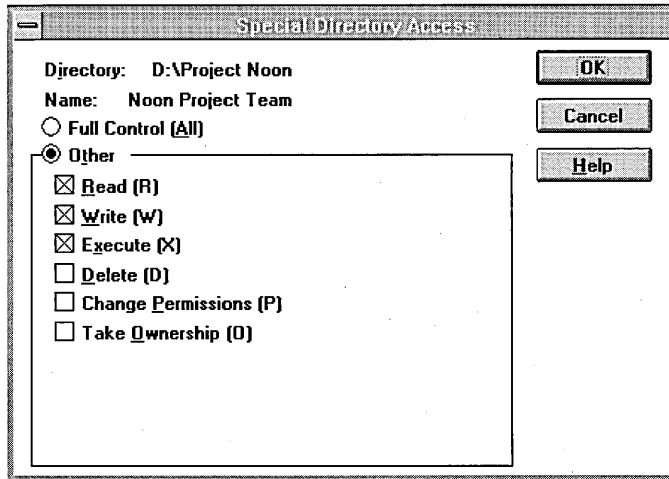
4. Open the appropriate Special Access dialog box.

To set permissions on directories, choose Special Directory Access... from the Type Of Access box or double-click the name of the group or user.

To set permissions on all the files in the selected directories, choose Special File Access... from the Type Of Access box.

To set permissions on selected files, choose Special File Access... from the Type Of Access box or double-click the name of the group or user.

The Special Access dialog box shows which access permissions have been granted based on the current standard or special permissions setting.



3. To set special access permissions, select the check boxes for the access you want to grant.

To grant full control, select Full Control (All).

If you are setting permissions for all files in directories, you can select Access Not Specified. This removes permissions from files in the selected directories and prevents files from inheriting permissions from their directories.

4. Choose the OK button.

Setting Permissions Through Shared Directories

You can set permissions through a shared directory whether the directory is on a drive formatted to use the Windows NT file system (NTFS), FAT, or HPFS.

You can use the Access Through Share Permissions dialog box to change permissions set for the listed groups and users and remove a group or user from the permissions list. For information on adding users and groups to the permissions list for a shared directory, see “Adding Users and Groups to Permissions and Auditing Lists,” later in this chapter.



To work with shared directory permissions, you must be logged on as a member of the Administrators or Power Users group.

To secure shared directories effectively, keep the following in mind:

- Permissions set through a shared directory are effective only when the directory is reached over the network.
- Permissions set through a shared directory apply to all files and subdirectories in the shared directory.
- Permissions set through a shared directory that is on an NTFS volume operate in addition to NTFS permissions set on the directory itself. Shared directory permissions specify the maximum access allowed. For example, if a user has Read permission on the shared directory but List permission on the directory itself, the user's access is limited to List.

The following table shows the permissions for files and directories granted through the shared directory and the actions available to users for each permission.

	No Access	Read	Change	Full Control
● Permission allows use				
○ Permission does not allow use				
Display subdirectory names and filenames	○	●	●	●
Display the data and attributes of files	○	●	●	●
Run program files	○	●	●	●
Go to the directory's subdirectories	○	●	●	●
Create subdirectories and add files	○	○	●	●
Change data in and append data to files	○	○	●	●
Change the file's attributes	○	○	●	●
Delete subdirectories and files	○	○	●	●
Change permissions (NTFS files and directories only)	○	○	○	●
Take ownership (NTFS files and directories only)	○	○	○	●

► **To view or change permissions on a shared directory**

1. Select the shared directory whose permissions you want to change in either the tree or contents panes of the directory window.
2. From the Disk menu, choose Share As. Or choose the Share Directory button on the toolbar.
3. In the Share Directory dialog box, choose the Permissions button.
4. In the Access Through Share Permissions dialog box, select the name of a group or user and select a permission from the Type Of Access box.
5. Choose the OK button.



► **To remove shared directory permissions for a group or user**

1. In the Access Through Share Permissions dialog box, select the name of the group or user.
2. Choose the Remove button.

Auditing Files and Directories

Auditing files and directories allows you to track their usage. For a particular file or directory, you can specify which groups or users and which actions to audit. You can audit both successful and failed actions. Windows NT stores the information generated from auditing in a file. You can view the information using Event Viewer. For more information on Event Viewer, see Chapter 15, “Event Viewer.”

You can use the File Auditing and Directory Auditing dialog boxes to change auditing set for the listed groups and users and remove a group or user from the audit list. For information on adding users and groups to the audit list, see “Adding Users and Groups to Permissions and Auditing Lists,” later in this chapter.

Important To audit files and directories, you must set the audit policy to audit file and object access. Set the audit policy using User Manager. For more information on audit policy, see Chapter 13, “User Manager.”



To audit files and directories, you must be logged on as a member of the Administrators group.

To audit the following activities on a directory, select the events shown.

- Event audits action
- Event does not audit action

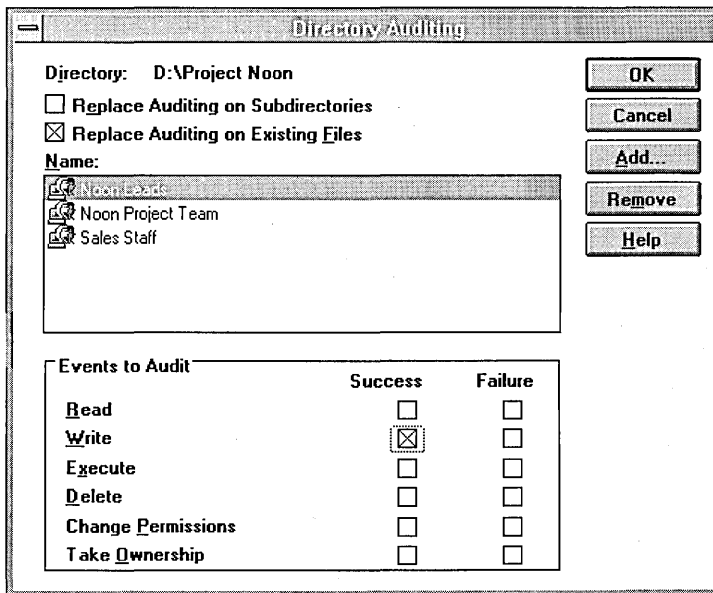
	Read	Write	Execute	Delete	Change Permissions	Take Ownership
Displaying filenames	●	○	○	○	○	○
Displaying attributes	●	○	●	○	○	○
Changing attributes	○	●	○	○	○	○
Creating subdirectories and files	○	●	○	○	○	○
Going to the directory's subdirectories	○	○	●	○	○	○
Displaying owner and permissions	●	●	●	○	○	○
Deleting the directory	○	○	○	●	○	○
Changing directory permissions	○	○	○	○	●	○
Changing directory ownership	○	○	○	○	○	●

To audit the following activities on a file, select the events shown.

	Read	Write	Execute	Delete	Change Permissions	Take Ownership
● Event audits action						
○ Event does not audit action						
Displaying the file's data	●	○	○	○	○	○
Displaying attributes	●	○	●	○	○	○
Displaying the file's owner and permissions	●	●	●	○	○	○
Changing data	○	●	○	○	○	○
Changing attributes	○	●	○	○	○	○
Running the file	○	○	●	○	○	○
Deleting the file	○	○	○	●	○	○
Changing the file's permissions	○	○	○	○	●	○
Changing the file's ownership	○	○	○	○	○	●

► **To view or change file or directory auditing**

1. In the File Manager window, select the file or directory.
2. From the Security menu, choose Auditing.



3. If you are setting auditing on a directory, two check boxes allow you to control how auditing changes apply to existing files and subdirectories.

By default, the Replace Auditing On Existing Files check box is selected, so the changes you make to auditing apply to the directory and its files only.

Select both the Replace Auditing On Subdirectories and the Replace Auditing On Existing Files check boxes to apply auditing changes to the directory and its files, and to existing subdirectories and their files.

To apply auditing changes to the directory only (not to existing files in the directory or to subdirectories and their existing files), clear both the Replace Auditing On Subdirectories and Replace Auditing On Existing Files check boxes.

To apply auditing changes to the directory and subdirectories only (not to existing files in the directory or subdirectories), select the Replace Auditing on Subdirectories check box and clear the Replace Auditing on Existing Files check box.

4. Set auditing for each group and user in the list:

Select the name of a group or user and then select the events to audit for that group or user.

5. Choose the OK button.

▶ **To remove file or directory auditing for a group or user**

1. In the Auditing dialog box, select the name of the group or user in the list.
2. Choose the Remove button.

Adding Users and Groups to Permissions and Auditing Lists

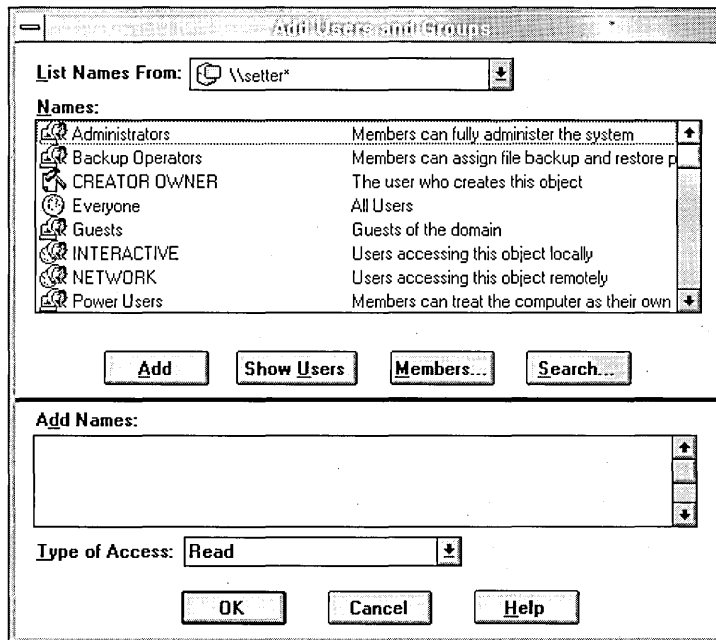
The Add Users And Groups dialog box is available from the dialog boxes that allow you to change and remove permissions and auditing for users and groups. Use the dialog box to add users and groups to the permissions or auditing list, search for the members of a group, and find the domain to which a group or user belongs.

▶ **To add a user or group to a permissions or auditing list**

1. In the permissions or auditing dialog box, choose the Add button.

The Add Users And Groups dialog box displays the groups on the computer or in the domain shown by the List Names From box. Local groups are shown for the computer or domain whose name is followed by an asterisk (*). You can select another domain by using the List Names From box.

Domains appear only if your computer is a member of a domain on a Windows NT Advanced Server network. The domains shown have a trust relationship.



2. You can use options in the Add Users And Groups dialog box to display users, find the users in a group, or find the domain to which a group or user belongs.
 - To display the names of users on the selected computer or domain, choose the Show Users button
 - To see a group's content, select the group and choose the Members button. Users are listed in a new dialog box. On a Windows NT Advanced Server network, global groups that are members of a local group appear in the list. To see a global group's users, select the group and choose the Members button. To include the group in the Add Users And Groups dialog box, choose the Add button. To include some of the group's users, select them and choose the Add button.
 - To add a group or user, you must know the domain which contains the group's or user's account. On a Windows NT Advanced Server network, choose the Search button to find the domain of a group or user. In the Find Account dialog box, type the name of the group or user in the Find User Or Group box and specify the domains you want to search. Then choose the Search button. To include the groups or users in the Add Users And Groups dialog box, select them in the Search Results box and choose the Add button.

3. To add groups or users to the list, select them in the Names box and choose the Add button, or double-click the name of the group or user. Or you can type the names of groups and users in the Add Names box. Separate names using a semicolon.

If the account of the group or user is not located on the computer or domain shown by the List Names From box, you must specify the location. Type the computer or domain name followed by the group or user name and separate the names using a backslash, for example `shipping\ernesta`. You can type the name without waiting for Windows NT to list groups in the Names box.

4. If you are adding users or groups to a permissions list, select the permission for the groups or users shown in the Add Names box using the Type Of Access box.
5. Choose the OK button.

Taking Ownership of Files or Directories

When you create a file or directory, you become the owner of it. By granting permissions, the owner controls how the file or directory is used. The owner can grant permission to another user to take ownership of a file or directory. Otherwise, you must be logged on as a member of the Administrators group to take ownership.

Although an administrator can take ownership, an administrator cannot transfer ownership to others. This preserves security. For example, only an administrator who takes ownership and changes permissions can gain access to a file on which you have set No Access permission. By checking the ownership of the file, you would see the ownership change and know who had violated the permission you set on the file. To make sure that your files are secure, you should check their ownership regularly.

► To take ownership of a file or directory

1. Select the file or directory in the File Manager window. You can select more than one file or directory at a time.
2. From the Security menu, choose Owner.
3. Choose the Take Ownership button.

If you have selected one or more directories, File Manager asks whether you want to take ownership of all files and subdirectories in the trees of the selected directories. Choose Yes if you want to do so.

Maintaining Disks

Use commands on the Disk menu to format, copy, and label floppy disks.

Formatting a Floppy Disk

Formatting prepares a floppy disk so that information can be stored on it and retrieved from it. Windows NT uses the MS-DOS FAT file system when formatting a disk. When you format a disk, File Manager removes all the information from it, writes new directory information to it, and checks for unusable portions called bad sectors.

▶ **To format a floppy disk**

1. Insert a disk into a drive.
2. From the Disk menu, choose Format Disk.
3. In the Disk In box, make sure that the drive shown is the one containing the floppy you want to format. If necessary, select the correct drive.
4. In the Capacity box, select the size of the disk you want to format.
5. To give the disk a volume label, type a name in the Label box under Options.
6. To quickly reformat a disk that has been formatted previously, select the Quick Format check box. A quick format deletes directory information in the file allocation table and root directory. The disk is not checked for bad sectors.
7. Choose the OK button.
8. A message prompts you to confirm that you want to format the disk. Formatting deletes all information on a disk, so make sure the disk is the one you want to format. Then choose the Yes button.

File Manager displays its progress in a dialog box as formatting proceeds. You can work with File Manager while formatting continues in the background. To cancel formatting, choose the Cancel button. To hide the dialog box while formatting continues, choose the Hide button.

After your disk is formatted, a message prompts you to indicate whether you want to format another disk.

Caution You cannot recover information on a disk that has been formatted.

Copying a Floppy Disk

You can make a copy of a floppy disk by using the Copy Disk command on the Disk menu. When you copy a floppy disk, both disks must have the same storage capacity. For example, if the disk you are copying from (the source disk) has a capacity of 720K, the disk you are copying to (the destination disk) must also.

▶ **To copy an entire disk**

1. Insert the source disk in the drive you want to copy from. If you have two floppy disk drives of the same size, insert the destination disk in the drive you want to copy to.
2. From the Disk menu, choose Copy Disk.
3. If your computer has two floppy disk drives, select the letter of the source drive and the destination drive in the Copy Disk dialog box. Then choose the OK button.

If your computer has only one floppy disk drive, you are not prompted to select drives.

4. A message prompts you to confirm that you want to copy the disk. There is no way to recover information previously stored on the destination disk, so make sure the disk in the destination drive is one you want to overwrite. Then choose the Yes button.

If you are making a copy using a single floppy disk drive, you are prompted to switch source and destination disks as needed.

A message informs you of the percentage of your disk that has been copied.

File Manager displays its progress in a dialog box as the copy is made. You can work with File Manager while copying continues in the background. To cancel copying, choose the Cancel button. To hide the dialog box while copying continues, choose the Hide button.

Labeling a Disk

You can assign or change a label for a disk by selecting the Label Disk command on the Disk menu.

► **To assign or change a volume label**

1. Click the drive icon for the disk you want to label.
2. From the Disk menu, choose Label Disk.
3. In the Label box, type the label for the disk.

Labels on NTFS disks can contain up to 32 characters. Labels on FAT and HPFS disks can contain up to 11 characters.

4. Choose the OK button.

CHAPTER 5

Control Panel



You can use Control Panel to customize various features of Windows NT.

This chapter describes the options available in Control Panel, which include the following:

- Changing the desktop
- Setting serial port communications options
- Working with fonts
- Working with date, time, and international settings
- Customizing the keyboard, cursor, and mouse
- Working with printers
- Working with device drivers
- Defining options for the operating system and the uninterruptible power supply
- Configuring the network
- Managing server properties and services

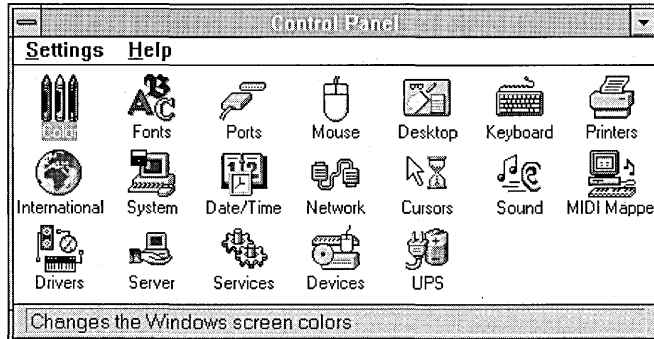
Overview

Control Panel provides many options for customizing Windows NT so that it works and looks the way you want. The icons in Control Panel represent options, including network and sound capabilities, for configuring a computer. For each icon, there is a corresponding command on the Settings menu. Your Control Panel window may look different, depending on the devices you have installed, such as an extra pointing device.

Most changes made in Control Panel (except adding and removing fonts) will affect only the user who is currently logged on to the computer.



Some options in Control Panel require you to be logged on as a member of a specific group. If you are not a member of the necessary group, a message appears.



The following table describes Control Panel options.

Choose	To
Color	Set the color of the various elements of the desktop.
Cursors	Change the appearance of the cursor.
Date/Time	Change the system date, time, and time zone.
Desktop	Specify the pattern, screen saver, alignment grid, icon spacing, and cursor blink rate.
Devices	Start, stop, and configure the startup type for device drivers.
Drivers	Install and configure drivers for optional devices such as sound boards and synthesizers.
Fonts	Add or remove screen, vector, and TrueType fonts. (Some printer fonts are installed automatically when you install a printer. Other printer fonts must be installed using a font installation program provided by the font manufacturer.)
International	Specify international settings such as the country and language, number and currency formats, and date and time formats without changing the language of the product itself.
Keyboard	Adjust the keyboard delay and repeat rate.
MIDI Mapper	Select, change, or create MIDI setups, patch maps, or key maps for playing a synthesizer connected to your computer.
Mouse	Customize elements such as speed and button function for your pointing device.
Network	Install and configure network adapter cards and other network software, and join a workgroup or a domain.
Ports	Set parameters for serial communications ports.
Printers	Open Print Manager to work with local and network printers.
Server	For the local computer, view and manage connected users, directory shares, open resources, directory replication, and recipients of administrative alerts.
Services	Start, stop, pause, or continue the services available on the computer and configure startup options.
Sound	Assign sounds to system and application events, and turn on or off the warning beep and system sounds.
System	Specify the default operating system for startup, change user environment variables, and define paging file size.
UPS	Configure the uninterruptible power supply to ensure safe shutdown during a power failure.

For additional information about any option in Control Panel, see the online Help.

Changing the Desktop

You can use the Desktop option to customize the appearance of your desktop (which is where elements such as windows, icons, and dialog boxes appear). You can specify a pattern or wallpaper for the desktop, adjust icon spacing, wrap icon titles, or set an invisible grid to easily align windows and icons. Use the Color option to select the colors used for displaying desktop elements.

Customizing Desktop Colors

The colors assigned to the different parts of the desktop are saved in *color schemes*. Several predefined color schemes are provided. A solid color in Windows NT is directly supported by your display adapter. VGA adapters support 16 solid colors, and 256-color adapters support 20 solid colors. Both types of displays support hundreds of dithered colors, which are produced by patterns of colored dots to simulate a color or pattern. Depending on the screen resolution, dithered colors can look almost exactly like solid colors.

Changing an Existing Color Scheme

You can change individual colors assigned to a color scheme. If you find that you use only one or two color schemes, you can shorten the list of selections by deleting schemes. The only color scheme that cannot be deleted is Windows Default, the scheme you see the first time you start Windows NT.

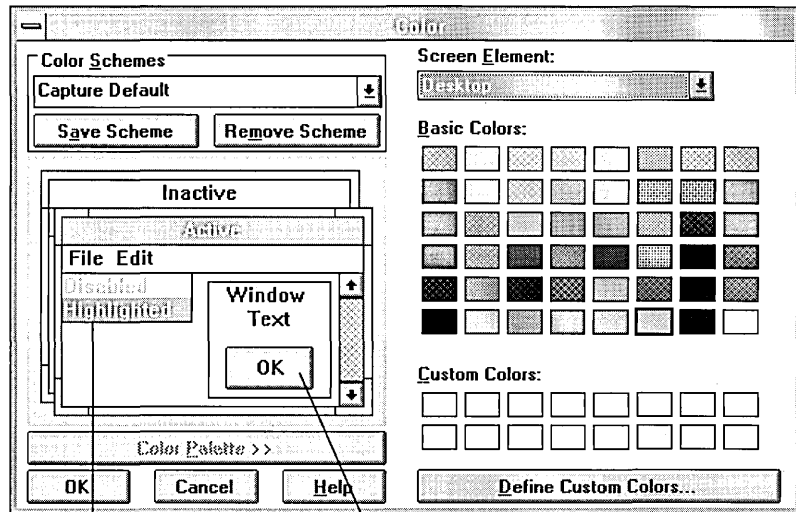
Note Deleting a color scheme on a particular computer will remove that scheme for every user on that computer.

► **To change the colors of a color scheme**



1. In the Control Panel window, double-click the Color icon.
2. In the Color Schemes box of the Color dialog box, select the color scheme you want to change.
3. Choose the Color Palette button.

The Color dialog box expands to include a list of screen elements, a palette of basic colors, and a palette titled Custom Colors.



Clicking "Highlighted" alternately selects the Highlight and Highlighted Text elements.

Clicking the OK button alternately selects the Button Face, Button Shadow, Button Text, and Button Highlight elements.

- Click the part of the sample screen where you want to change the color. Or in the Screen Element box, select the element from the list.

You can see which element is selected in the Screen Element list.

- In the Basic Colors palette, select the color you want.

The color is displayed in the sample screen.

- Change the color of any other screen elements until you are satisfied with the color scheme.

Control Panel uses the solid color closest to the selected dithered color for the following screen elements:

Window Frame	Window Text	Window Background
Menu Bar	Menu Text	Active and Inactive Title Bar Text
Button Face	Button Text	Disabled Text
Highlight	Highlighted Text	

- To save the new color selections, choose the Save Scheme button, and then type a name for the scheme.

If you don't save the scheme, Windows NT still uses the new color selections until you change them again, even if you quit and restart Windows. However, when you make another change or choose an existing scheme, the color selections are lost.

- Choose the OK button.

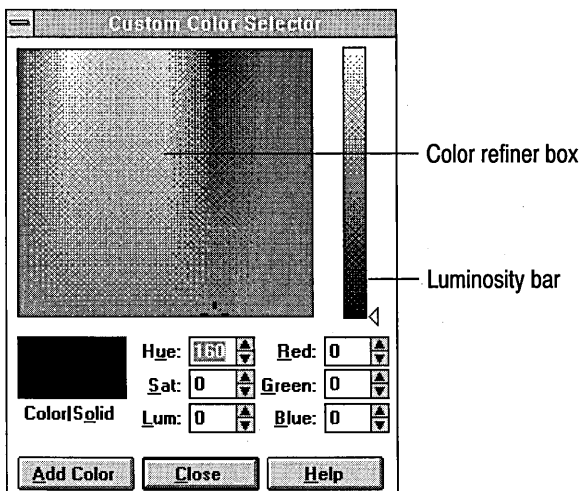
Defining Custom Colors

The Basic Colors palette contains 48 colors. You can define and use up to 16 additional custom colors in a color refiner box by specifying the hue, saturation, luminosity, and relative amounts of red, green, and blue.

Hue is the position of the color along the color spectrum. *Saturation* is the purity of the hue, moving from gray to the pure color. *Luminosity* is the brightness of the color on a scale from black to white.

► To define a custom color

- In the Color dialog box, choose the Color Palette button, and then choose the Define Custom Colors button.



- Move the color refiner cursor to the area of the color refiner box that shows the color you want. Then drag the arrow next to the luminosity bar to adjust the luminosity.

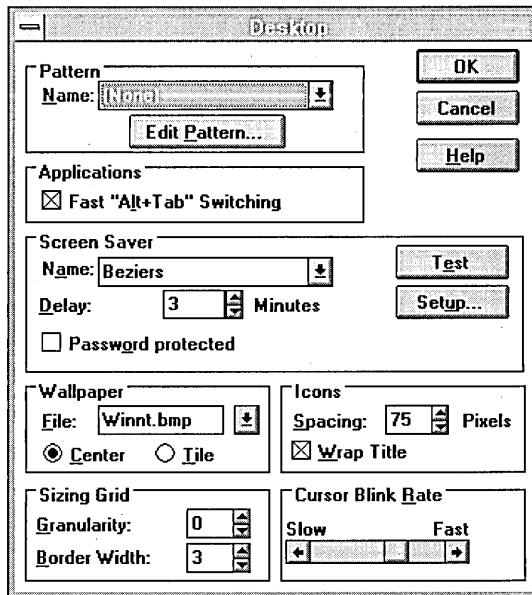
The new color is displayed on the left side of the Color/Solid box. The right side of the box displays the solid color closest to your choice. To select the solid color, choose the right side of the box, or press ALT+O.

- When you are satisfied with the color, select a box in the Custom Colors palette for the new color. You can select an empty box or one that contains a color you want to change.
If you do not select a box for the new color, it is placed in the first available empty box or in the upper-left position in the Custom Colors palette. Subsequent custom colors fill the boxes in sequence from upper left to lower right unless you choose a specific box for the new color.
- Choose the Add Color button to add the new color to the Custom Colors palette.
- Define any other custom colors you want to add to the palette, and then choose the Close button to return to the Color dialog box. Or to return to the Color dialog box without closing the Custom Color Selector dialog box, drag the Custom Color Selector dialog box to a new position.

You can now choose the custom colors the same way you would choose colors from the Basic Colors palette.

Configuring Desktop Appearance

You can use the Desktop icon in Control Panel to configure the appearance of your desktop.



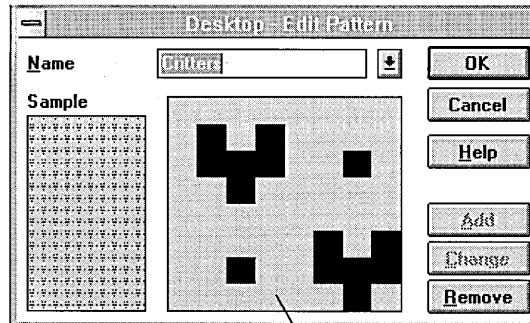
Changing or Creating a Pattern

You can change a predefined desktop pattern, create a new pattern, or remove a pattern.

► To change an existing pattern



1. In the Control Panel window, double-click the Desktop icon.
2. Choose the Edit Pattern button.



Click areas in the cell where you want to reverse the color.

3. In the Name list, select a pattern.

A sample of the current pattern appears in the Sample box. The cell shows an enlarged version so you can make changes to the pattern.
4. In the cell, click locations where you want to reverse the colors in the pattern.
5. When the Sample box shows the pattern you want, choose the Change button.
6. Choose the OK button to return to the Desktop dialog box.

► To create a pattern

1. In the Name box of the Edit Pattern dialog box, type a name for the new pattern.
2. Click locations in the cell where you want to reverse the colors in the pattern.
3. When the cell shows the pattern you want, choose the Add button.
4. Choose the OK button to return to the Desktop dialog box.

The pattern you define is repeated as many times as necessary to completely fill the background. The colors of the pattern are determined by the Desktop and Window Text colors you choose.

If you find that you use only one or two patterns, you can select patterns you no longer use and choose the Remove button in the Edit Pattern dialog box.

Displaying Custom Wallpaper

You can display a .BMP bitmap graphic on your desktop instead of a solid color or pattern. Paint programs that produce .BMP files, such as Windows Paintbrush, can be used to create a bitmap or to modify a scanned image. After you create the bitmap, save the .BMP file in the \WINNT directory (or specify the full path when choosing the bitmap as wallpaper).

Note Windows uses more memory when displaying wallpaper than when displaying a solid color or a pattern on the desktop. If you run out of memory when running an application, you can change to a color or pattern to free some memory.

► **To choose a bitmap to display as wallpaper**



1. In the Control Panel window, double-click the Desktop icon.
2. In the File box under Wallpaper, select a bitmap from the list.

If you saved the bitmap in a directory other than the Windows NT directory, type the full path and bitmap filename.

3. Select Center or Tile.

The Center option positions the bitmap in the center of the desktop. The Tile option repeats the bitmap as many times as necessary to cover the desktop.

If you select both a pattern and custom wallpaper in the Desktop dialog box, the wallpaper lies over the pattern. If you select the Center option for the wallpaper and the bitmap doesn't cover the entire desktop, you'll see the pattern around the edges of the bitmap. If the original bitmap is too large to fit on the screen or takes up too much memory, Windows NT does not display it.

If you want to remove a wallpaper from the list, delete the bitmap file from the \WINNT directory.

Preventing Icon Titles from Overlapping

Sometimes an icon's title is so wide that it overlaps an adjacent icon. You can use the Desktop icon to control the display of icon titles.

Windows NT calculates the standard spacing for application, document, and program-item icons based on the size of the widest icon. Usually this spacing is adequate. However, sometimes the description for an icon exceeds the icon's width, causing it to overlap adjacent icons.

Icon spacing is measured in pixels, the smallest unit of measurement on the screen. Increments of 10 pixels result in noticeable increases in spacing between icons.

▷ **To increase icon spacing and wrap an icon title**

1. Under Icons in the Desktop dialog box, click the up or down arrow in the Spacing box to increase or decrease the spacing between icons, or type a number.
2. Select the Wrap Title check box if you want the title to wrap.

Changing Window Border Width

Many windows can be resized by using the mouse to drag the window border to a new size. If a window can be resized, you can make it easier to “grab” the window border by increasing the border width.

▷ **To change the border width of windows**

- Under the Sizing Grid in the Desktop dialog box, click the up or down arrow in the Border Width box to increase or decrease the border width. Or type a number from 1 to 50, with 1 being the narrowest border.

Changing the Sizing Grid of Windows

The position and alignment of application windows and icons on your desktop are determined by an invisible grid. When Windows NT is set up, the sizing grid is turned off so that icons and windows remain where you place them on the desktop. When the sizing grid is turned on, application windows and minimized icons align with the nearest invisible gridline.

The grid changes in multiples of 8 pixels. A value of 1 creates a grid with 8 pixels between gridlines, a value of 2 creates a grid with 16 pixels between gridlines, and so forth. A value of 0 cancels the grid.

This option only affects application windows and the application icons that appear at the bottom of your screen. The sizing grid has no effect on document windows and icons.

▷ **To set the grid spacing**

- Under the Sizing Grid in the Desktop dialog box, click the up or down arrow in the Granularity box to increase or decrease the size of the grid, or type a number from 0 to 49.

Switching Between Applications

Windows NT allows you to run multiple applications at one time. However, when doing this, it is sometimes difficult to locate a specific application window. You can use fast application switching to switch between your applications.

▶ **To use fast application switching**



1. In the Control Panel window, choose the Desktop icon.
2. In the Desktop dialog box, select the Fast Alt+Tab Switching check box, and then choose the OK button.

If Fast Task Switch is selected, you can quickly cycle through the names of the applications running at that time. If Fast Task Switch is not selected, pressing ALT+TAB still works, but only the title bar of each window is highlighted.

3. Press ALT+TAB to cycle through the running applications. When you see the name of the application you want, release the keys.

If, while moving through the applications by pressing ALT+TAB, you want to return to your original application, press ALT+TAB+ESC.

Working with Screen Savers

Screen savers are used to reduce wear on your display and to provide security for your system. A screen saver is a moving pattern or bitmap that appears after you have not used your computer for a specified time.

When Windows NT is set up, a default screen saver is selected. However, several other screen savers are available. Move the mouse or press any key to turn off the screen saver.

You can use the Windows NT screen savers or the IdleWild screen savers included in the Microsoft Entertainment Pack for Windows. To use the IdleWild screen savers, the IWLIB.DLL file and the screen saver files (those with the extension .IW) must be in the same directory. Place these files in your \WINNT directory.

When you use a screen saver provided by Windows NT, you can ensure that unauthorized users do not have access to your work by using password protection with a screen saver. If someone tries to use your computer once the password-protected screen saver is displayed, a Lock Workstation dialog box appears. To unlock the computer, the same password used to log on to the computer must be entered.

- ▶ **To select a screen saver and turn password protection on and off**
1. Under Screen Saver in the Desktop dialog box, select a screen saver in the Names box.
 2. In the Delay box, click the up or down arrow to increase or decrease the number of minutes before the screen saver is activated, or type a number between 1 and 99.
 3. If you want to protect your display with a password, select the Password Protect check box.
 4. To configure your screen saver, choose the Setup button, and then complete the setup dialog box that appears.
 5. To see how your screen saver looks, choose the Test button, and then move the mouse or press a key on the keyboard to stop the screen saver.

Setting Serial Port Communications Options

You can specify the communications settings for each serial port your system uses by using the Ports option. Windows NT can support up to 256 serial ports. Serial ports (named COM1 through COM256) are used to connect to serial pointing devices, printers, and other serial devices. Most computers include at least two serial ports: COM1 and COM2. Some devices, such as serial-port adapters, modems, and fax cards, use COM3 through COM256. The settings you specify determine how information is transferred between your computer and the serial device.

The communications settings you can specify include standard settings such as those for baud rate, parity, and flow control, and more advanced settings such as those that specify the base port address and interrupt request (IRQ) line that Windows NT uses to send information to a serial port. If you plan on using only COM1 and COM2, you may only need to change the standard settings. If you use COM3 through COM256, you may need to change the advanced settings.

Most communications applications that you use to exchange information between computers, such as Windows Terminal, require that you specify standard port settings within the application. These settings, such as baud rate, parity, and data bits, override the settings you specify by using the Ports option in Control Panel.

▶ **To specify standard communications settings**



1. In the Control Panel window, choose the Ports icon.
2. In the Ports dialog box, select the name of the port for which you want to specify communications settings.
3. Choose the Settings button.
4. In the Settings dialog box, display the options for each setting by clicking the scroll arrow to the right of each box.
5. Set the options to match the device connected to the port.
For information about the correct settings, see the documentation supplied with the device.
6. When you finish specifying the settings, choose the OK button to return to the Ports dialog box, and then choose the Close button.

For additional help on setting Advanced Options, see the online Help in the Ports dialog box.

Working with Fonts

A font, or typeface, is a collection of letters, numerals, symbols, and punctuation marks that have common characteristics. Fonts come in different sizes and styles. Font sizes are the height of a character measured in points—a point is approximately $1/72$ of an inch. Font styles include characteristics such as bold and italic. Because of the differences in display resolution between the screen and the printer, what appears on screen and what appears in the printed document may be different.

If you use TrueType fonts in your documents, Windows NT and all Windows applications display the fonts on the screen exactly as they appear when printed; there is no need to install matching screen fonts. In addition, by using TrueType fonts, your documents become more portable because they look the same printed on different printers, as long as you use the same application and print at the same resolution. If you print at a different resolution or are printing a document from an older application, line and page breaks might change.

Adding Screen Fonts and TrueType Fonts

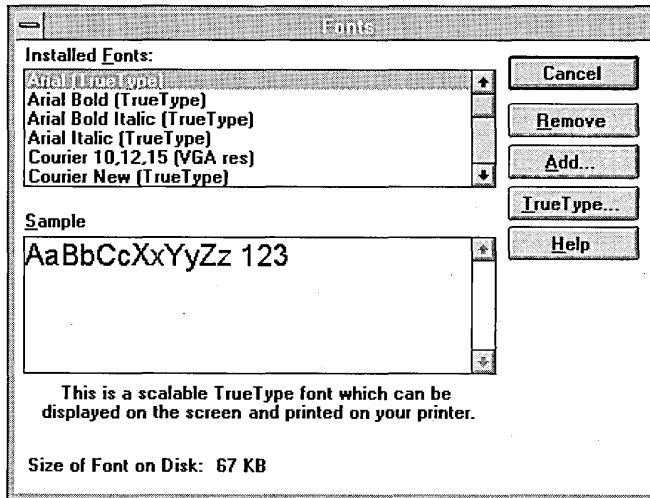
When you install a printer driver, screen fonts that match the printer fonts are usually installed. If you are using cartridge or soft fonts, your font manufacturer usually supplies an installation program for installing screen fonts, or the installation program that installs the cartridge or soft fonts may install the screen fonts automatically.

If no installation program is provided for installing screen fonts, you can use the Fonts option to install them. You can also use the Fonts option to install any additional TrueType fonts that you purchase.

▶ To add a font



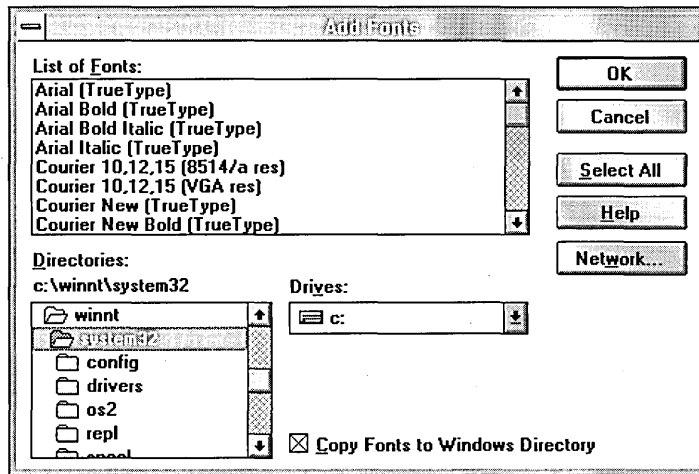
1. In the Control Panel window, choose the Fonts icon.



The Fonts dialog box lists all the installed fonts and the font type (for example, TrueType) displayed in parentheses.

The Sample box displays the selected font in all available sizes unless the font is a vector font or a TrueType font. Vector fonts can be scaled to any height, so the only size displayed is the size used to design the font. TrueType fonts can also be scaled to any height and are displayed in about 24-point size.

2. In the Fonts dialog box, choose the Add button.



3. In the Directories and Drives boxes of the Add Fonts dialog box, select the drive and directory that contains the fonts you want to add.
4. In the List Of Fonts box, select the fonts you want to add.
To select a nonconsecutive list of fonts in the box, click the fonts while pressing CTRL.
To add every font in the list, choose the Select All button.
5. If you have limited disk space, you can clear the Copy Fonts To Windows Directory check box. You can then use the fonts directly from the directory in which they are located, without copying them to your \WINNT\SYSTEM32 directory.
6. Choose the OK button to add the selected fonts, and then choose the Close button.

Removing a Font

The fonts installed in Windows NT occupy memory. If you don't use all the fonts you have installed, you can remove them from your system and free memory for use by your applications.

Important The MS Sans Serif font set is used by most Windows NT dialog boxes. Do not remove this font; if you do, the text in the dialog boxes will be difficult to read. Deleting a font on a particular computer removes that font for every user who logs on to that computer.

▶ **To remove a font**

1. In the Installed Fonts list of the Fonts dialog box, select the fonts you want to remove.
To select a nonconsecutive list of fonts in the box, click the fonts while pressing CTRL.
2. Choose the Remove button.
3. If you want to delete the font files from your disk as well as remove the fonts from memory, select the Delete Font File From Disk check box.

Caution It is recommended that you not delete fonts from the disk if you chose not to copy the fonts to your \WINNT\SYSTEM32 directory. If you delete the fonts from your hard disk, you must supply the original Windows NT installation disks if you decide to add these fonts later.

4. In the message that appears, choose the Yes button, or, if you are removing several fonts at the same time, choose the Yes To All button.
5. In the Fonts dialog box, choose the Close button.

Working with Date, Time, and International Settings

The system date and time are used in some Windows applications and in various places in Windows NT such as File Manager and Event Viewer. Before setting the date and time on your system, you must be sure to set the correct time zone. The way the date and time are displayed can be specified through the International option.

Configuring Date and Time

The system date and time are reflected in Clock and Calendar (two Windows NT applications in the Accessories group), as well as in the information kept by File Manager for each file you save on your disk.

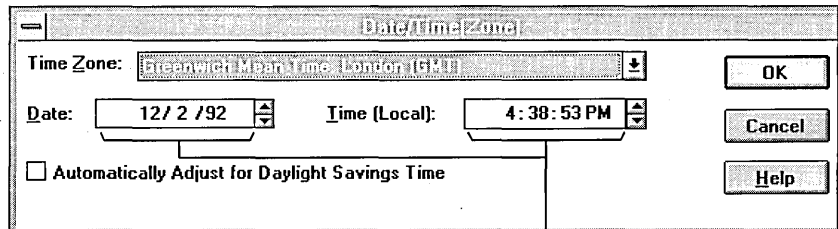
Setting the System Date and Time

You can set the date and time on your system.

▶ To set the date and time



1. In the Control Panel window, choose the Date/Time icon.



The order of the elements in date and time depends on settings in the International Format boxes.

2. In the Time Zone box, select the time zone for your area.
If your area uses daylight saving time, select the check box to automatically adjust the time.
3. In the Date box, select the part of the date (day, month, or year) you want to change, and then type the new value, or click the up or down arrow.
4. In the Time box, select the part of the time (hour, minute, second, suffix) you want to change, and then type the new value, or click the up or down arrow.
5. Choose the OK button.

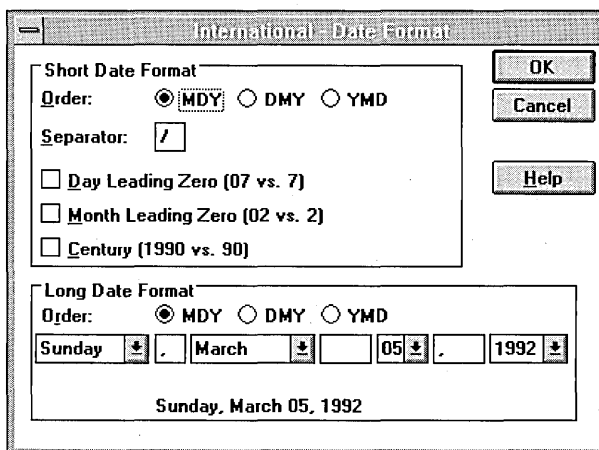
Changing the Date and Time Display

You can change the way the date is displayed in applications that have a date function. For example, you can vary the order of the month, day, and year, or change the punctuation used to separate parts of the date.

► To change the date format



1. In the Control Panel window, choose the International icon.
2. Under Date Format in the International dialog box, choose the Change button.



3. In the International - Date Format dialog box, set the options you want for both the Short Date Format and Long Date Format.

The Short Date Format displays the date as three numbers representing the month, day, and year. You can specify the order and number of digits for each part of the date. For example, selecting Century displays the year as a four-digit number.

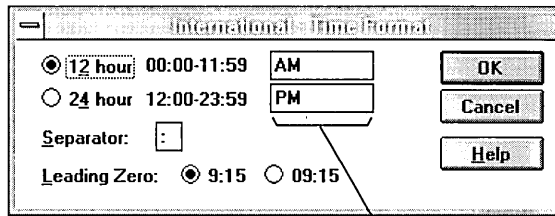
The Long Date Format displays the date as a combination of words and numbers (for example, Monday, October 19, 1992) or a variation you specify.

4. Choose the OK button to return to the International dialog box.

You can also specify how the time is displayed in applications. For example, you can display the time in a 12-hour or 24-hour format, change the punctuation between the hour, minute, and second, or add suffixes to the time, such as A.M. for morning or PST for Pacific Standard Time.

► **To change the time format**

1. Under Time Format in the International dialog box, choose the Change button.



Two different suffixes can be added to the 12-hour format; only one suffix is visible and can be added in the 24-hour format.

2. Set the options you want, and then choose the OK button to return to the International dialog box.

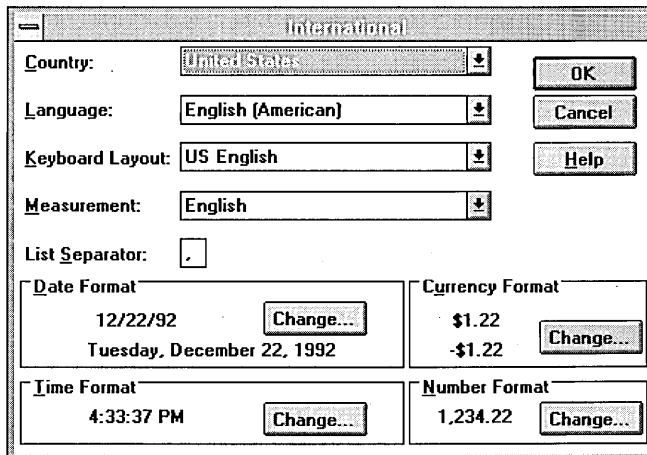
Working with Other International Settings

With the International option, you can specify basic international settings such as the country, language, and system of measurement you want to use. When you select a country, Windows NT automatically adjusts other formats to reflect those used by the selected country. You can also customize these settings.

► **To select international settings**



1. In the Control Panel window, double-click the International icon.



2. In the International dialog box, specify the settings for Country, Language, Keyboard Layout, Measurement, and List Separator.

A description of each option follows this procedure.

3. Choose the appropriate Change button to customize settings for Date and Time Format as specified in the preceding section.
4. Choose the Change button under Currency Format.

In the International - Currency Format dialog box, you can control the way currency is represented. For example, you can place the currency symbol in different locations relative to the amount, specify how negative currency values are represented, or change the currency symbol for your country.

5. Set the options you want, and then choose the OK button to return to the International dialog box.

6. Choose the Change button under Number Format.

In the International - Number Format dialog box, you can control the way numbers are displayed. For example, you can choose the punctuation separating thousands and punctuation separating the fractional part of a decimal number, or change the decimal display of numbers.

7. Set the options you want, and then choose the OK button to return to the International dialog box.

Use this option	To
Country	Specify the country with the standard settings you want to use. When you select a country, Windows NT automatically adjusts the settings for the date, time, number, and currency formats, as well as the Paper Size option in the Print Setup dialog box, to match the standard formats used by that country.
Language	Specify the language you want to work in. The language you select affects the way applications sort information and provides ANSI code page, OEM code page, and OEM font information. For example, if the language you are working in includes extended characters, setting this option to that language ensures that your applications will correctly sort words or phrases that include these characters.
Keyboard Layout	Specify the keyboard layout of your computer. Keyboard layouts vary to accommodate the special characters and symbols used in different languages. Windows NT uses this setting to interpret the keys you press.
Measurement	Select the metric or English system of measurement.
List Separator	Specify a symbol to separate elements in a list. In English, the list separator is typically a comma and is used to separate words or numbers that appear in a series.

Customizing the Keyboard, Cursor, and Mouse

You may have personal preferences about how your cursor, keyboard, mouse, or other pointing device works. For example, you may want the mouse pointer to move rapidly, the keyboard to repeat rapidly when you hold down a key, or the cursor to blink more slowly. You can use Control Panel to customize several options.

Choose	To
Keyboard	Adjust the keyboard speed.
Desktop	Adjust the cursor blink rate.
Cursors	Change the cursor appearance.
Mouse	Adjust the speed of the pointer, set the double-click speed, swap the functions of the left and right mouse buttons, and set any options specific to the mouse you are using.

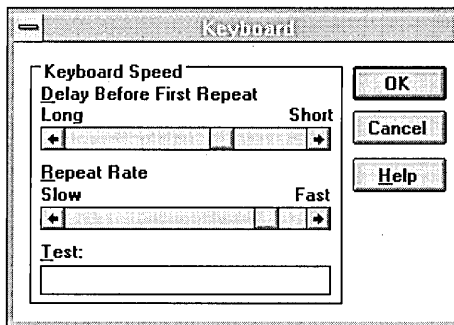
Adjusting the Keyboard Delay and Repeat Rate

You can adjust how long your computer waits after you hold down a key before it repeats that key, and then how fast the key repeats when you hold it down.

► To change the keyboard delay and repeat rate



1. In the Control Panel window, choose the Keyboard icon.



2. Under Delay Before First Repeat, drag the scroll box toward Long or Short to increase or decrease the delay. Or click the appropriate scroll arrow.
3. Under Repeat Rate, drag the scroll box toward Fast or Slow to increase or decrease the repeat rate. Or click the appropriate scroll arrow.
4. To test the speed, move to the Test box and type or hold down any key on the keyboard. Adjust the box positions until you reach a delay speed and repeat rate you are comfortable with.
5. Choose the OK button.

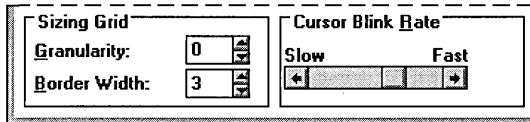
Adjusting the Cursor Blink Rate

You can adjust how fast the cursor blinks.

▶ To change the cursor blink rate



1. In the Control Panel window, choose the Desktop icon.



2. Under Cursor Blink Rate, drag the scroll box toward Fast or Slow or click the appropriate scroll arrow.
3. Choose the OK button.

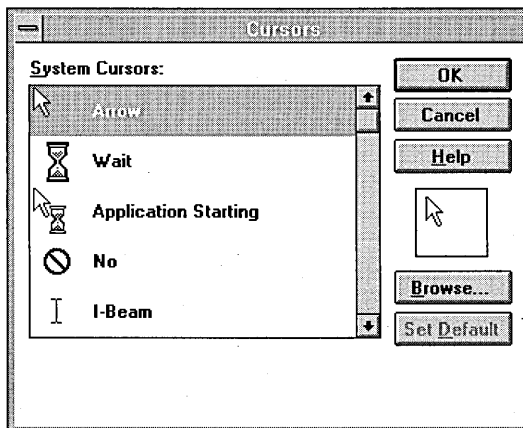
Changing the Cursor Appearance

You can change the look of your cursor with animated or static cursors provided by Windows NT.

▶ To change your cursor



1. In the Control Panel window, choose the Cursors icon.



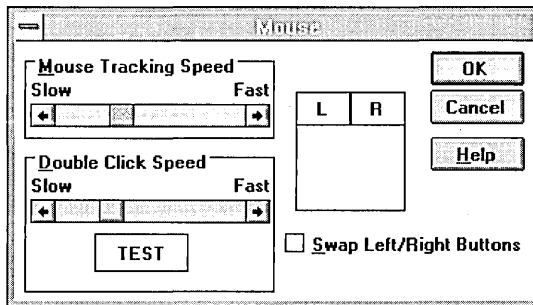
2. In the System Cursors box, select an action whose cursor you want to change.
3. Choose the Browse button.

4. In the Directories and Drives boxes of the Browse dialog box, select the drive and directory that contains the cursor files you want to view.
5. In the File Name box, select a file.
An example of what the cursor looks like appears in the Preview Window.
6. Choose the OK button to return to the Cursors dialog box.
7. Change the cursors for any other actions and then choose the OK button.
8. To reset the selected action to the system default cursor, choose the Set Default button.

Customizing Your Mouse or Other Pointing Device

You can adjust the way Windows NT works with your mouse or other pointing devices. For example, if you are using a mouse, you may be able to switch the functions of the left and right buttons, change the speed of the mouse pointer, or change the double-click rate.

Before customizing settings for your pointing device, you need to install it and its driver, using Windows NT Setup. For information, see Chapter 12, “System Maintenance with Windows NT Setup.”



► To customize your pointing device



1. In the Control Panel window, choose the icon for your pointing device.
A dialog box appears for the device you are using.
2. Set the options you want, and then choose the OK button.

For details about the options and their settings, see the documentation for your pointing device and Help, if available.

Working with Printers



The Printers option in Control Panel opens Print Manager and allows you to work with local and network printers. With Print Manager you can:

- Install local printers
- Set printer properties
- Connect to and share printers on a network
- Remotely administer printers

For more information about Print Manager, see Chapter 6, “Print Manager.”

Working with Device Drivers

When you add a new device to your system, such as a new sound board or video player, you need to install the driver that controls the device. A *device driver* is a program that allows a specific piece of hardware (or device) to communicate with Windows NT. Although the device may be installed in or connected to your computer, Windows NT does not recognize the device until after you install and configure the appropriate driver.

Installing and Configuring Drivers

Most devices come with the appropriate driver. Windows NT also supplies sound drivers for common sound devices, such as sound boards and synthesizers. If you do not have a driver for your device, contact your device dealer or manufacturer about providing one.

Installing a New Driver



To install *kernel drivers* (drivers that access hardware), you must be logged on as a member of the Administrators group. The drivers you install will be available to all users.

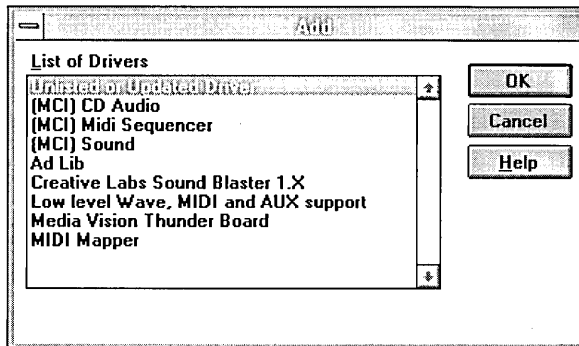
► To install a new driver



1. In the Control Panel window, choose the Drivers icon.

The Drivers dialog box displays a list of the drivers already installed.

2. In the Drivers dialog box, choose the Add button.



3. In the Add dialog box, select the driver you want to install from the list, or select Unlisted or Updated Driver if your driver is not yet known to the system, and then choose the OK button.
4. You will often get a message saying the driver is already present on your system. If you don't have a driver disk or a new driver somewhere else on your system, you should select the Current button.

If a message asks you to insert the disk that contains the driver file, insert the disk containing the driver you want to install into drive A. Or, if the driver is located on your hard disk, type the drive and directory where the driver is located.

If you do not know where the driver file is located, choose the Browse button to locate and select the drive and directory that contain the driver file, but do not type the filename for the driver.

5. If a setup dialog box appears, select the settings required by the driver, such as the port address and interrupts for a sound board.

Important The settings you specify must not conflict with the settings used by other devices installed on your system, such as a mouse or network card. For example, the interrupts used by each device must be unique. You may get a message about a configuration error having occurred if the hardware used by the drivers you are installing or the options you have requested conflict with the hardware or drivers already installed on your system.

To avoid conflicts, see the manuals for your other hardware devices to determine the settings they use. Then see the manual that came with the device you are configuring for information about its settings.

6. When you finish selecting the settings, choose the OK button.
Windows NT installs any additional related drivers automatically. These drivers may also require specific settings. In this case, other setup dialog boxes may appear.
7. Repeat steps 5 and 6 until all related drivers have been configured.
The new driver and any changed driver settings do not take effect until you restart Windows NT. A message asks you if you want to restart Windows NT.
8. To have the new driver take effect immediately, choose the Restart Now button.

Installing a Driver Not Supplied with Windows NT

When you purchase a new device, such as a sound board, the associated driver should be included with the device. If you do not have a driver for your device, contact the device manufacturer or dealer to get one. Follow any instructions the manufacturer provides for installing the driver.

Note Most drivers written for Windows 3.1 cannot be installed. Drivers should be written specifically for Windows NT. If a driver can't be installed, a message indicating the problem will be displayed.

Setting Driver Options

After you have installed a driver, you can change any of its settings. If you want to use more than one set of settings for the same driver, you need to install that driver twice. For instructions on how to install a driver, see "Installing and Configuring Drivers," earlier in this section.

▶ To adjust driver settings



1. In the Control Panel window, choose the Drivers icon.
2. In the Installed Drivers list in the Drivers dialog box, select the driver you want to configure.
3. Choose the Setup button.

Some drivers do not require specific settings. If you select such a driver, the Setup button is unavailable.

The Setup dialog box appears. The options in this dialog box vary according to the driver you are configuring.

4. Set the options as described in the manual for your device.
5. Choose the OK button.

The changes you make do not take effect until you restart Windows NT. A message asks if you want to restart Windows NT.

6. To have the new settings take effect immediately, choose the Restart Now button.

Removing a Driver



You need to be logged on as a member of the Administrators group to remove some drivers.

If you are no longer using a device, you can remove its driver from the Drivers list. Removing a driver from the Drivers list does not remove the driver file from your hard disk. If you need to use the same device later, you can add its driver again.

Caution The drivers that are automatically installed while running Setup are required by your system (these are the drivers that are displayed when you first open the Drivers dialog box). If you remove one of these drivers, your system may not work properly.

► To remove a driver



1. In the Control Panel window, choose the Drivers icon.
2. From the list of installed drivers in the Drivers dialog box, select the driver you want to remove.
3. Choose the Remove button.
4. When the message asks you to confirm your decision to remove the driver, choose the Yes button.
A message asks if you want to restart Windows NT.
5. To have the removal take effect immediately, choose the Restart Now button.

Using Audio and MIDI Sounds in Windows NT

The Sound icon provides several options for controlling audio sound in Windows NT. To use audio sounds, you need to install a sound card and a sound driver, and then choose the Sound icon to assign different sounds to system and application events.

The Musical Instrument Digital Interface (MIDI) Mapper provides options for setting up and playing MIDI sound in Windows NT. To use MIDI sounds, you need a sound device such as a synthesizer and MIDI device drivers. Windows NT supports two different standards, the General MIDI guidelines and the Microsoft authoring guidelines for MIDI files (for playing MIDI information generated by an application or stored in a MIDI file).

The information in this section is intended only as a general guide. For more specific help, see the documentation for the sound device you install.

Assigning Sounds to Events

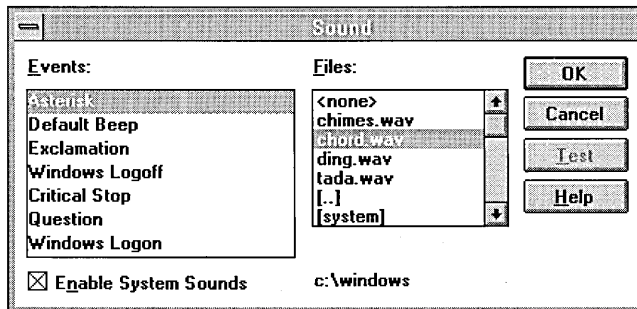
With the Sound option, you can assign sounds to different application and system events. For example, you can select a sound to play whenever you start Windows NT. Other sounds play as specified by the application you are using. For example, some applications play the sound assigned to Default Beep whenever you click the mouse outside of an open dialog box. The sounds you can assign to these events are stored in files with the .WAV filename extension.

To use sound in Windows NT, the sound driver that controls your sound board must be installed and configured for your system. If you do not have a sound board or if the sound driver is not configured properly, you hear a warning beep when an error occurs. Windows NT does not support playing a waveform sound through the PC speaker; therefore, if you do not have sound hardware, the Test button is unavailable.

► To assign sounds to events



1. In the Control Panel window, choose the Sound icon.



2. From the Events box in the Sound dialog box, select the event that you want to assign a sound to.
If a sound file is already assigned to that event, it is selected in the Files box. Otherwise, “none” is selected.
3. In the Files box, select the sound file you want to use. If the file you want is not listed, select the drive and directory where the file is located by scrolling in the Files box, and then select the file.
If you don’t want to assign a sound to the selected event, select “none.”
4. To hear the sound, choose the Test button or choose the event or filename.
5. Repeat steps 2 through 4 until you have assigned a sound to each event you want.

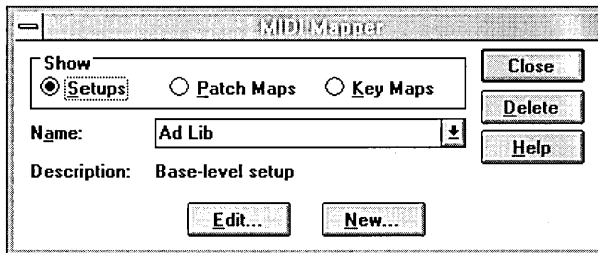
6. Select the Enable System Sounds check box.
7. Choose the OK button.

You can turn the warning beep and all other sounds off by clearing the Enable System Sounds check box and assigning “none” to Windows Logon and Windows Logoff.

Changing MIDI Settings



If you are using a sound device such as a synthesizer that has MIDI capabilities, you can specify MIDI settings for the setups, patch maps, and key maps.



For additional help on the MIDI Mapper, see the documentation for the sound device you are installing, or see the online Help in the MIDI Mapper dialog box.

Caution To use MIDI Mapper, you should have a basic understanding of MIDI concepts and terminology. It is recommended that you not use MIDI Mapper to edit or create MIDI setups unless you are experienced with MIDI and understand the results of the changes you make.

Managing Devices

Use the Devices option in Control Panel to start, stop, and configure the startup type for device drivers.

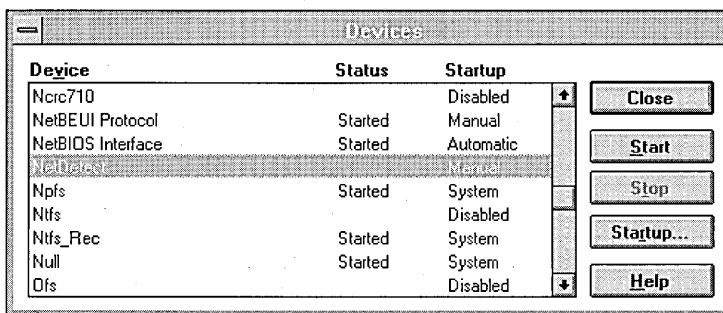
Starting and Stopping Devices

Use the Devices dialog box to start and stop devices.

► **To start or stop a device**



1. In the Control Panel window, choose the Devices icon.



In the Devices dialog box, if Started is displayed in the Status column for a device, that device driver is loaded. If the Status column is blank, that device driver is not loaded.

The Startup column displays the startup type of each device. The startup types are described in the following procedure under “Configuring Device Startup.”

2. Select a device.
3. Choose the Start or Stop button.

Some devices are essential to system operation and cannot be stopped. When such a device is selected, the Stop button is unavailable.

4. Choose the Close button.

Configuring Device Startup

You can determine when a device will start by specifying the startup type.

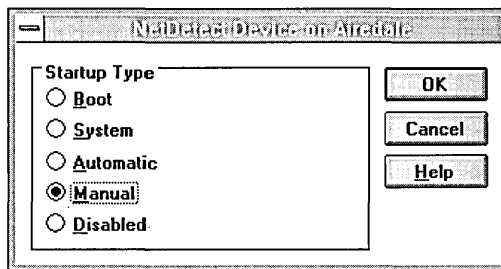


To configure device startup you must be logged on to a user account that is a member of the Administrators local group.

▶ To set the startup type of a device



1. In the Control Panel window, choose the Devices icon.
2. In the Devices dialog box, select a device.
3. Choose the Startup button.



4. Select a startup type.

Select	To
Boot	Start the device every time the computer starts. Boot devices start before any other devices. Use for critical devices essential to system operation.
System	Start the device every time the system starts. System devices start after Boot devices. Use for critical devices essential to system operation.
Automatic	Start the device every time the system starts. Automatic devices start after Boot and System devices. Use for devices that are not critical for basic system operation.
Manual	Allow the device to be started by a user or by a dependent device.
Disabled	Prevent the device from being started by a user. However, the device can be started by the system.

Caution Changing the startup type of a Boot or System device can leave the system in an unusable state.

5. Choose the OK button.
6. In the Devices dialog box, choose the Close button.

Defining Options for the Operating System

You can have more than one operating system installed on your computer if you want to use different operating systems at different times. Choose the System option in Control Panel to specify the operating system that the boot loader will use the next time you start your computer. You can also specify the user environment variables and view or change the size of your computer's virtual-memory paging file by using the System option.

► **To specify the default operating system for startup**



1. In the Control Panel window, double-click the System icon.

The System dialog box shows the settings for the user whose profile is currently active on this computer.

System

Computer Name: SCOTTIE

Operating System

Startup: "Windows NT"

Show list for 30 seconds

System Environment Variables:

ComSpec = D:\winnt\system32\cmd.exe
Ds2LibPath = D:\winnt\system32\os2\dll;
Path = D:\winnt\system32
windir = D:\winnt

User Environment Variables for chrisdr

temp = D:\temp

Variable: tmp

Value: D:\temp

Buttons: OK, Cancel, Virtual Memory..., Tasking..., Help, Set, Delete

2. In the Startup box, select the default operating system from the list of systems installed on your computer.

This is the operating system that the boot loader will propose to start automatically the next time you start your computer.

3. In the Show List For box, specify the number of seconds the list of choices should be displayed before automatically starting the default operating system.
4. Choose the OK button.

Changing the Environment Variables

Windows NT requires certain information to find programs, to allocate memory space for some programs to run, and to control the behavior of various programs. This information—called the system and user environment variables—can be viewed in the System dialog box. These environment variables are similar to those that can be set in the MS-DOS operating system, such as PATH and TEMP.

The system environment variables are defined by Windows NT, and you cannot add new variables or change the values.

The user environment variables include any environment variables you want to define or variables defined by your applications, such as the path where application files are located.

After you change any user environment variables in the System dialog box and choose the OK button, Windows NT saves the new values in the registry so they are available automatically the next time you start your computer.

If any conflict exists between environment variables, Windows NT resolves the conflict in this way:

- System environment variables are set first.
- User environment variables defined in the System dialog box are set next and override system variables.
- Variables defined in AUTOEXEC.BAT are set last and do not override system or environmental variables.

This means, for example, that although you cannot change the values of a system environment variable directly, you can overwrite it by creating a user environment variable with a name that is identical to the name of the system environment variable you want to overwrite.

Note Path settings, unlike other environmental variables, are cumulative. The full path (what you see when you type **path** at the command prompt) is created by appending the path contained in AUTOEXEC.BAT to the paths defined in the System option of Control Panel.

► **To change user environment variables for your computer**



1. In the Control Panel window, choose the System icon.

The System dialog box shows the current system environment variables and the environment variables for the user whose profile is currently active on this computer.

2. In the User Environment Variables box, select the variable you want to change.

The name of the selected variable appears in the Variable box, and its current value appears in the Value box.

You can also click the Variable box, and then type a variable name that does not appear in the list. Variables that you add in this way are appended to the list of environment variables for the current user profile.

3. In the Value box, type a new value for the variable.
4. To remove a variable completely, select it in the User Environment Variables box, and then choose the Delete button.
5. When the Variable and Value boxes contain the new information you want to specify, choose the Set button.

Choose the Cancel button at any time to remove all changes made in the System dialog box and restore the previous values.

6. When you have completed all changes you want to make to environment variables, choose the OK button.

Changes to these variables are stored immediately, but the changes won't affect programs that are already running when the changes are made. You must restart your computer to see the effects of the changes while running, for example, the command prompt.

Changing the Virtual-Memory Paging File

Windows NT uses a special file on your hard disk called a virtual-memory *paging file* (or swap file). With virtual memory under Windows NT, some of the program code and other information are kept in RAM while other information is temporarily swapped to virtual memory. When that information is required again, Windows NT pulls it back into RAM and, if necessary, swaps other information to virtual memory. This activity is invisible, although you might notice that your hard disk is working. The resulting benefit is that you can run more programs at one time than your system's RAM would usually allow.



If you are logged on as a member of the Administrators group for a computer, you can change the size of the virtual-memory paging file or create additional paging files on other local hard drives.

A virtual-memory paging file is created automatically on your computer when you install Windows NT. Usually, you should leave the paging file at its recommended size for each drive. However, you might want to change the file size if, for example, you frequently work with applications that require a large amount of memory and that could therefore benefit from a larger paging file.

Note The virtual-memory paging file is a file named PAGEFILE.SYS in your system partition. You cannot delete this file while running Windows NT. If you delete this file while running under another operating system, a new paging file is created automatically the next time you start Windows NT.

The recommended size for the virtual-memory paging file, which Windows NT identifies as the size that ensures the best performance, is equivalent to the amount of RAM available on your system plus 12 MB. However, the size of the file also depends on the amount of free space available on your hard disk when the paging file is created.

If you have multiple hard disks, you should consider creating a paging file for each local hard drive on your computer. Depending on the capabilities of your system's hard disk controller, the disks can be reading or writing information simultaneously, greatly improving performance. Also, because Windows NT expands the paging file as necessary, multiple paging files make expansion easier, since each file expands a little rather than a single file expanding a lot.

► **To change the size of your system's virtual-memory paging file**

1. In the System dialog box, choose the Virtual Memory button.
If you are not logged on as a member of the Administrators group for a computer, the Virtual Memory button is not available, so you cannot change the size of your computer's paging file.
2. In the Drive box of the Virtual Memory dialog box, select the drive for which you want to change the paging file size.

Virtual Memory	
Drive [Volume Label]	Paging File Size (MB)
C: [ANAMVOL1]	20 - 70
D: [ANAMVOL2]	

OK
Cancel
Help

Paging File Size for Selected Drive

Drive: C:[ANAMVOL1]

Space Available: 25 MB

Initial Size (MB):

Maximum Size (MB): Set

Total Paging File Size for All Drives

Minimum Allowed: 2 MB

Recommended: 27 MB

Currently Allocated: 20 MB

- In each Paging File Size box, type a number in megabytes to specify the new initial size or maximum size for the paging file, and then choose the Set button.

For example, type **20** to create a 20 MB paging file.

- Choose the OK button to return to the System dialog box.

You must restart your computer to see the effects of the changes.

Changing Application Response Time

By default, Windows NT gives priority to the application running in the foreground of your display screen. This application receives more processor time relative to other applications running in the background. (A foreground application is the application running in the active window, topmost on your screen.)

- ▶ **To change the priority (response time) of a foreground application relative to other running applications**



- Double-click the System icon in Control Panel.
- In the System dialog box, choose the Tasking button.

3. In the Tasking dialog box, select one of the following options:
 - Best Foreground Application Response Time (Default)
 - Foreground Application More Responsive Than Background
 - Foreground And Background Applications Equally Responsive

The first two options vary the degree of priority given to the foreground application; the last button gives all applications an equal share of processing time.

Setting Up the Uninterruptible Power Supply

An uninterruptible power supply (UPS) is a battery-operated power supply connected to a computer to keep the system running during a power failure. The UPS service for Windows NT detects and warns users of power failures, and manages a safe system shutdown when the backup power supply is about to fail.

Before purchasing a UPS device to use with Windows NT, confirm with the UPS manufacturer that both the device and its serial cable are compatible with Windows NT.

You can use the UPS option in Control Panel to set various options for configuring how UPS works on a computer, such as:

- The serial port where the UPS device is connected.
- Whether the UPS device sends a signal if the regular power supply fails.
- Whether the UPS device sends a warning when battery power is low.
- Whether the UPS service sends a signal telling the UPS device to shut off.
- A command file to execute at shutdown time.
- The expected life and recharge time for the battery.
- The timing for warning messages.

The actual options for configuring the UPS service depend on the specific UPS hardware installed on your system. Incorrect settings can cause undesirable operation of your UPS hardware. For details about possible settings, see the documentation for your UPS device.

▶ **To set up the UPS service for a computer**



1. In Control Panel, double-click the UPS icon.

The screenshot shows the 'UPS' dialog box with the following settings:

- Uninterruptible Power Supply is installed on: COM1: [dropdown]
- UPS Configuration**
 - Power failure signal
 - Low battery signal at least 2 minutes before shutdown
 - Remote UPS Shutdown
- UPS Interface Voltages:**
 - Negative Positive
 - Negative Positive
 - Negative Positive
- Execute Command File
 - File Name: [text box]
- UPS Characteristics**
 - Expected Battery Life: 2 [spin] min
 - Battery recharge time per minute of run time: 100 [spin] min
- UPS Service**
 - Time between power failure and initial warning message: 5 [spin] sec
 - Delay between warning messages: 120 [spin] sec

Buttons: OK, Cancel, Help

2. In the UPS dialog box, select or clear the Uninterruptible Power Supply Is Installed On check box, and then specify the serial port where the UPS device is connected.

You cannot specify a serial port unless the Uninterruptible Power Supply Is Installed On check box is selected.

3. If the UPS device on your system can assert a main power failure indication, select the Power Failure Signal check box.

This setting corresponds to the CTS pin for the UPS serial port connection.

4. If the UPS device on your system can send a warning when battery power is low, select the Low Battery Signal check box.

This setting corresponds to the DCD pin for the UPS serial port connection.

5. If the UPS device can accept a signal from the UPS service telling it to shut off, select the Remote UPS Shutdown check box.

This shuts off the UPS device battery when it is no longer needed. This setting corresponds to the DTR pin for the UPS serial port connection.

6. For each item that is checked in the UPS Configuration group, specify Negative or Positive for the UPS Interface Voltages.

This setting defines how your UPS device expects to communicate with the UPS service. For information about making this choice, see the documentation for your UPS device.

Depending on which items you've checked in the UPS Configuration group, steps 7 through 10 may or may not be necessary.

7. In the Expected Battery Life box, specify the time in minutes that the system can run on battery power. Check the UPS device documentation for the appropriate setting.

The range is 2 to 720 minutes; the default is 2 minutes.

8. In the Battery Recharge Time box, specify the time in minutes that the battery must be recharged for every minute of run time. Check the UPS device documentation for the appropriate setting.

The range is 1 to 250 minutes; the default is 100 minutes for each minute of battery run-time.

9. In the Time Between Power Failure box, specify the time, in seconds, between when a power failure occurs and when the first message is sent to notify users.

The range is 0 to 120 seconds; the default is 5 seconds.

10. In the Delay Between Warning Messages box, specify the interval, in seconds, between messages sent to notify users of a power failure and to advise them to stop using the computer.

The range is 5 to 300 seconds; the default is 120 seconds.

11. Choose the OK button.

Depending on the changes you make in the UPS dialog box, a message asks if you want to start, stop, or restart the UPS service, depending on whether it is currently running. Choose Yes or No. If you choose Yes, Windows NT configures the UPS service to begin automatically each time your system starts up.

You can also start and stop the UPS service using the Services option in Control Panel once the UPS is configured.

You can also configure the UPS option to execute a command file immediately prior to system shutdown. For example, such a file might run a command to close remote connections. This command file must execute within 30 seconds. Failure to complete execution in 30 seconds jeopardizes the safe shutdown of your Windows NT computer.

► **To set up the UPS service to execute a file prior to system shutdown**

1. In the \WINNT\SYSTEM32 directory, create a command file with one of the following file extensions: .BAT, .CMD, .EXE, or .COM.
2. Select the Execute Command File box.
3. In the UPS dialog box, type the name of the command file in the File Name box.

Using UPS with Other System Services

The UPS service should be used in conjunction with the Windows NT Alerter, Messenger, and Event Log services. This will ensure that events related to the UPS service, such as a power failure or a UPS connection failure, are recorded in the system log of Event Viewer and that designated users are notified of these events over the network.

The Alerter and Messenger services must be started for a computer to generate a UPS or other type of network alert. After setting up the UPS service on your computer, use the Services tool in Control Panel to make sure the Alerter, Messenger, and Event Log services are configured to start automatically. Use the Server option in Control Panel to designate which users and computers will receive alerts. The Messenger service must be started on computers that are to receive UPS alerts and UPS warning messages.

Testing Your UPS Configuration

After configuring UPS options, you or your system administrator should test that your computer is protected from power failure.

▷ **To test UPS configuration**

1. Simulate a power failure by disconnecting the power to the UPS device.
The computer and peripherals connected to the UPS device should remain operational and a warning message and/or alert should appear on the computer screen.
2. Wait until the UPS battery reaches a low level.
At that point system shutdown should occur.
3. Restore power to the UPS device.
4. Check the system log in Event Viewer to ensure that all actions were logged and that there were no errors.

If the UPS service is configured to run a command file, you should test that file execution does not exceed the 30 second time limit.

▷ **To test command file configuration**

- Determine a worst case scenario. For example, if your command file starts up a custom application to disconnect logon sessions to a remote computer, test command file execution with a maximum number of logon sessions.

If you have problems running the UPS service, see the system log in Event Viewer for event details related to UPS.

Configuring the Network

You can use the Network option in Control Panel to make changes in your computer's network configuration. For example, if you add a new adapter card to your computer after installing Windows NT, you need to specify the network device drivers and supporting software that Windows NT needs to work with network adapter cards. You can also use the Network option to join a workgroup or domain, configure network bindings, and set network provider search order.

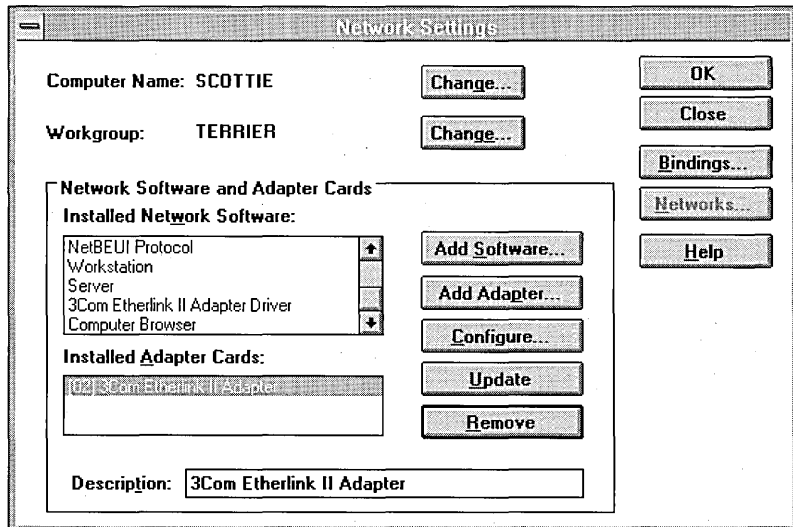


To make changes in the Network Settings dialog box, you must be logged on as a member of the Administrators group for your computer.

► To use the Network option



- Choose the Network icon in Control Panel.



The following table summarizes the buttons in the Network Settings dialog box.

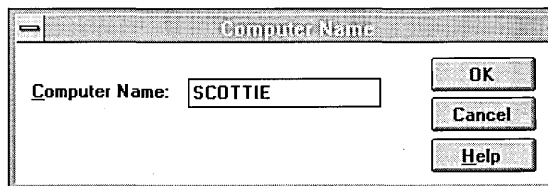
Choose	To
Change (Computer name)	Change the computer name for this computer.
Change (Domain or Workgroup)	Display a dialog box for joining a workgroup or domain.
Add Software	Display one or more dialog boxes for installing a network software component.
Add Adapter	Display one or more dialog boxes for installing a network adapter card.
Configure	Display one or more dialog boxes for configuring the selected network software component or adapter card.
Update	Display one or more dialog boxes for updating a network software component or adapter card.
Remove	Remove a selected network software component or adapter card.
Bindings	Display a dialog box for adding and removing bindings for network components.
Networks	Display a dialog box for setting network search order if your computer is connected to more than one kind of network provider. (This button is available only if other network providers are present.)

Changing the Computer Name

You can change the computer name for the current computer in the Network Settings dialog box. A computer name cannot be the same as any other computer, workgroup, or domain name on the network.

► **To change the computer name**

1. In the Network Settings dialog box, choose the Change button next to the computer name.



2. In the Computer Name dialog box, type a unique name for this computer, and then choose the OK button.

Caution If you change the computer name for a computer that participates in a Windows NT Advanced Server domain, the new computer name must have an account in the domain. If the computer does not have an account, you will not be able to log on to the domain or access any domain user accounts (including your own account). Check with your network administrator to ensure that you specify a correct computer name and that the computer has an account in the domain.

Installing Network Adapter Cards

To communicate over the network, a computer must have a network adapter card installed. Windows NT uses a *network device driver*, which is software that coordinates communication between the adapter card and the computer's hardware and other software, controlling the physical function of the network adapter cards.

During the initial installation of Windows NT, you have the opportunity to install at least one network card. To add to or change your computer's network adapter cards after installation, you must choose the Network icon in Control Panel.

▷ To install one or more network adapter cards

1. In the Network Settings dialog box, choose the Add Adapter button.
2. In the Add Network Adapter dialog box, select the name of the adapter card that is installed in your computer, and then choose the Continue button.

If you have a disk with software from a vendor, select Other.

3. When Setup asks for a disk, insert the disk in the drive, or type the path of the driver if the file is located on your hard disk or on a network drive. Then choose the OK button.

You may be asked to insert additional disks if more than one disk was provided by the hardware manufacturer. You may also be asked for specific Windows NT installation disks.

4. When you complete all your changes and close the Network Settings dialog box, a message asks if you want to restart your computer for the changes to take effect. To restart your computer immediately, choose the Yes button.

Installing Network Software

Windows NT also uses network software (or protocol) drivers that bind to the adapter card driver. You can also add supporting software for network components in the Network Settings dialog box.

► **To install network software**

1. In the Network Settings dialog box, choose the Add Software button.
2. In the Add Network Software dialog box, select the software component you want to install, and then choose the Continue button.

If you have a disk with software from a vendor, select Other.

3. When Setup asks for a disk, insert the disk in the drive. Or type the path of the software component if the file is located on your hard disk or on a network drive. Then choose the OK button.

You may be asked for additional disks if more than one disk was provided by the hardware manufacturer. You might also be asked for specific Windows NT installation disks.

4. When you complete all your changes and close the Network Settings dialog box, a message asks if you want to restart your computer for the changes to take effect. To restart your computer immediately, choose the Yes button.

Updating or Removing Network Components

You can either update or remove the configuration information for an installed network software component or adapter card.

▶ **To update a network component**

1. In the Network Settings dialog box, select the component you want to update in the Installed Network Software box or the Installed Adapter Cards box.
2. Choose the Update button.
3. Complete the dialog boxes that appear.

You will be asked to insert disks from the manufacturer that contain the updated driver information for the selected component.

When you remove a network component, the information is removed from your system configuration. The related software remains on your hard disk. After removing a network component, you must restart your system before you can reinstall that component.

▶ **To remove a network component**

1. In the Network Settings dialog box, select the component you want to remove in the Installed Network Software box or the Installed Adapter Cards box.
2. Choose the Remove button.
3. Complete the dialog boxes that appear.

The dialog box for removing the component is supplied by the manufacturer. Choose the Help button in the dialog box for more information.

For your changes to take effect, you must restart your computer.

Configuring Network Software and Adapter Cards

Many adapter cards and their supporting software can be configured to achieve the best performance on your system. You can set the appropriate configuration for your network components in the Network Settings dialog box.

The dialog boxes for configuring your adapter and software are supplied by the manufacturer. Most of these dialog boxes contain a Help button to guide you through making choices for optimal settings. For additional information, refer to the documentation for your network adapter card or software.

► To configure network software or an adapter card

1. In the Network Settings dialog box, select the name of the item you want to configure in either the Installed Network Software box or the Installed Adapter Cards box.

Optionally, in the Description box, type text to describe the component, or keep the description provided by the manufacturer. If you have multiple adapter cards, consider including the slot number of the card in its description.

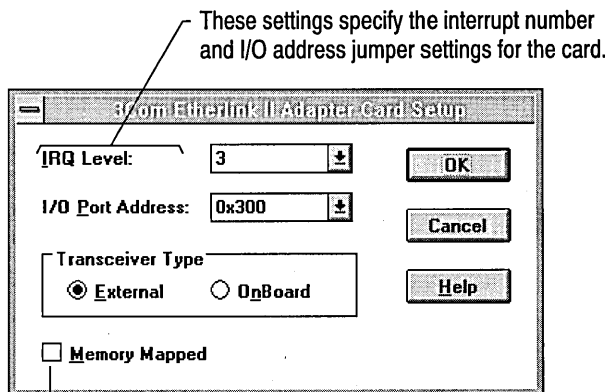
2. Choose the Configure button.

Windows NT displays a dialog box specifically for the selected component, as provided by the component manufacturer.

For information about any items in the dialog box, choose the Help button.

3. Complete options in the dialog box to specify your choices, and then choose the OK button.

For example, the following illustration shows a typical configuration dialog box for a 3Com® EtherLink II® network adapter card.



Choosing and Configuring Protocol Software

To communicate over a network, each computer must be configured with at least one type of protocol software. Protocol software works between the upper-level network software and the network adapter card. The protocol packages data that is to be sent on the network in a way that the computer on the receiving end can understand. Microsoft provides four protocols for use with Windows NT: NetBEUI (NetBIOS extended user interface), TCP/IP (transmission control protocol/internet protocol), NWLink (NetWare Link), and Data link control.

Protocol software	Description
NetBEUI 3.0	A small, efficient, and fast protocol tuned for small LANs. It is installed automatically when you install Windows NT.
TCP/IP	Provides communication across wide area networks (WANs) and routers.
NWLink	Provides a protocol compatible with the Novell NetWare IPX/SPX protocol, so that Windows NT computers can interoperate with Novell NetWare servers.
Data link control	Not designed to be a primary protocol for use between PCs. It is useful if your computer needs to access IBM mainframe computers or if you are setting up a printer that attaches directly to the network, instead of to a serial or parallel port on a print server.

NetBEUI is the standard Windows networking protocol and is automatically installed during Windows NT setup. If there are no wide area network (WAN) links in the network, and if there is no need to connect to any devices other than computers running Windows NT or other Windows operating systems, you do not need to add any protocol software. If you need WAN internet capability, add TCP/IP. With both protocols supported, you can benefit from NetBEUI performance when connecting to local computers and you can still connect over WANs to other networks.

To install other protocols included with Windows NT, choose the Add Software button in the Network Settings dialog box. All adapter card drivers that come with Windows NT can use any of the included protocols.

For additional information on installing and configuring network protocols, see Appendix A, "Network Protocols."

Setting LAN Adapter Numbers

When you install Windows NT on a computer (and when you install additional protocols or network adapter cards), Windows NT automatically assigns LAN adapter (Lana) numbers to protocol/network adapter card bindings. You need to change a LAN adapter number only if you have a NetBIOS application that specifies that it must use a certain LAN adapter number.

► **To set LAN adapter numbers for special applications**

1. In the Network Settings dialog box, select NetBIOS Interface in the Installed Network Software box.
2. Choose the Configure button.
3. In the Network Route box, select the protocol whose LAN adapter number you need to change and then type in a new number in the Lana Number box.
4. Complete options in the dialog box to specify your choices, and then choose the OK button.

Joining a Workgroup or Domain

You can assign the workgroup for the current computer, such as the workgroup created if you were previously using Windows for Workgroups. If the computer will participate in a Windows NT Advanced Server domain, you can use the Network Settings dialog box to join the domain.

In Windows NT, a *workgroup* is a collection of computers that appear, for convenience, under the same workgroup name when you browse network resources. Any computer can join any workgroup.

A *domain* is a collection of computers, defined by the administrator of a Windows NT Advanced Server network, that share an account database and security policy. A domain provides the same convenience for network browsing and also provides access to the centralized user accounts and group accounts maintained by the domain administrator. In most cases, you will want a Windows NT workstation to join a domain—this is the only way for a user who has an account on a Windows NT Advanced Server domain to be able to log on to that account at a Windows NT workstation.

There are two ways for a computer to join a domain. One method is for the domain administrator to log on to the computer and then, in the Network Settings dialog box, create a domain account for the computer and add it to the domain. Alternatively, a domain administrator can use Server Manager to create a domain account for the computer, after which you can join the domain at the current computer using the Domain/Workgroup Settings dialog box.

Domain/Workgroup Settings

Computer Name: BEAGLE

Member of:

Workgroup:

Domain: DOMAIN

Create Computer Account in Domain

Domain Administrator User Name:

Domain Administrator Password:

This option will create a computer account on the domain for this computer. It is for use by domain administrators only.

OK

Cancel

Help

▶ **To join a workgroup**

1. In the Network Settings dialog box, choose the Change button next to the current workgroup or domain name.
The Change button is unavailable if you previously changed the computer name in the current session.
2. In the Domain/Workgroup Settings dialog box, select the Workgroup option, and then type the name of the workgroup you want the computer to join.
The workgroup name must not be the same as the computer name.
3. Choose the OK button.

▶ **To join a domain**

1. Verify that the domain administrator has already created a domain account for your computer.
2. In the Network Settings dialog box, choose the Change button next to the current domain or workgroup name.
The Change button is unavailable if you previously changed the computer name in the current session.
3. In the Domain/Workgroup Settings dialog box, select the Domain option, and then type the name of the domain you want the computer to join.
4. Choose the OK button.



If you are logged on as a domain administrator, you can automatically add an account for the current computer when the computer joins the domain.

▶ **To add a computer to a domain**

1. In the Domain/Workgroup Settings dialog box, select the Domain option, and then type the name of the domain you want the computer to join.

The computer name, as shown at the top of this dialog box, must be a unique name in the domain.

2. Select the Create Computer Account In Domain check box.
3. In the appropriate boxes, type the username and password for your domain administrator user account.

If you are a member of a trusted domain, type the name of that domain, followed by your account name. For example, type **Shipping\Chrisdr**, where shipping is a trusted domain of the domain in which you are creating a computer account, and Chrisdr is an account in shipping with authority to administer the local domain.

4. Choose the OK button.

Joining a Domain from a Remote Access Workstation



To join a domain from a remote workstation, you must be logged on as a member of the Administrators group for your computer or as a member of the Domain Administrators group.

▶ **To join a domain from a remote workstation**

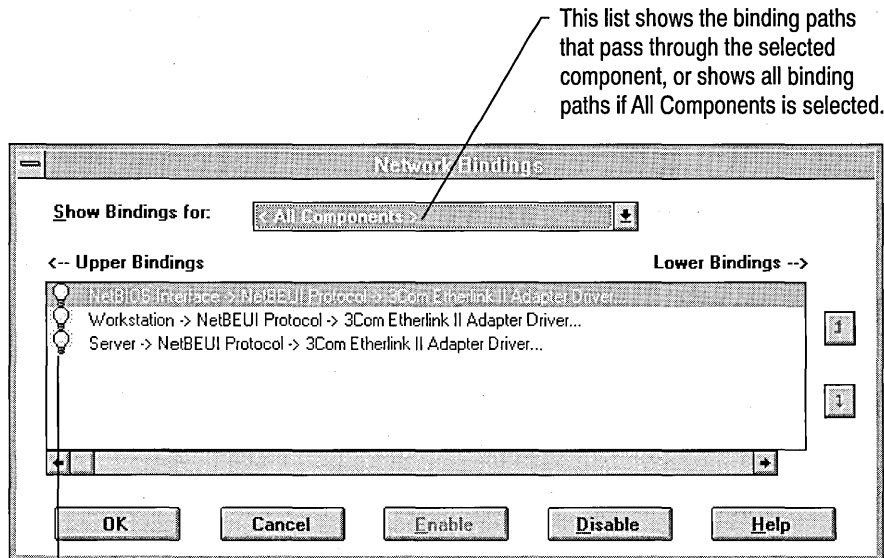
1. Start the Remote Access Service from your computer.
2. Connect to the network.
3. Start Control Panel and double-click the Network icon.
4. In the Network Settings dialog box, choose the Change button next to your workgroup name.
5. In the Domain box, type the name of the domain you want to join. Unless you are a domain administrator, your computer must already have an account in the domain you intend to join.
6. Choose the OK button.

Configuring Network Bindings

The network consists of a series of software layers, where software in each layer performs specific functions for the layers above and below it. All network software layers end at the network adapter card, which moves information between computers. Each network component can be bound to one or more network components above it or below it to make the component's services available to any other component that can benefit from them.

By default, Windows NT maximally binds all network components to ensure that they are fully utilized. If you rarely use a particular adapter card and want to reduce the software loaded into memory, you can simply unbind (disconnect) that network adapter card from all network components.

When you choose the Bindings button in the Network Settings dialog box to add or remove bindings, the Network Bindings dialog box shows the bindings of network components as a series of bound paths, from the upper layer services and protocols to the lowest layer of adapter-card device drivers.



Caution Do not attempt to reconfigure binding settings unless you are an experienced network administrator familiar with the requirements of your network software.

If you have more than one kind of protocol installed, you can set the order in which workstation and NetBIOS software bind to each protocol. You might want to change the binding order for one of the following reasons:

- If the protocol you use most frequently is first in the Binding list, average connection time decreases.
- Some protocols are faster than others for certain network topologies. Putting the faster protocol first in the Bindings list improves performance.
For example, if you use both the NetBEUI and TCP/IP protocols, but only connect to TCP/IP periodically, put NetBEUI first in the protocol binding list.

▶ **To view bindings for network components**

1. In the Network Settings dialog box, choose the Bindings button.
2. In the Show Bindings For box of the Network Bindings dialog box, select one or more components. Or choose All Components to see a list of all bound components.

▶ **To enable or disable binding paths for selected network components**

1. In the Network Bindings dialog box, select a binding path.
2. To enable the binding path, choose the Enable button.
To disable the binding path, choose the Disable button.

The icon next to the selected binding shows the current state of that binding path.

3. Choose the OK button.

▶ **To change protocol binding order**

1. In the Network Settings dialog box, choose the Bindings button.
2. In the Show Bindings For box of the Network Bindings dialog box, select a top level component such as Workstation.
3. Select the binding path to move up or down and use the protocol order buttons to change the binding order.
4. Choose the OK button.

Configuring the Remote Procedure Call Service

Windows NT Setup automatically installs the files you need for the Remote Procedure Call (RPC) service, a mechanism that enables programmers to easily develop distributed applications. However, to use this functionality, you need to specify the Name Service Interface (NSI) that the RPC service uses to communicate with name service databases. Use the RPC Name Service Provider Configuration dialog box to specify settings for the name service provider. To see this dialog box, choose the Network icon in Control Panel, select RPC Name Service Provider in the Network Software list, and then choose Configure.

To configure the name service provider, you must know which provider you want. If you choose the DCE Cell Directory Service, you must also supply the network address of the provider. The Windows NT Locator is the default name service that is installed with Windows NT.

Setting Network Provider Search Order

If you have more than one kind of network installed at your site, you can specify the order in which Windows NT searches the various networks for certain operations.

After you specify the network search order, Windows NT will always search in that order. After Windows NT finds the specified server, directory, file, or other item on one network, it does not continue to search the networks listed lower in the search order.

► To set network provider search order

1. In the Network Settings dialog box, choose the Networks button. (This button is dimmed if no other network providers are available.)
2. In the Access Networks In This Order box, select the name of the network whose order you want to change, and then choose the Up or Down button to move that network higher or lower in the search order.
3. Continue selecting network names to define the order until all networks are listed in the order you want for searching, and then choose the OK button.

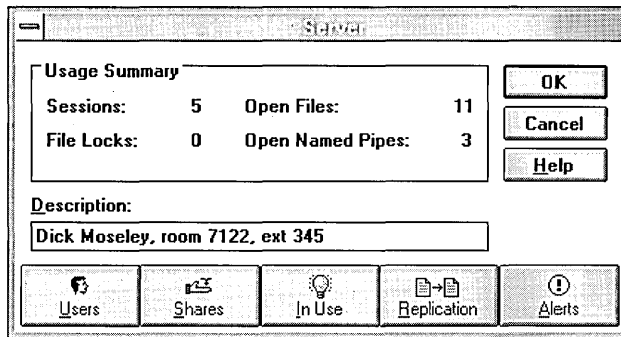
Managing Server Properties

Use the Server option in Control Panel to display a summary of connections and resource use for the computer; to edit the computer description; to view connected users, shared resources, and open resources; and to manage directory replication and the recipients of administrative alerts.

► To manage properties



1. In the Control Panel window, choose the Server icon.



The Server dialog box displays a usage summary for the computer.

Item	Meaning
Sessions	The number of users remotely connected to the computer
Open Files	The number of shared resources opened on the computer
File Locks	The number of file locks on open resources of the computer
Open Named Pipes	The number of named pipes opened on the computer

2. To change the computer description, type new text in the Description box.
3. To administer a property associated with one of the five buttons at the bottom of the Server dialog box, choose a button and complete the dialog box that appears. These buttons and their associated dialog boxes are described in procedures following this one.

Choose	To
Users	View a list of all the users connected over the network to the computer and the resources opened by a selected user. One or all of the connected users can be disconnected.
Shares	View a list of the computer's shared resources and the users connected over the network to a selected resource. One or all of the connected users can be disconnected.
In Use	View a list of the open shared resources on the computer. One resource or all resources can be closed.
Replication	Manage directory replication for the computer.
Alerts	View and manage the list of users and computers that are notified when administrative alerts occur on the computer.

- To exit, choose the OK button.

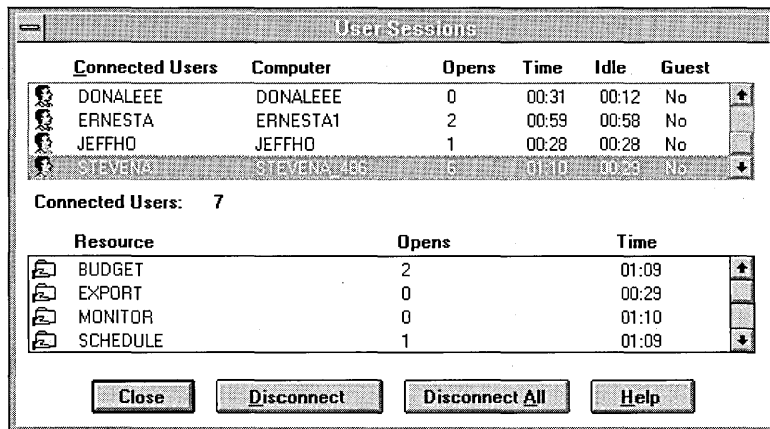
Viewing User Sessions

Use the User Sessions dialog box to view all the users connected over the network to the computer, and the resources opened by a selected user.

One or all of the connected users can be disconnected. There are several reasons to do this. For example, you might be about to stop the Server service on the computer, or you might be about to shut down the computer. To avoid data loss, always warn users before disconnecting them.

► To view users connected over the network to the computer

- In the Control Panel window, choose the Server icon.
- In the Server dialog box, choose the Users button.







In the User Sessions dialog box, the Connected Users box lists the users remotely connected to the computer.

Item	Meaning
Connected Users	The user name of a connected user. In some cases the user's computer name may be displayed instead of the user name.
Computer	The computer name of the computer where the user is logged on.
Opens	The number of resources opened on the computer by the user.
Time	The hours and minutes that have elapsed since this session was established.
Idle	The hours and minutes that have elapsed since the user last initiated an action.
Guest	Whether this user has guest status on the computer.

Below the Connected Users box, the Connected Users summary shows the number of users remotely connected to the computer.

- To view the resources used by a user, select a user name from the Connected Users box.

The Resource box lists the shared resources that user is connected to.

Item	Meaning
Icon	Graphically indicates the type of each listed resource: <ul style="list-style-type: none">  A shared directory  A named pipe  A shared printer  A resource of an unrecognized type
Resource	The name of a shared resource to which the selected user is connected
Opens	The number of opens against this resource by this user
Time	The hours and minutes that have elapsed since this resource was first opened

In some cases, a connection to a printer is monitored here as a connection to a named pipe.

- To disconnect one user, select the user name from the Connected Users box and then choose the Disconnect button. To disconnect all users, choose the Disconnect All button.

Warn users before disconnecting them.

- To exit, choose the Close button, and then in the Server dialog box choose the OK button.

Viewing Shared Resources

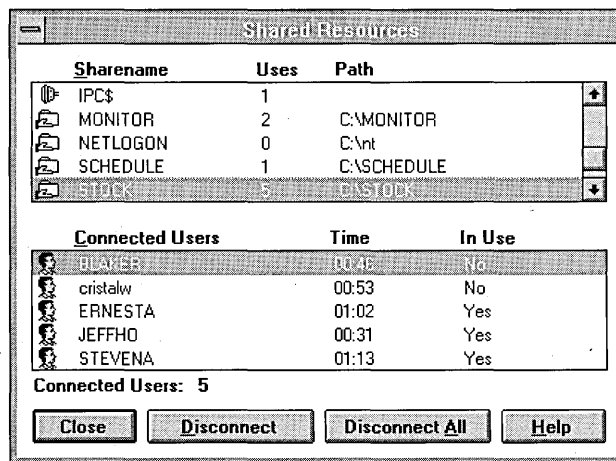
Use the Shared Resources dialog box to view the shared resources available on the computer and the users connected over the network to a selected resource.

Note To share directories or manage shared directories, use File Manager. To share printers or manage shared printers, use Print Manager.





One or all of the connected users can be disconnected. There are several reasons to do this. For example, you may need to allow another user to connect to a shared directory that already has its maximum number of users connected. To avoid data loss, always warn users before disconnecting them.

► To view shared resources

1. In the Control Panel window, choose the Server icon.
2. In the Server dialog box, choose the Shares button.



In the Shared Resources dialog box, the Sharename box lists available resources.

Item	Meaning
Icon	Graphically indicates the type of each listed resource:  A shared directory  A named pipe  A shared printer  A resource of an unrecognized type
Sharename	The name of a shared resource
Uses	The number of connections to the shared resource
Path	The path of the shared resource

In some cases, a connection to a printer is monitored here as a connection to a named pipe.

- To view the users connected to a shared resource, select a share name from the Sharename box. The Connected Users box lists the connected users.

Item	Meaning
Connected Users	The user name of a user connected to the selected shared resource. In some cases the user's computer name may appear instead of the user name.
Time	The hours and minutes that have elapsed since the user first connected to this shared resource.
In Use	Whether the user currently has a file open from this shared resource.

Below the Connected Users box, the Connected Users summary shows the number of users connected to the selected resource.

- To disconnect one user from all shared resources, select the user name from the Connected Users box and then choose the Disconnect button. To disconnect all users from all shared resources, choose the Disconnect All button.

Warn users before disconnecting them. Each disconnected user is disconnected from all shared resources on the computer—not just the resource selected in the Sharename box.

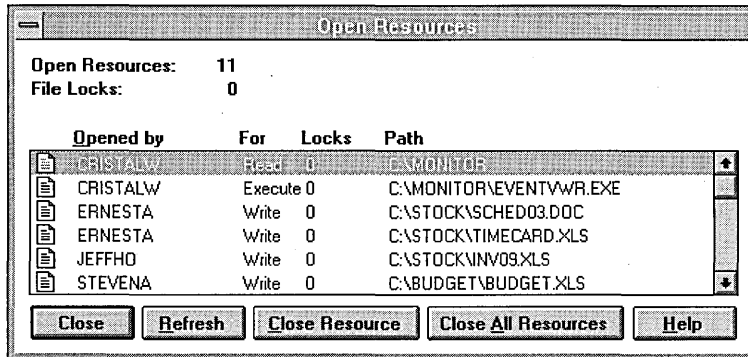
- To exit, choose the Close button, and then in the Server dialog box choose the OK button.

Viewing Resources In Use

Use the Open Resources dialog box to view the resources open on the computer. One or all of the resources can be closed. To avoid data loss, always warn connected users before closing resources.

► **To view resources in use**

1. In the Control Panel window, choose the Server icon.
2. In the Server dialog box, choose the In Use button.



The Open Resources dialog box shows the resources open on the computer.

Item	Meaning
Open Resources	The total number on open resources on the computer
File Locks	The total number of file locks on open resources
Icon	Graphically indicates the type of each listed resource: <ul style="list-style-type: none"> A file A named pipe A print job in a print spooler A resource of an unrecognized type
Opened By	The user name (or sometimes the computer name) for a user who opened a resource
For	The permission granted when the resource was opened
Locks	The number of locks on the resource
Path	The path of the open resource

In some cases, a print job is monitored here as an open named pipe.

3. To close a single resource, select one resource from the list and then choose the Close Resource button. To close all resources, choose the Close All Resources button.
Warn connected users before closing resources.
4. To update the displayed information, choose the Refresh button.
5. To exit, choose the Close button, and then in the Server dialog box choose the OK button.

Managing Directory Replication

Use the Directory Replication dialog box to manage replication for the computer. Directory replication is the duplication of a master set of directories from a server (called an export server) to specified servers or workstations (called import computers) in the same or other domains. A Windows NT workstation can only be set up as an import computer.

Before replication can occur, a special user account must be created, configured, and assigned to the Replicator service. For information on preparing the Replicator service, and for detailed information explaining directory replication, see the *Microsoft Windows NT Advanced Server System Guide*, which is provided with the Microsoft Windows NT Advanced Server software required for the replication export server.

The procedures that follow describe how to use the Server option in the Control Panel to set up the computer as an import computer. When setting up an import computer you do not need to create the imported subdirectories, because a subdirectory is automatically created the first time it is imported.

► To set up an import computer

1. In the Control Panel window, choose the Server icon.
2. In the Server dialog box, choose the Replication button.



The Directory Replication dialog box contains the following items relating to import replication.

Item	Description
Do Not Import	Prevents import of replicated subdirectories and files.
Import Directories	Allows replicated subdirectories and their files to be imported.
To Path	The directory in which replicated subdirectories and files will be stored. The default is C:\WINNT\SYSTEM32\REPL\IMPORT. (If Windows NT is installed in a location other than C:\WINNT, the system adjusts this default accordingly.)
Manage	Displays the Imported Directories dialog box, where the subdirectories to be imported are specified, and where import locks are added or removed.
From List	Subdirectories are replicated to this import computer from the domains and computers listed here. By default, the From List contains a [blank] entry and this computer automatically imports from the local domain.
Add	Displays the Select Computer dialog box. Used to add a computer or domain to the From List.
Remove	Removes a selected computer or domain from the From List.

3. In the Directory Replication dialog box, select Import Directories.
4. To change the directory where imported subdirectories will be stored, type a new path in the To Path box.
5. To import subdirectories from a domain or computer, under Import Directories choose the Add button, and then complete the Select Domain dialog box that appears.

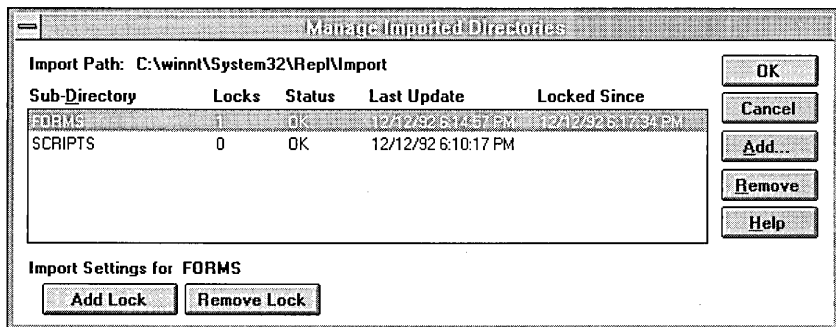
The domain name or computer name is added to the From List.

Note By default, the From List contains a [blank] entry and this computer automatically imports from the local domain. If any entries are added to the From List, the local domain is no longer imported from. If needed, it must be explicitly added to the From List.

6. To stop importing subdirectories from an export server or domain, select the domain or server name in the From List, and then choose the Remove button.
7. To view a list of the subdirectories that have been imported to this computer, or to manage locks on those imported subdirectories, under Import Directories choose the Manage button, and then complete the dialog box that appears. For more information, see the following procedure.
8. To exit, choose the OK buttons in the Directory Replication and Server dialog boxes.

▷ **To view a list of, or manage locks for, imported subdirectories**

1. In the Directory Replication dialog box, under Import Directories, choose the Manage button.



The Manage Imported Directories dialog box contains the following items.

Item	Description
Import Path	The directory in which replicated subdirectories and files are stored on this computer.
Sub-Directory	A list of the subdirectories that are imported to this computer. A subdirectory is automatically imported if it is exported by one of the export servers or domains in the From List of the Directory Replication dialog box.
Locks	A lock prevents import to the subdirectory. More than one lock might be applied to a subdirectory. Import to a subdirectory only occurs if this column has a value of 0.
Status	OK indicates that the subdirectory is receiving regular updates from an export server and the imported data is identical to the exported data.
	No Master indicates that the subdirectory is not receiving updates. The export server might not be running, or the export server might have stopped exporting updates.
	No Sync indicates that the subdirectory has received updates, but the data is not up to date. This could be due to a communications failure, open files on the import computer or export server, the import computer not having access permissions at the export server, or an export server malfunction.
	[blank] indicates that replication has never occurred for that subdirectory. Replication may not be properly configured for this import computer, for the export server, or both.
Last Update	The date and time the last update was made to a file in this import subdirectory, or in its subtree.
Locked Since	The date and time the oldest lock was placed on this subdirectory.
Import Settings For	Shows the selected subdirectory.
Add Lock	Adds a lock to the selected subdirectory, preventing import.
Remove Lock	Removes a lock from the selected subdirectory. Import only occurs when a subdirectory has 0 locks.

Item	Description
Add	<p>Displays the Add Sub-Directory dialog box, used to add new subdirectories to the list of imported subdirectories.</p> <p>However, this is usually unnecessary. This does not create the actual subdirectory; and when a subdirectory is exported by one of the export servers or domains in the From List of the Directory Replication dialog box, it is automatically imported and is added to this list.</p>
Remove	<p>Removes the selected subdirectory from the list.</p> <p>However, this is usually unnecessary. If that subdirectory is exported by one of the export servers or domains in the From List of the Directory Replication dialog box, it will still be imported and will later reappear in this list.</p>

2. To temporarily stop importing to a subdirectory, select the subdirectory from the list and then choose the Add Lock button.
3. To resume importing to a locked subdirectory, select the subdirectory and then choose the Remove Lock button.

Usually, you should only remove locks that you have applied. Import only resumes when the Locks column shows a value of 0 for the subdirectory.
4. To return to the Directory Replication dialog box, choose the OK button.

Managing Administrative Alerts

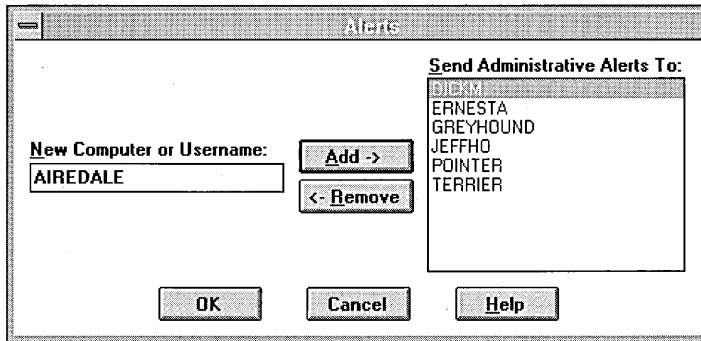
The Alerts dialog box displays and manages the list of users and computers that are notified when administrative alerts occur at this computer.

Alerts relate to server and resource use. They warn about security and access problems, user session problems, server shutdown because of power loss when the UPS service is available, and printer problems. For example, an alert can be generated when disk space becomes low.

For alerts to be sent, the Alerter and Messenger services must be running on the computer originating the alert. For alerts to be received, the Messenger service must be running on the destination computer.

► **To manage the recipients of administrative alerts**

1. In the Control Panel window, choose the Server icon.
2. In the Server dialog box, choose the Alerts button.



3. To add a user or computer to the list of alert recipients, type the user name or computer name in the New Computer Or Username box, and then choose the Add button.
4. To remove a user or computer from the list of alert recipients, select the user name or computer name from the Send Administrative Alerts To box, and then choose the Remove button.
5. To exit, in the Alerts dialog box choose the OK button, and then in the Server dialog box choose the OK button.

Managing Services

Use the Services option in Control Panel to start, stop, pause, or continue each of the services available on the computer, to determine whether a service will start up automatically when the system starts, and to control some other service startup parameters.

The default services provided with the system are shown in the following table.

Service	Description
Alerter	Notifies selected users and computers of administrative alerts that occur on this computer. Used by the Server and other services. Requires the Messenger service.
Clipboard Server	Supports the ClipBook Viewer application, allowing pages to be seen by remote ClipBooks.
Computer Browser	Maintains an up-to-date list of computers, and provides the list to applications when requested. Provides the computer lists displayed in the Select Computer and Select Domain dialog boxes.
Directory Replicator	Replicates directories, and the files in those directories, between computers.
Event Log	Records system, security, and application events in the event logs.
Messenger	Sends and receives messages sent by administrators or by the Alerter service.
Net Logon	Supports pass-through authentication of account logons. Used when the workstation participates in a domain.
Network DDE	Provides a network transport for DDE (dynamic data exchange) conversations and provides security for DDE conversations.
Network DDE DSDM	Manages the shared DDE conversations. It is used by the Network DDE service. DSDM stands for DDE share database manager.
Remote Procedure Call Locator	Allows distributed applications to use the Microsoft RPC name service. The RPC Locator service manages the RPC name service database. The server side of a distributed application registers its availability with the RPC Locator service. The client side of a distributed application queries the RPC Locator service to find available compatible server applications.

Service	Description
Remote Procedure Call	Is the RPC subsystem for Windows NT. The RPC subsystem includes the endpoint mapper and other miscellaneous RPC services.
Schedule	Must be running for the at command to be used. The at command can be used to schedule commands and programs to run on a computer at a specified time and date.
Server	Provides RPC (remote procedure call) support, and file, print, and named pipe sharing.
UPS	Manages an uninterruptible power supply connected to this computer.
Workstation	Provides network connections and communications.

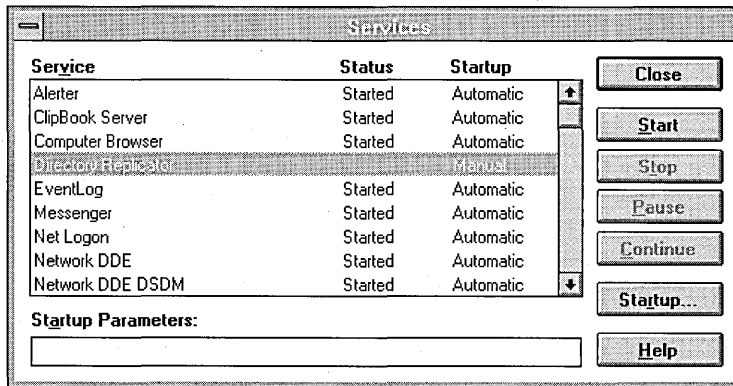
Starting and Stopping Services

Use the Services dialog box to start, stop, pause, or continue each of the services available on the computer, and to pass startup parameters to the service.

► To start, stop, pause, or continue a service



1. In the Control Panel window, choose the Services icon.



A blank in the Status column indicates that the service is stopped.

2. In the Services dialog box, select a service.
3. Choose the Start, Stop, Pause, or Continue button.

Optionally, to pass startup parameters to a service, type the parameters in the Startup Parameters box before choosing the Start button.

4. In the Services dialog box, choose the Close button.

Because stopping the Server service disconnects all remote connected users, use the following procedure to stop that service.

► **To stop the Server service**

1. Use the Services option in Control Panel to pause the Server service.
This prevents new users from establishing a connection with this computer.
2. Notify all connected users, warning them to disconnect within a specified time period.
3. After expiration of your warning period, use the Services option in Control Panel to stop the Server service.

Configuring Service Startup

Use the Service Startup dialog box to configure when and how a service is started and, optionally, to specify a user account the service will use to log on.

When services start, they log on. By default, most services log on using a special system account. (Of the services provided with Windows NT, only the Directory Replicator and Schedule services will usually log on using other user accounts.)

When a user account other than the system account is used to log on a service, that user account must have the Password Never Expires option selected. For instructions on configuring a user account, see Chapter 13, "User Manager."

If it is the Directory Replicator service that you are assigning the user account to, it must be a domain user account, and it must be a member of the domain's Backup Operators group. For instructions on configuring a domain user account as described here, see the *Microsoft Windows NT Advanced Server System Guide* provided with the Microsoft Windows NT Advanced Server software required for the replication export server.

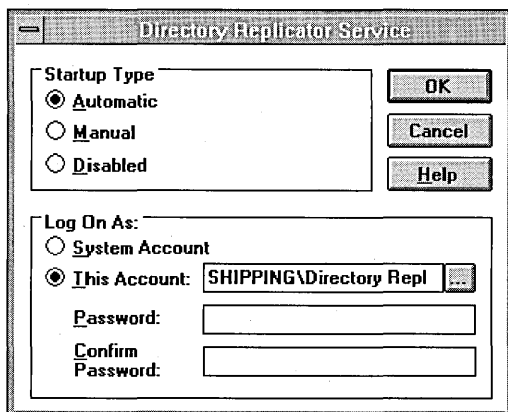


To configure service startup you must be logged on to a user account that is a member of the Administrators local group.

► **To configure startup for a service**



1. In the Control Panel window, choose the Services icon.
2. In the Services dialog box, select a service.
3. Choose the Startup button.



4. Specify a startup type.

Select	To
Automatic	Start the service every time the system starts. (The Server service will not start automatically unless the computer has at least 12 MB of memory.)
Manual	Allow the service to be started by a user or by a dependent service.
Disabled	Prevent the service from being started.

5. Specify the user account the service will use to log on.

Select	To
System Account	Specify that the service will log on using the system account.
This Account	Specify a user account the service will use to log on.

Note Most services must log on using the system account.

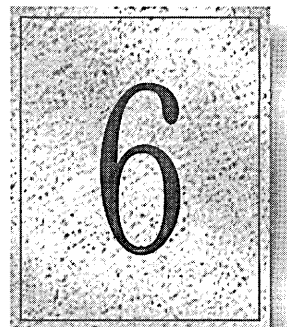


- If you select This Account, choose the Browse button and specify a user account in the Add User dialog box that appears. After completing and exiting that dialog box, type the password for the user account in both the Password and Confirm Password boxes.
- Choose the OK button, and then in the Services dialog box, choose the Close button.

If a user account has been assigned to a service as described in steps 5 and 6 of the previous procedure, and if the password for that user account is later changed (for example, while using the User Properties dialog box in User Manager to administer the user account), the password for that user account must also be changed here, in the Service Startup dialog box.

CHAPTER 6

Print Manager



Use Print Manager to work with local and network printers.

This chapter explains how to control printing and printers, and includes the following topics:

- Installing a printer for use with Windows NT and your applications
- Connecting to a network printer
- Changing a printer's properties, including sharing a printer over the network
- Securing a printer and auditing its use
- Printing documents
- Administering network print servers remotely

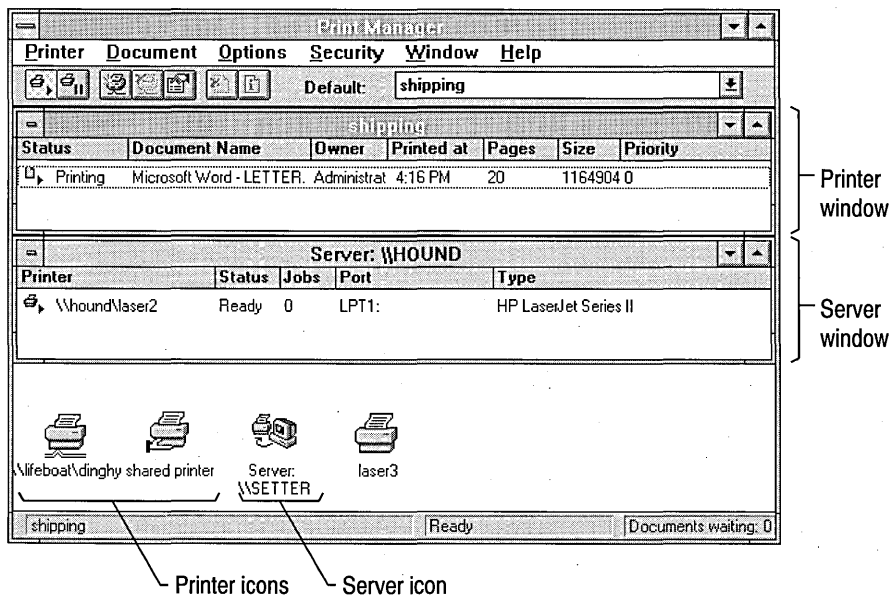
Overview

Use Print Manager to install local printers and to connect to printers on the network so that you can print to them from your applications. Each printer that is available appears in its own window in Print Manager. Printer windows show you the current activity of the printer, including a list of the documents waiting to be printed. If you have several printers available to you on the network, you can use Print Manager to find one that is ready to print and not busy printing other users' documents.

You can use Print Manager to control documents that have been sent to a printer. You can pause and resume printing, arrange the order in which waiting documents will be printed, and remove documents that are waiting to print.

Print Manager allows you to manage both local and remote printers to suit your needs. Use Print Manager to share printers on the network, control access to printers, and set other printer properties such as the hours the printer is available to print.

The Print Manager window contains a menu bar, toolbar, and status bar. Printer windows and icons represent printers you have installed or to which you are connected over the network. Server windows and icons represent servers to which you have connected in order to administer printers remotely.



The *toolbar* provides quick access to commands through buttons.

The *status bar* shows the status of the current job or printer, including how many pages of the job have been printed and how many documents are waiting to be printed.

The *printer window* shows information for one of the printers that you have installed or to which you are connected. For each printer, you can see what documents are waiting to be printed, who owns them, how large they are, and other information.

The *server window* shows information for all printers connected to a Windows NT-based server.

The toolbar and status bar are displayed by default. You can hide them by choosing the Toolbar and Status Bar commands from the Options menu.

Starting and Quitting Print Manager

By default, when you start Print Manager, its window appears as it was when you last quit Print Manager. The positions of printer and server windows are saved as long as the Save Settings on Exit command is in effect when you quit.

▶ To start Print Manager



- From the Main Group, choose the Print Manager icon.
- Or–
- In Control Panel, choose the Printers option.

▶ To quit Print Manager

- From the Printer menu, choose Exit.

Installing a Printer

Use the Print Manager Create Printer option from the Printer menu when:

- You are physically installing a printer on a computer.
- You are physically installing a printer that connects directly to the network.
- You want to define a printer that prints to a file.
- You want to define multiple printers with varying properties for the same physical printer.



To create a printer, you must be logged on as a member of the Administrators or Power Users group.

The printers you create using Print Manager represent physical devices, usually physical printers. Because Print Manager printers are representations of physical devices, they can be used flexibly. You can create more than one printer representing the same physical printer, or you can create a printer that prints to a file. For example, if you have a printer in your office, but also share it with others over the network, you might want to create two printers for the physical printer. You can create a printer for yourself that is not shared over the network and a second printer that is shared. Then it's easy to control the use of the shared printer. You can set permissions on it, ensuring that only members of your department can print to it. Or you can set a low priority for it, ensuring that documents you send to the printer will always print before documents sent by those who share it.

Note If you want to print to a printer that is already shared on a network, add it to the printers in Print Manager by connecting to it. For more information, see “Connecting to a Network Printer,” later in this chapter.

When you choose Create Printer from the Printer menu, Print Manager displays a Create Printer dialog box where you can define the operation of the printer. To complete a basic printer installation, specify the printer name, driver, and an optional description. Then specify a printing destination. The destination can be a port, a file, or a network address. Print Manager will prompt you to select the appropriate printer driver or to install a new one if necessary.

► To install a printer

1. From the Printer menu, choose Create Printer.

The screenshot shows the 'Create Printer' dialog box with the following fields and options:

- Printer Name:** Shipping
- Driver:** HP LaserJet III Si
- Description:** department printer available 6 AM to 6 PM
- Print to:** LPT1:
- Share this printer on the network**
 - Share Name:** Shipping
 - Location:** Room 342

Buttons on the right: OK, Cancel, Setup..., Details..., Settings..., Help.

2. In the Printer Name box, type a name for the printer.

This name appears in the title bar of the printer window. It is the name network users running Windows NT will see when connecting to the printer if you share the printer over the network. The name can be up to 32 characters long.

3. In the Driver box, select the printer's driver.

If your printer does not appear in the list, you can try installing the printer using a compatible driver. For example, if your printer is Hewlett-Packard® PCL® compatible, you may be able to use one of the HP® LaserJet® drivers included with Windows NT. Consult your printer's documentation to determine which drivers you can choose.

4. In the Description box, type an optional description.

Network users will see this description when adding the printer to their available printers. Use the description to inform them about the printer. For example, if the printer is available only during certain hours, you could include that information here.

5. In the Print To box, choose a destination for printing output:

- If you are installing a printer that you have physically connected to a computer, choose the appropriate parallel or serial port, for example, LPT1.

If the port you want does not appear in the list, choose Network Printer. In the Print Destinations dialog box, choose Local Port and then choose the OK button. Type the name of the new port in the Port Name dialog box and choose the OK button. Print Manager adds the port to the list of print destinations.

- If you want to print to a file, choose File. When you print, you are prompted for a file name.
- If you are installing a Hewlett-Packard printer that connects directly to the network, choose Network Printer. In the Print Destinations dialog box, choose Hewlett-Packard Network Port and then choose the OK button. In the Add A Hewlett-Packard Network Port dialog box, select the network address in the Card Address box and name the port. Then choose the OK button.

Before you can create a printer that uses a Hewlett-Packard network port, the Data Link Control protocol must be installed and running. You can install the protocol using the Network option in Control Panel.

6. Choose the OK button.
7. If the appropriate printer driver is not already installed, Windows NT prompts you to enter the path of the distribution files where the driver is located. Type the path and choose the OK button. Windows NT prompts you to insert disks as necessary to install the driver.

Print Manager displays a dialog box that allows you to set up your printer's features. You can set these now or later.


This completes a basic printer installation. You can specify many other options when installing a printer. For more information, see "Changing a Printer's Properties," later in this chapter.

Installing a Printer Driver

Use Print Manager when you need to install a new or additional printer driver for your printer.

Because RISC and x86-based computers use different printer drivers, you may want to install printer drivers for both platforms on your print servers if your network contains a mixture of RISC and x86-based computers. For example, when a RISC-based Windows NT computer connects to an x86-based Windows NT print server, the RISC version of the printer's driver must be available to the RISC-based computer. You can install the RISC printer driver on either the local computer or on the x86-based print server. If you install the driver on the server, it will be available to any other RISC-based Windows NT computer on your network.

► To install a printer driver not listed in the Driver box

1. Select the printer's icon or window.
-  2. From the Printer menu, choose Properties. Or choose the Properties button on the toolbar.
3. In the Printer Properties dialog box, select Other in the Driver box.
4. In the Install Driver dialog box, specify the drive and path where the printer driver is located and choose the OK button.

If you are installing a second driver for a printer on a server, for example a RISC driver on an x86-based computer, specify the location of the PRINTER.INF file for the RISC drivers, for example a shared directory on the network.

5. In the Select Driver dialog box, select the driver in the Printer Driver box. If the driver is not located in the directory shown by the Source Directory box, edit the path. Then choose the OK button.

Print Manager installs the new driver.

Connecting to a Network Printer

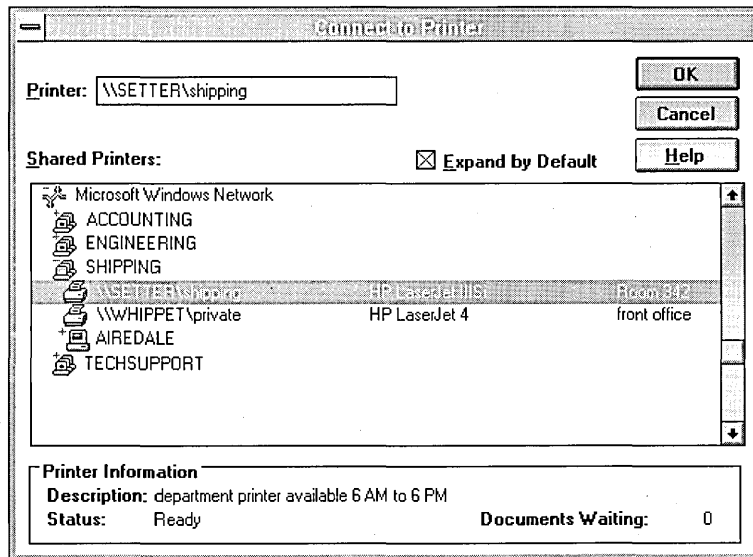
To print to a printer that is shared over the network, connect to it. Connecting to the printer adds the printer to the available printers displayed in the Print Manager window.

By default, printers in your computer's domain or workgroup are displayed automatically in the Shared Printers box. If you are connecting over a slow network, for example connecting through Remote Access Service, you can switch this off by clearing the Expand By Default check box.

► To connect to a network printer



1. From the Printer menu, choose the Connect To Printer command. Or choose the Connect Printer button on the toolbar.



2. In the Connect To Printer dialog box, select a printer.

The Shared Printers box shows networks, domains or workgroups, and shared printers organized in a tree structure. Double-click an item to expand the list: double-click a network name to display domains or workgroups. Double-click a domain or workgroup name to display printers shared by computers running Windows NT and to display other print servers. To display printers shared by other print servers, for example computers running LAN Manager 2.x, double-click a computer name.

When you select a printer, Print Manager fills in the Printer box with the name of the computer sharing the printer and the name of the printer. The Printer Information box displays additional information, including the printer's description, status, and the number of waiting documents.

Or you can type the name of a computer and shared printer in the Printer box. Precede the computer name with two backslashes (\\) and separate the computer name from the shared printer's name with a single backslash (\), for example, \\printserver\laser.

3. Choose the OK button.
4. If the printer you selected is shared by a Windows NT computer and has a printer driver compatible with your computer, Print Manager connects you to the printer and you can print.

Print Manager prompts you to install a printer driver if the computer sharing the printer is not a Windows NT computer or if the printer driver available on the computer is not compatible. For example if your computer is RISC-based and the computer sharing the printer is x86-based, a RISC-compatible driver must be installed on either the computer sharing the printer or your computer. Choose the OK button to continue in order to install a driver.

5. In the Select Driver dialog box, select the appropriate driver for the printer in the Driver box.
6. In the Windows NT Setup dialog box, type the directory and path where Windows NT printer drivers are stored, and then choose the Continue button.

Windows NT installs the driver and displays a printer window for the connected printer.

Removing a Printer

You can use Print Manager to remove printers that you have installed and to which you are connected.

► To remove a printer



1. Select the printer window or printer icon.
2. To remove a printer to which you are connected over the network, choose Remove Printer from the Printer menu, or choose the Disconnect Printer button on the toolbar.

To remove an installed printer, choose Remove Printer from the Printer menu.

3. Print Manager prompts you for confirmation. Choose the Yes button to remove the printer.

Changing a Printer's Properties

You can set printer properties when you create a printer or you can change a printer's properties after you have created it. Properties include:

- Sharing the printer on the network.
- Setting printing options such as the size and format of paper available at the printer and the font cartridges that are installed.
- Setting job defaults such as the default paper size and printing orientation.
- Setting printer details such as the hours the printer is available and the printing priority of documents sent to the printer.



To change printer properties, you must be logged on as a member of the Administrators or Power Users group, or you must have been granted Full Control permission for the printer.

▶ **To change the properties of an installed printer**

1. Select the printer's icon or window.



2. From the Printer menu, choose Properties. Or choose the Properties button on the toolbar.

Printer Properties

Printer Name: shipping

Driver: HP LaserJet III Si

Description: department printer available 6 AM to 6 PM

Print to: LPT1:

Share this printer on the network

Share Name: shipping

Location: Room 342

OK

Cancel

Setup...

Details...

Settings...

Help

You can now change the printer's properties as discussed in the sections that follow.

Sharing a Printer

Sharing a printer allows others on the network to connect to the printer and to print their documents on it. Before you can share a printer, the Server service must be running. You can start the Server service by using the Services option in Control Panel.

► To share a printer on the network

1. In the Printer Properties dialog box, select the Share This Printer On The Network check box.

Share this printer on the network

Share Name:

Location:

2. In the Share Name box, Print Manager creates a share name for the printer. Computers running Windows NT see the printer name when connecting to the printer; however, computers running MS-DOS require a share name that conforms to MS-DOS naming conventions in order to connect.

The share name is based on the printer name. You can edit the share name; however, if you want MS-DOS-based computers to connect to the printer, the share name must follow MS-DOS naming conventions and cannot be longer than 12 characters.
3. In the Location box, type a description of the printer's location to let users know where their documents will be printed. Users see the printer's location in the Connect To Printer dialog box when they add the printer to their list of available printers.
4. Choose the OK button.

Setting Printing Options

Setup options allow you to configure the printer to take full advantage of its features. The options that are available depend on the printer. The following table lists typical setup options:

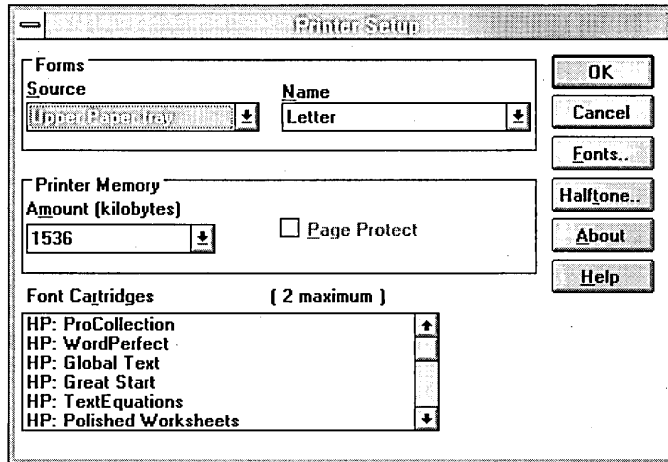
Option	Purpose
Forms	Specifies the size and format of paper used in the printer. Printers that support multiple paper trays or sources for paper allow you to match a form with a source.
Memory	Specifies the amount of memory available in the printer.
Font	Specifies the font cartridges installed in the printer. Controls the loading of soft fonts and font substitution.
Halftone	Adjusts the printing of halftone colors.

For more information on setup options available for your printer, choose the Help button in the Printer Setup dialog box.

▷ **To set or change printing options**

1. In the Printer Setup dialog box, choose the Setup button.

A typical Printer Setup dialog box used for setting printing options is shown below. The options available for your printer may be different.



2. Set the options and then choose the OK button.

Setting Job Defaults

Job defaults include printing settings such as paper size and orientation. The settings in Print Manager establish how documents print by default, so you should use settings that are appropriate for the type of document you print most frequently. When you need to change a setting, you can do so from within your applications when you print. Settings made from within an application override the defaults set in Print Manager.

The settings that are available depend on the printer. The following table lists typical settings.

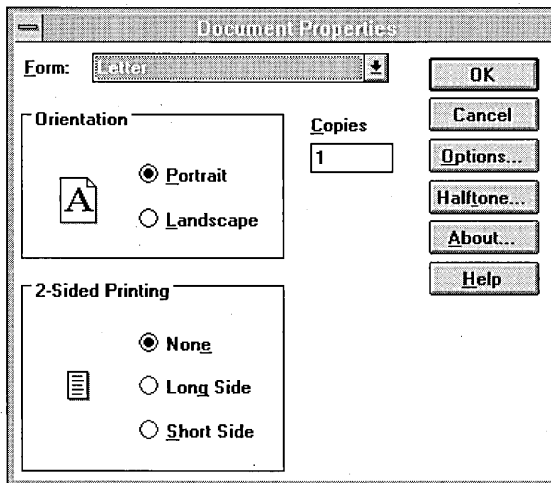
Setting	Purpose
Form	Selects a paper size
Orientation	Sets printing the page vertically or horizontally
Copies	Sets the number of copies to print
2 Sided	Sets printing on both sides of the paper
Resolution	Sets the resolution at which graphics print
Color	Switches between color and monochrome printing
Download Fonts	Specifies whether or not to download TrueType fonts to the printer

For more information on options available for your printer, choose the Help button in the Document Properties, Advanced Document Properties, and Halftone Color Adjustment dialog boxes.

► **To set or change job defaults**

1. In the Printer Properties dialog box, choose the Details button.
2. In the Printer Details dialog box, choose the Job Defaults button, and set defaults in the Document Properties dialog box.

A typical Document Properties dialog box used for setting job defaults is shown below. The options available for your printer may be different.



3. In the Document Properties dialog box, choose the Options button to set more defaults in the Advanced Document Properties dialog box.
4. In the Document Properties dialog box, choose the Halftone button to adjust halftone printing for color and monochrome graphics.
5. Choose the OK button to close each dialog box.

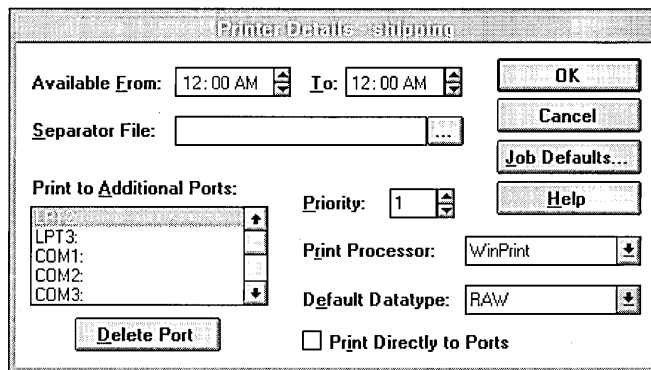
Setting Printer Details

Use the Printer Details dialog box to set the following printer features:

- Set the hours a printer is available
- Print a separator page
- Create a pool of printers
- Set printer priority
- Specify a print processor
- Specify a default data type
- Print directly to ports

► To set printer details

1. In the Printer Properties dialog box, choose the Details button.



2. Set or change printer details and then choose the OK button.

Setting Printing Hours

Setting printing hours sets the period during which the printer will print documents sent to it. Documents can be sent to the printer at any time, but they will only be printed during the hours that you have set. By default, printing hours are not limited.

Setting printing hours allows you to control the flow of work to a printer. For example, you can create two printers in Print Manager for the same physical printer and restrict the printing hours for one printer to nighttime hours. You can send documents to the nighttime printer at any time, but they will print only at night. Use the nighttime printer to print documents that are large or that you don't need immediately. This keeps the physical printer available during the day to print the documents you need right away. Print those documents by directing them to the printer whose hours you have not limited.

▶ **To set or change printer availability**

- In the Printer Details dialog box, set the period that the printer is available using the Available From and To scroll boxes.

Available From: To:

Using Separator Files

You can use separator files for a variety of purposes. Windows NT includes separator files that print a page at the beginning of each document to make it easy to find a document among others at the printer and separator files that can switch a printer between PostScript® and PCL printing. You can create your own separator files and specify their use by Print Manager.

The following table shows the names of separator files supplied with Windows NT, the purpose of each, the type of printer with which each is compatible, and whether or not the file can be edited.

Filename	Purpose	Compatible with	Can be edited
DEFAULT.SEP	Prints a page before each document	PCL	No
PSLANMAN.SEP	Prints a page before each document	PostScript	Yes
PCL.SEP	Switches printer to PCL printing	PCL	Yes
PSCRIPT.SEP	Switches printer to PostScript printing	PostScript	Yes

▶ **To specify a separator page**

- In the Printer Details dialog box, type the name of the separator file, including its path, in the Separator File box. To use the Windows NT default separator page, type DEFAULT.SEP in the Separator File box.

Separator File:

If you want to search for a file, choose the browse button next to the Separator File box. You can then search for the file using the Select Separator Page dialog box.

Setting Printer Priority

Use the priority setting to control which documents will print first when sent to a printer. When you create two printers for the same physical printer and set different priorities for them, documents sent to the printer whose priority is higher will always print before documents sent to the printer whose priority is lower.

For example, if you are the primary user of the printer in your office, but you also share it with others over the network, you can ensure that your print jobs will always print before those of others by creating two different printers for the physical printer and setting a low priority for the shared printer.

► To set or change the priority

- In the Printer Details dialog box, set the priority in the Priority box.

By default, the priority is set to 1, which is the lowest priority. You can set a priority from 1 to 99.

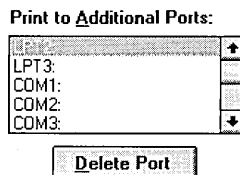
Priority:

Creating a Printer Pool

Print Manager allows you to pool printers. When printers are pooled, several printers connected to a server behave as a single printer. When a document is sent to the server, the first available printer in the pool will print it. The printers in the pool must be identical to ensure printing consistency. To create a pool of printers, create a printer and include in the printer definition the additional ports to which the pool printers are connected.

► To create a printer pool

- In the Printer Details dialog box, select port names from the Print To Additional Ports box that correspond to the ports where you have connected printers.



If the ports you need do not appear in the list, you can add them.

▷ **To add a port**

1. In the Printer Properties dialog box, select Network Printer in the Print To box.
2. In the Print Destinations dialog box, select Local Port and choose the OK button.
3. In the Port Name dialog box, type the name of the port you want to add in the Enter A Port Name box, and then choose the OK button.

Printing Directly to Ports

You can control how Print Manager sends documents to the printer. By default, documents are spooled before starting to print. When a document is spooled, it is stored on the hard disk first and then the spooler sends it to the printer. You can continue working with your application as soon as the document is stored on the disk. The spooler sends the document to the printer in the background.

If you want to bypass spooling, you can print directly to the printer. However, you will have to wait until the document is printed before continuing to work with your application.

▷ **To print directly to ports**

- In the Printer Details dialog box, select Print Directly To Ports.


Print Directly to Ports

Specifying a Print Processor or Data Type

The Windows NT print processor supports Journal and Raw data types. In general, you should not need to change either the default print processor or data type. These options are available so that specialized applications can modify the printing process. Such an application may require you to specify a specialized print processor and a particular data type when you create a printer to use with the application.


▷ **To set or change the print processor**

- In the Printer Details dialog box, select the filename of the processor in the Print Processor box.

Print Processor: 

▷ **To set or change the default data type**

- In the Printer Details dialog box, select a data type in the Default Datatype box.

Default Datatype: 

Setting Time-outs

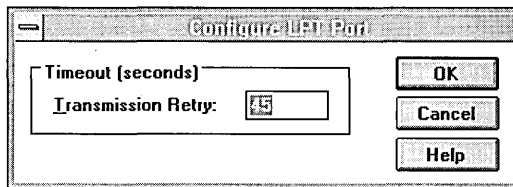
For printers that are connected to a computer's parallel port, for example LPT1, you can control the amount of time that elapses before Print Manager decides that the printer is not responding and notifies you of an error. The setting affects the printer you've selected and any other local printers that use the same driver. The setting for Transmission Retry determines how long Print Manager will wait for a printer to ready itself to accept more data.

► **To set time-out options**

1. Select the printer whose time-outs you want to set.

Time-outs can be set only for printers connected to a parallel port.

2. From the Printer menu, choose Properties.
3. In the Printer Properties dialog box, choose the Settings button.



4. Set the number of seconds in the Transmission Retry box, and then choose the OK button.

Securing a Printer

You can secure printers by setting permissions on them. Each permission you set specifies the access that a group or user has to the printer. For example, when you set Print permission for the group called marketing on the printer, members of that group can print documents on the printer, but cannot change any of the printer's properties.

Permissions are cumulative except that the No Access permission overrides all other permissions. For example, if the marketing group has Full Control permission while the finance group has only Print permission, and Annie is a member of both groups, Annie will have Full Control permission. However, if you change the finance group's permission to No Access, Annie will not be able to use the printer even though she is a member of a group that has access to it.

By default, if you have permission to print, you also can control the printing of any document you print. As creator of the document at the printer, you are allowed to control the document through permissions granted the Creator Owner. In general, you should not change the permissions granted to the Creator Owner or remove the Creator Owner from the permissions list.



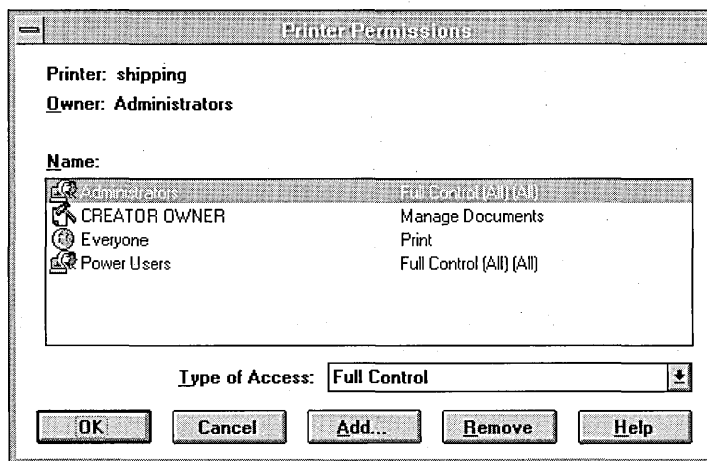
To change permissions on a printer, you must be the owner of the printer or have been granted Full Control permission.

The following table shows the permissions for printers and the actions available to users for each permission.

	No Access	Print	Manage Documents	Full Control
● Permission allows use				
○ Permission does not allow use				
Print documents	○	●	○	●
Control settings for documents	○	○	●	●
Pause, resume, restart, and delete documents	○	○	●	●
Change the printing order of documents	○	○	○	●
Pause, resume, purge printer	○	○	○	●
Change printer properties	○	○	○	●
Delete printer	○	○	○	●
Change printer permissions	○	○	○	●

▶ To set or change printer permissions

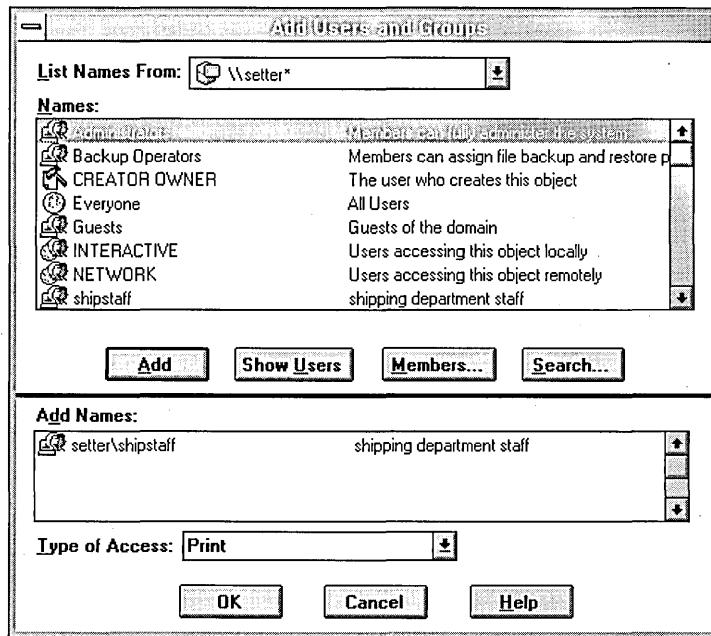
1. Select the printer window or icon for the printer whose permissions you want to set or change.
2. From the Security menu, choose Permissions.



3. Select the name of the group or user and choose a permission from the Type Of Access box.
4. Choose the OK button.

► **To add a group or user to the printer permissions list**

1. In the Printer Permissions dialog box, choose the Add button.



The Add Users And Groups dialog box displays the groups on the computer or in the domain shown by the List Names From box. Local groups are shown for the computer or domain whose name is followed by an asterisk (*).

You can select another domain by using the List Names From box. Domains appear only if your computer is a member of a domain on a Windows NT Advanced Server network. The domains shown have a trust relationship.

2. You can use options in the Add Users And Groups dialog box to display users, find the users in a group, or find the domain to which a group or user belongs.
 - Choose the Show Users button to display the names of users on the current computer or domain.
 - To see a group's content, select the group and choose the Members button. Users are listed in a new dialog box. On a Windows NT Advanced Server network, global groups that are members of a local group appear in the list. To see a global group's users, select the group and choose the Members button. To include the group in the Add Users And Groups dialog box, choose the Add button. To include some of the group's users, select them and choose the Add button.

- To add a group or user, you must know the domain which contains the group's or user's account. On a Windows NT Advanced Server network, choose the Search button to find the domain of a group or user. In the Find Account dialog box, type the name of the group or user in the Find User Or Group box and specify the domains to search. Then choose the Search button. To include the groups or users in the Add Users And Groups dialog box, select them in the Search Results box and choose the Add button.
3. To add groups or users to the permissions list, select them and choose the Add button, or double-click the name of the group or user.
Or you can type the names of groups and users in the Add Names box. Separate names using a semicolon. If the account of the group or user is not located on the computer or domain shown by the List Names From box, you must specify the location. Type the computer or domain name followed by group or user name and separate the names using a backslash, for example **shipping\ernesta**. You can type the name without waiting for Windows NT to list groups in the Names box.
 4. Select the permission for the groups or users shown in the Add Names box using the Type Of Access box.
 5. Choose the OK button.

▶ **To remove printer permissions for a group or user**

1. In the Printer Permissions dialog box, select the name of the group or user.
2. Choose the Remove button.

Auditing a Printer

Auditing a printer allows you to track its usage. For a particular printer, you can specify which groups or users and which actions to audit. You can audit both successful and failed actions. Windows NT stores the information generated from auditing in a file. You can view the information using Event Viewer. For more information, see Chapter 15, "Event Viewer."

Important To audit a printer, you must set the audit policy to audit file and object access. Set the audit policy using User Manager. For more information on audit policy, see Chapter 13, "User Manager."

To audit the following activities for a printer, select the events shown.

- Event audits action
- Event does not audit action

	Print	Full Control	Delete	Change Permissions	Take Ownership
Printing documents	●	○	○	○	○
Changing job settings for documents	○	●	○	○	○
Pausing, restarting, moving, and deleting documents	○	●	○	○	○
Sharing a printer	○	●	○	○	○
Changing printer properties	○	●	○	○	○
Deleting a printer	○	○	●	○	○
Changing printer permissions	○	○	○	●	○
Taking ownership	○	○	○	○	●

► **To set or change printer auditing**

1. Select the printer window or icon for the printer that you want to audit.
2. From the Security menu, choose Auditing.
3. Set auditing for each group and user in the list: select the name of a group or user, and then select the events to audit for that group or user.
4. Choose the OK button.

► **To add a group or user to the printer auditing list**

1. In the Printer Auditing dialog box, choose the Add button.

The Add Users And Groups dialog box displays the groups on the computer or in the domain shown by the List Names From box. Local groups are shown for the computer or domain whose name is followed by an asterisk (*).

You can select another domain by using the List Names From box. Domains appear only if your computer is a member of a domain on a Windows NT Advanced Server network. The domains shown have a trust relationship.

2. You can use options in the Add Users And Groups dialog box to display users, find the users in a group, or find the domain to which a group or user belongs.
 - Choose the Show Users button to display the names of users on the current computer or domain.
 - To see a group's content, select the group and choose the Members button. Users are listed in a new dialog box. On a Windows NT Advanced Server network, global groups that are members of a local group appear in the list. To see a global group's users, select the group and choose the Members button. To include the group in the Add Users And Groups dialog box,

choose the Add button. To include some of the group's users, select them and choose the Add button.

- To add a group or user, you must know the domain which contains the group's or user's account. On a Windows NT Advanced Server network, choose the Search button to find the domain of a group or user. In the Find Account dialog box, type the name of the group or user in the Find User Or Group box and specify the domains to search. Then choose the Search button. To include the groups or users in the Add Users And Groups dialog box, select them in the Search Results box and choose the Add button.
3. To add groups or users to the auditing list, select them and choose the Add button, or double-click the name of the group or user.

Or you can type the names of groups and users in the Add Names box. Separate names using a semicolon. If the account of the group or user is not located on the computer or domain shown by the List Names From box, you must specify the location. Type the computer or domain name followed by group or user name and separate the names using a backslash, for example **shipping\ernesta**. You can type the name without waiting for Windows NT to list groups in the Names box.

4. Choose the OK button.

▶ **To remove printer auditing for a group or user**

1. In the Printer Auditing dialog box, select the name of the group or user.
2. Choose the Remove button.

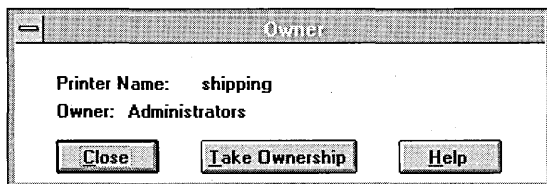
Taking Ownership of a Printer



The owner of a printer can always change the permissions set on the printer. If you have Full Control permission for a printer, you can take ownership of it. Otherwise, you must be logged on as a member of the Administrators group to take ownership.

▶ **To take ownership of a printer**

1. Select the printer window or icon for the printer.
2. From the Security menu, choose Owner.



3. Choose the Take Ownership button.

Using Forms

A form specifies paper size and the size of margins. Many printers support a range of forms: letter, legal, A4, #10 envelope, and so on. When you create a printer, you assign a form to each of the printer's trays. In addition to supporting standard forms, Print Manager allows you to create custom forms and assign them to printers. Use this feature to ensure that a printer is always ready to print your special forms.

For example, you can define a letter-sized form called Letterhead whose expanded top margin reserves space for the information on your company's letterhead. You can then assign this form to a paper tray on one of your printers and keep that tray filled with letterhead paper. Users connected to the printer can select the Letterhead form when printing from their applications and be assured that their documents will be printed on the company stationery. If a user selects a form that is not assigned to a tray on the printer, the document will wait to print until the selected form has been assigned to the printer.

Forms you create are stored on the computer. When you create a form for use with a particular printer, create the form on the computer used as the printer's server.

► To create a form

1. From the Printer menu, choose Forms.

Forms

Forms on this Computer:

- Letter Small
- Tabloid
- Ledger
- Legal
- Statement
- Executive

OK

Cancel

Help

Form Description

Name: Letter

Paper Size

Width: 8.50in

Height: 11.00in

Print Area Margins

Left: 0.00in

Top: 0.00in

Right: 0.50in

Bottom: 0.00in

Add

Delete

Units

Metric English

2. In the Form Description box:
 - In the Name box, type a name for the form.
 - In the Paper Size box, type the measurements for the width and height of the paper.
 - In the Print Area Margins box, type the measurements for the left, right, top, and bottom margins.

You can enter sizes in either inches or centimeters by selecting the English or Metric option buttons in the Units box.

3. Choose the Add button.
4. Choose the OK button.

▷ **To assign a form to a printer**

1. Select the printer to which you want to assign the form.
2. Choose the Properties button, or choose Properties from the Printer menu.
3. In the Printer Properties dialog box, choose the Setup button.
4. Select the source, for example Upper Paper Tray, and the name of the form, for example Letter.

Source and form options are dependent on the printer.

5. Choose the OK button.

▷ **To remove a form**

1. From the Printer menu, choose Forms.
2. In the Forms On This Computer box, select the form you want to remove.
You cannot delete any of the standard forms supplied with Windows NT.
3. In the Forms dialog box, choose the Delete button.

Printing Documents

The way you print documents depends on the application you are using. Use Print Manager to manipulate the documents at the printer. You can pause printing, and change the order of or remove documents that are waiting to print.



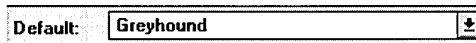
You can always control printing of your own documents. However, to control printing of other users' documents, you must be logged on as a member of the Administrators or Power Users group, or you must have been granted Manage Documents or Full Control permission for the printer.

Setting the Default Printer

When you choose the Print command in an application, the application sends the document to the default printer. Some applications allow you to select any of the available printers when you print. Set the default printer to be the printer you print to most often.

► **To set the default printer**

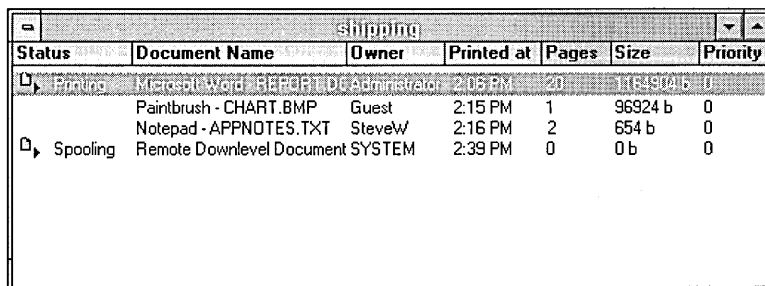
- On the Print Manager toolbar, choose the Default box and select a printer from the list.



Viewing Documents at the Printer

To see the documents that are printing or waiting to be printed, display the printer's window. Print Manager displays documents sorted by the order in which they will print.

The printer window shows each document's status, name, and owner; the time it was sent to the printer; its size in pages and bytes; and its priority. You can change the widths of the columns that display this information.



Status	Document Name	Owner	Printed at	Pages	Size	Priority
Printing	Microsoft Word - B1E981.DOC	Administrator	2:05 PM	20	1164906 b	0
	Paintbrush - CHART.BMP	Guest	2:15 PM	1	96924 b	0
	Noteepad - APPNOTES.TXT	SteveW	2:16 PM	2	654 b	0
Spooling	Remote Downlevel Document	SYSTEM	2:39 PM	0	0 b	0

► **To change the widths of columns**

- Using the mouse, point to the vertical bar that follows the heading of the column whose width you want to change, and then drag the bar to widen or narrow the column.

Pausing and Resuming Printing

You can interrupt and restart printing of all documents on a printer or of one document on a printer.

▶ To pause all printing

1. Select the printer's window or icon.

If a document is selected in the printer window, deselect it by pressing the right mouse button or by pressing the SPACEBAR.



2. From the Printer menu, choose Pause. Or choose the Pause button on the toolbar.

▶ To resume all printing

1. Select the printer's window or icon.

If a document is selected in the printer window, deselect it by pressing the right mouse button or by pressing the SPACEBAR.



2. From the Printer menu, choose Resume. Or choose the Resume button on the toolbar.

▶ To pause printing of a document

1. Select the document in the printer window.



2. From the Document menu, choose Pause. Or choose the Pause button on the toolbar.

▶ To resume printing a document

1. Select the document in the printer window.



2. From the Document menu, choose Resume. Or choose the Resume button on the toolbar.

Changing Printing Order

You can change the order in which documents will be printed.

▶ **To change the order of a document**

- Select the document in the printer window, and then drag it to a new position in the printing order.
- Or–
- Select the document in the printer window, and then press CTRL+UP ARROW or CTRL+DOWN ARROW to move the document up or down in the printing order.

Restarting Documents

You can restart printing from Print Manager. When you restart a document, Print Manager reprints it from the beginning. For example, if your printer experiences a problem such as wrinkled paper, use Print Manager to restart printing. You can restart printing only when the Print Directly To Ports option is off.

▶ **To restart printing of a document**

- Select the document in the printer window, and then choose Restart from the Document menu.

Removing Waiting Documents

You can remove documents that are waiting to print one at a time, or you can remove all documents that are waiting to print.

▶ **To remove a waiting document**



1. Select the document in the printer window.
2. From the Document menu, choose Remove Document. Or choose the Remove Document button on the toolbar.

▶ **To remove all waiting documents**

1. Select the printer's window or icon.
2. From the Printer menu, choose Purge Printer.

Displaying or Changing Document Details

When you display detailed information on a document, Print Manager displays the file's name, status, owner, size in pages and kilobytes, and the time it was sent to the printer. Print Manager also shows who will be notified of the document's status when it prints, the range of time in which the document can be printed, the document's priority, and the document's print processor.

► **To display details about a document**

1. Select the document in the printer window.
2. From the Document menu, choose Details. Or choose the Details button on the toolbar.



The image shows a dialog box titled "Document Details". It contains the following information:

Document Title: Microsoft Word - REPORT.DOC	OK	
Status: Printing	Pages: 20	Cancel
Size: 1159576	Owner: SteveW	Help
Printed On: Laser3	Notify: <input type="text" value="SteveW"/>	
Printed At: 12:59 AM	Priority: <input type="text" value="1"/>	
Processor: WinPrint	Start Time: <input type="text" value="12:00 AM"/>	
Datatype: NT JNL 1.000	Until Time: <input type="text" value="12:00 AM"/>	

Changing Print Notification

By default, the owner of a document is notified when the document has been printed. You can change who is notified.

► **To change print notification**

- In the Document Details dialog box, type the username of the person you want to notify in the Notify box.

Changing Document Priority

By default, documents sent to a printer have the same priority while waiting to print. But when you raise the priority of a document, it will print before other documents that are waiting at that printer. If multiple printers with different priorities have been defined for a physical printer, documents sent to printers with higher priority will still print before documents sent to lower priority printers. For more information on printer priority, see “Setting Printer Priority,” earlier in this chapter.

▷ **To change a document’s priority**

- In the Document Details dialog box, set the document’s priority in the priority box.

You can set a priority from 1, the lowest priority, to 99.

Changing Document Printing Hours

You can specify a period of time during which the document will print. If, for example, you have a long document to print, you can specify that it print during the evening. The hours you set must be within the hours the printer is available. For more information on setting hours for a printer, see “Setting Printing Hours,” earlier in this chapter.

▷ **To change printing hours for a document**

- In the Document Details dialog box, set the period of time during which the document will print in the Start Time and Until Time boxes.

Administering Network Print Servers Remotely

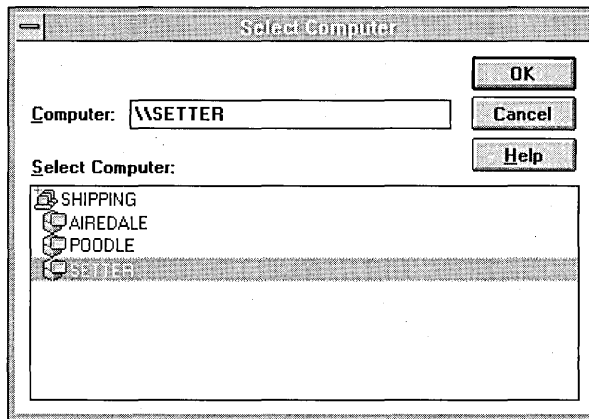
Print Manager allows you to administer network print servers remotely. You can change the properties of existing printers, as well as install new printers or remove printers.



To administer a printer, you must be logged on as a member of the Administrators or Power Users group, and you must have been granted Full Control permission for the printer.

► **To install, remove, or change a printer remotely**

1. From the Printer menu, choose Server Viewer.



2. In the Select Computer dialog box, double-click the name of a domain to display the servers in the domain. Choose the print server you want to administer, and choose the OK button.
3. Print Manager displays a window that shows the printers on the server you have chosen. You can minimize server windows.

Printer	Status	Jobs	Port	Type
\\server\Dot Printer	Ready	0	LPT2:	Epson FX-2800
\\server\Laser Printer	Ready	0	LPT1:	HP LaserJet III Si

To	Choose
Install a new printer	Create Printer from the Printer menu. You can then install the printer just as you would a local printer.
Remove a printer	Remove Printer from the Printer menu.
Change a printer	Properties from the Printer menu.

CHAPTER 7

Mail



The Mail electronic mail system helps you communicate efficiently with coworkers. This chapter provides an overview of the basic features of Mail for all users, and also provides information for the administrator who creates and manages the workgroup postoffice (WGPO).

The following topics are presented in this chapter:

- An overview of Mail
- Using Mail
- Setting up the Mail system
- Managing the workgroup postoffice
- Using Mail with other networks and other messaging systems

Although this chapter will get you started using Mail, your main source of information is online Help. To get Help, press F1 wherever you are working in Mail.

Overview

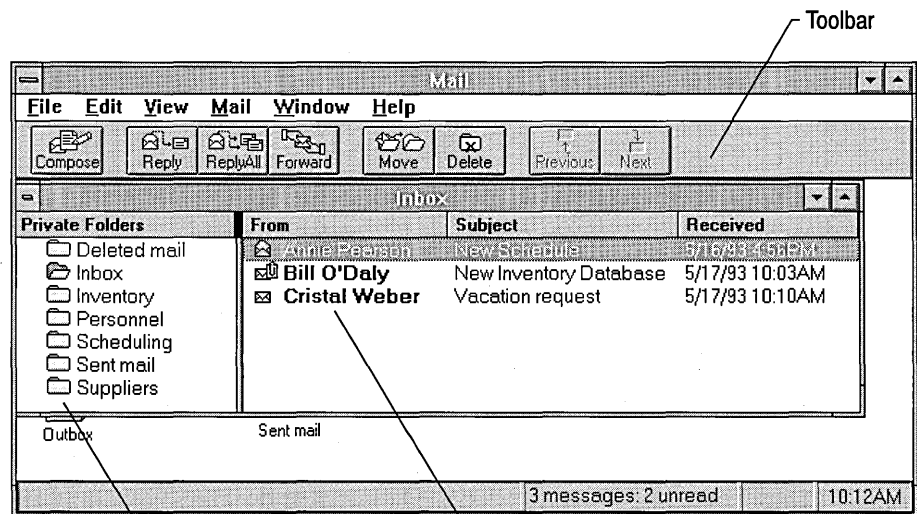
With Mail, you can:

- Send and receive electronic messages (e-mail).
- Attach files created with other applications, such as spreadsheet and word-processing applications, to your messages.
- Find messages in your mailbox according to criteria you specify.
- Print messages, organize and store messages in folders.

Before you can use Mail, an administrator must create a workgroup postoffice (WGPO), which contains all the information about Mail user accounts and serves as a collective mail drop facility for users. For information about how to create a WGPO, see “Setting Up the Mail System,” later in this chapter.

When you connect to your postoffice and sign in for the first time (as described in “Starting and Quitting Mail”), Mail creates a file named *username.MMF* in the directory where you installed Windows NT. Mail uses this file to store your messages, message folders, and Personal Address Book. The postoffice updates the file when it receives messages for you. Each Mail user in your workgroup has a message file, which is like a private mailbox. Each message file and the messages in it are protected by a password that only their owner knows.

The first time you sign in, Mail displays the Inbox, showing your messages and folders.



Folder

Message header

The Inbox displays *message headers*, which show who sent the message, the subject, and the date and time the message was received in your mailbox. If the sender specifies an urgent priority for the message, an exclamation point appears beside the message icon; a low-priority message appears with a down arrow; and a message that includes an attachment appears with a paper clip in the message icon. When you read a message, it appears in a Read Note form, as described in “Reading a Message,” later in this chapter.

You can use either the toolbar or menus to reply to messages, forward them to other Mail users, or print or delete them. You can move or copy messages to organize and store them in *folders*. You can also sort messages by priority, sender, subject, or date. If you want to keep a record of the messages you send to other people, you can automatically save copies in the Sent Mail folder. For more information about these activities, see “Using Mail,” later in this chapter.

In the message body, you can cut and paste text between messages and files. If you want to send formatted files, such as Microsoft Word or Microsoft Excel documents, you can attach them to a message. You can send as many attachments as you like with each message. For more information, see “Advanced Features of Mail,” later in this chapter.

Starting and Quitting Mail

This section explains how to connect to a postoffice, sign in to Mail, change your password, and quit Mail.

When you start Mail for the first time, you must create or connect to a postoffice and create an account for yourself in the postoffice if the administrator has not set up an account for you.

If an existing Microsoft Mail postoffice has been assigned for your workgroup or if someone in your workgroup has already created a WGPO, you must connect to that postoffice. If you need to create a new postoffice, see “Creating a Workgroup Postoffice,” later in this chapter.

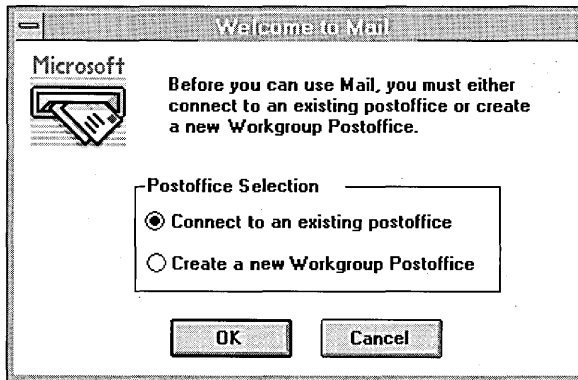
If you have already connected to a postoffice and created your account, see “Signing In to Mail,” later in this section.

Connecting to a Postoffice

Before connecting to a postoffice, ask the administrator for the path to the postoffice, and verify that your computer has enough available disk space for your message file (*username.MMF*). The required disk space depends on the number and type of messages stored in your mailbox. A typical small mailbox requires about 100K of disk space; a large mailbox might require several megabytes of disk space.

► **To connect to a postoffice**

1. From the Main group in Program Manager, choose the Mail icon.



2. In the Welcome To Mail dialog box, select the Connect To An Existing Postoffice option button.
3. In the Network Disk Resources dialog box, select the postoffice you want to connect to. In the Network Path box, type the path of the postoffice in the form `\\computername\sharename`; for example, type `\\blake\wgpo`.
4. Choose the OK button.
5. When Mail asks if you have an account on this postoffice, choose Yes if you already have an account. You will be asked for your password.
Or choose No if you need to create an account. The Enter Your Account Details dialog box appears, so you can create your account, as explained in the following section.

Creating an Account

After you connect to a postoffice, you need to create an account. Before creating one, check that the administrator has not already created an account for you.

► **To create an account**

- In the Enter Your Account Details dialog box, fill in the appropriate information, as described in the following tables.

Enter Your Administrator Account Details

Name: Blake Rambach

Mailbox: blaker

Password: PASSWORD

Phone #1:

Phone #2:

Office: 1056

Department: Executive Staff

Notes:

OK Cancel

Item	Description
Required information to create an account:	
Name	Type your full name, for example, Blake Rambach . The maximum length is 30 characters, and the default is the user name you entered when you installed Windows NT.
Mailbox	Type a unique name with which you will sign in to Mail. Choose a mailbox name that is easy to remember, for example, BLAKER . The maximum length is 10 characters, and the default is your Windows NT username.
Password	Type a password. You will use this password and your mailbox name to sign in to Mail. Choose a password that is easy to remember. The maximum length is 8 characters, and the default is PASSWORD .
Optional information to create an account:	
Phone #1	Type your phone number. The maximum length is 32 characters.
Phone #2	If you have two phone numbers or a phone number and a fax, type your second phone number. The maximum length is 32 characters.
Office	Type your office location, for example, 1056 to represent a room number. The maximum length is 32 characters.
Department	Type your department's name, for example, Executive staff . The maximum length is 32 characters.
Notes	Type any comments about your account. The maximum length is 128 characters.

After you create an account, Mail displays the Inbox, where your messages and folders appear, as shown earlier in this chapter.

Signing In to Mail

When you create an account, you are signed in automatically. The next time you start Mail, you sign in by typing your mailbox name and password. You can also set up Mail to enter your mailbox name or name and password automatically when you start it.

▶ **To sign in to Mail**

1. In the Main group in Program Manager, choose the Mail icon.
2. In the Name box of the Sign In dialog box, type your mailbox name and then press TAB.

The Postoffice Manager does not distinguish between uppercase and lowercase letters; “BLAKER,” “BlakeR,” and “blaker” are considered to be the same.

3. In the Password box, type your password and then press ENTER.

Mail displays your Inbox so that you can begin reading and sending messages, as described in “Using Mail,” later in this chapter.

▶ **To sign in to Mail automatically**

1. In the Main group in Program Manager, choose the Mail icon.
2. From the File menu, choose Properties.
3. To have Mail automatically enter your mailbox name, at the end of the path in the Command Line box, type a space and then your mailbox name. For example, type `c:\winnt\msmail32.exe blaker`.

Or to have Mail automatically enter your mailbox name and password, at the end of the path in the Command Line box, type a space, your mailbox name, another space, and then your password. For example, type `c:\winnt\msmail32.exe blaker secret`

Important If security is important in your workgroup, record only your mailbox name and not your password, so others cannot read your messages or send messages under your name.

Changing Your Password

For security, change your password regularly. If security is not a concern, you don't need to change it. If you forget your password, you must ask the postoffice administrator to define a new password for you.

▶ **To change your password**

1. From the Mail menu, choose Change Password.

2. Type your old password, and then press TAB.

For security, you do not see the characters as you type them.

3. Type your new password, and then press TAB.

4. To verify the new password, type it again exactly the same way, and then press ENTER.

Password verification distinguishes between uppercase and lowercase letters. “BLAKER,” “BlakeR,” and “blaker” are not considered the same. If your second attempt to type the new password does not match the first, the computer beeps; start over with a new password and then verify it.

Your new password is registered. You must use it the next time you sign in to Mail.

Quitting Mail

There are two commands on the File menu you can use to quit Mail: Exit and Exit And Sign Out. If Mail is the only application you are running that requires you to sign in to your mailbox, both of these commands close Mail and sign you out.

If you are running another application, such as Schedule+, that uses Mail to communicate with your workgroup, the Exit command does not sign you out. This allows the other application to continue using the postoffice when Mail is closed. If you restart Mail, you don't need to sign in.

The Exit And Sign Out command closes Mail and signs you out. This command also closes any other application using Mail that might be running. If you restart Mail, you will need to sign in again.

When you quit Mail, by default Mail permanently deletes all the messages in the Deleted Mail folder. If you don't want the messages in this folder deleted when you quit Mail, turn off this option.

▶ **To preserve deleted mail**

1. From the Mail menu, choose Options.

2. Under Other, clear the Empty Deleted Mail When Exiting check box.

▶ **To quit Mail and sign out**

- From the File menu, choose Exit And Sign Out.

▷ **To quit Mail and remain signed in**

- From the File menu, choose Exit.

If other applications that use Mail are not running, the Exit command also signs you out.

Using Mail

This section covers the basic steps for sending, reading, replying to, and deleting messages.

Some advanced features of Mail are described at the end of this section.

Sending a Message

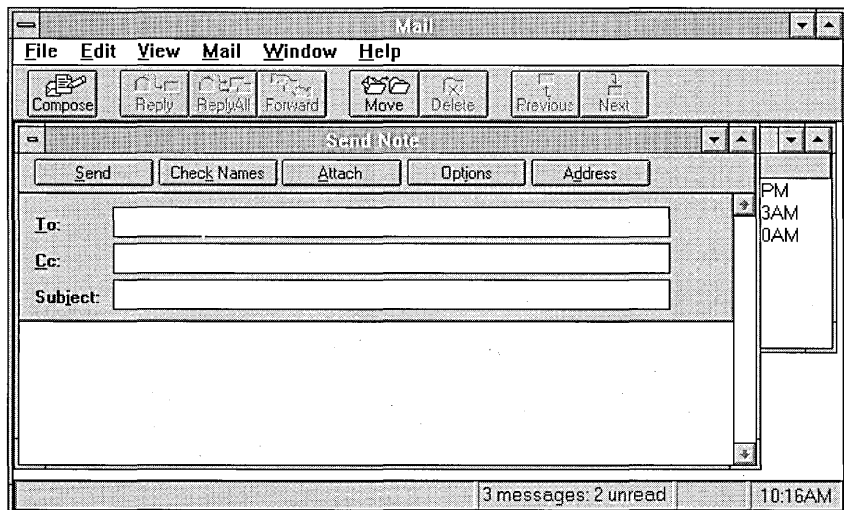
Sending a message involves a few simple steps: addressing it, typing a subject and message, and then sending it.

Addressing a Message

The first step in sending a message is to open a Send Note form and choose the users to whom you want to send the message.

▷ **To address a message**

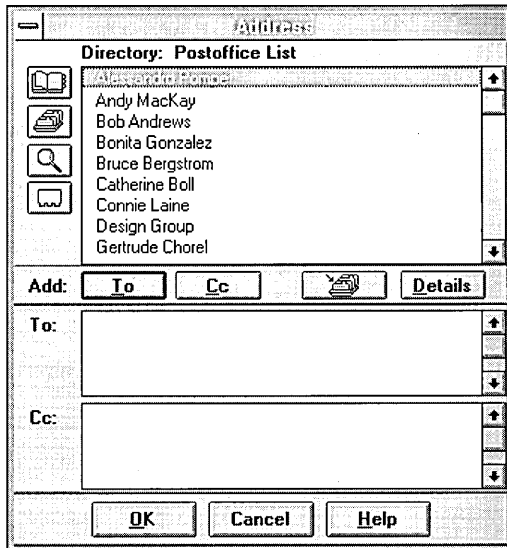
1. Choose the Compose button, or from the Mail menu, choose Compose Note. A Send Note form appears.



2. Choose the Address button.

Mail displays the Address Book, which contains the names of users on your postoffice.

For information about using the buttons in the Address Book and about using shortcut keys, see the table following this procedure.



3. To locate usernames in the address list:

- Type the first few characters of a name. The address list scrolls to the first name in the list with those characters and selects it. This is the fastest way to find a name.
- Or use the scroll arrows in the scroll bar.
- Or press the arrow keys to scroll through the list.





4. To select a name that is highlighted in the list, choose the To button or press ENTER.

The selected username is added to the To box.

5. To add names to the Cc list, repeat the steps for locating and selecting names, and then choose the Cc button or press ENTER.

6. Choose the OK button.

The display shows the Send Note form with the selected name entered in the To box. If you select a name from the Address Book, the name is underlined in the Send Note form. The underline indicates that Mail verified the name in the postoffice.

Button	Shortcut key	Use
	CTRL+L	The Directory button to select a user directory from the list of available directories for postoffices and gateways on your network.
	CTRL+P	The Personal Address Book button to display names and groups in your Personal Address Book.
	CTRL+F	The Find button to find a name or first part of a name in the current user directory.
	CTRL+N CTRL+A	The New Address button to add a new name and address to your Personal Address Book or to address a message to another mail system. You can add a gateway address plus the name and address of a user on another mail postoffice.

You can copy the names of people to whom you often send messages from the Postoffice List into your own Personal Address Book. If you often send messages to the same group of people, you can choose Personal Groups from the Mail menu to create a personal group name for them. When you include that group name on a message's recipient list, all the individuals in the group receive the message.

You can also address mail to users on another mail system if a gateway has been added to your Mail network. A gateway is software that enables direct mail systems to communicate with each other. When a message is sent from one mail system to another, the gateway filters out information specific to the originating mail system, attaches information the second mail system needs to deliver the message, and sends the message on its way. If a gateway has been added to your Mail network, its name appears in the Address Book.

Typing and Sending a Message

The next step is to type the subject and message text.

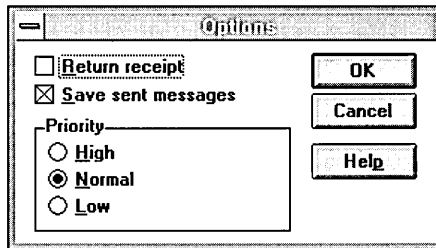
► To type a message subject and a message

1. In the Send Note form, click the Subject box, or press TAB until the insertion point is in the Subject box, and then type a short description of the message.
If you make a mistake while typing, press the BACKSPACE key to erase the error, and then continue typing.
2. Click anywhere in the message body, or press TAB, and then type the message you want to send.
If the text reaches the right margin of the form, the next word automatically moves to the next line; you don't need to press ENTER at the end of each line.

The last step is to send the message.

► **To send a message**

1. If you want to set options for the message you are sending, choose the Options button in the toolbar, and then select the options you want to set.

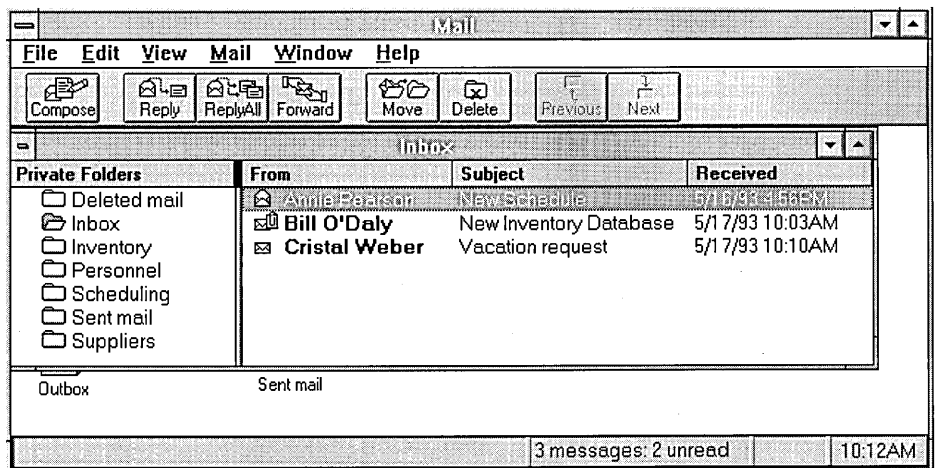


2. In the Send Note form, choose the Send button.

For more information about the Options dialog box, see online Help.

Reading a Message

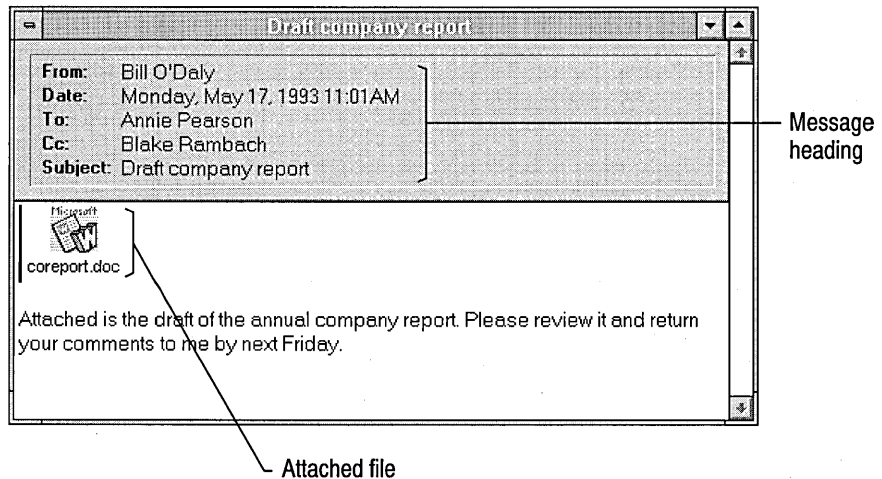
The message header in your Inbox displays information about the message, including who the message is from and the date and time it was received. If you haven't read a new message, Mail displays a closed-envelope symbol and displays the message header in bold.



► **To read a message**

- Double-click the message in the Inbox. Or press TAB to move the highlight from the Folders list to the message list; use the arrow keys to highlight the message, and then press ENTER.

The message appears in a Read Note form.



The gray area at the top of the form is the message heading, which shows who sent the message, when it was received, the people or groups it was sent to, and the message subject.

Attached files appear in messages as icons. An attached file can contain any kind of data, including text, graphics, a spreadsheet, executable code, and so on. If you have the application used to create an attached data file, you can open the file while reading the message by double-clicking the icon.

Note To avoid introducing a computer virus, you should use the same care when opening or activating an attached file or object in a message that you do when opening or activating a file or object from the network or a floppy disk.

Replying to a Message

After reading a message, you may want to send a reply. The Reply button or command automatically addresses the message to the person who sent it and includes the original message in the message body. Including the original message is useful because you can add comments above or within the original message.

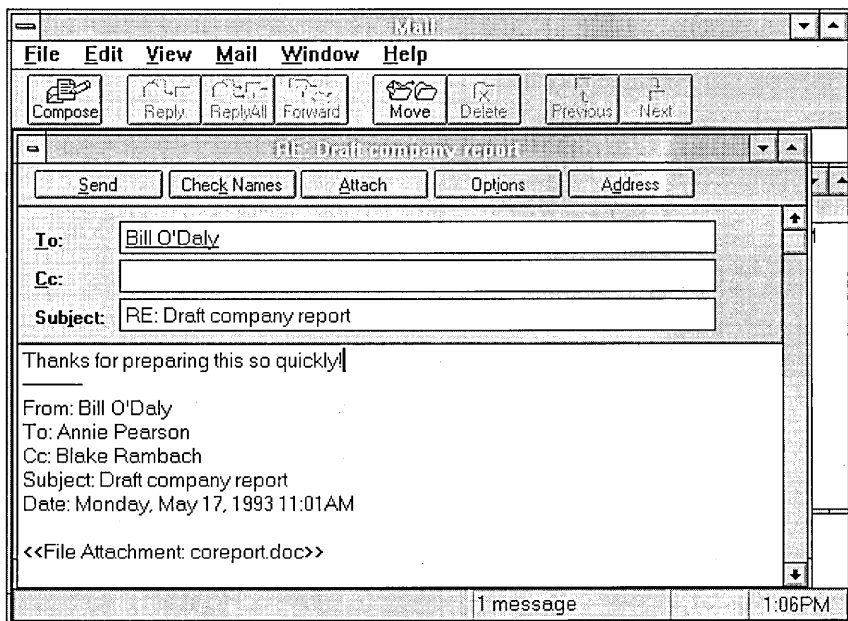
► To reply to a message

1. Choose the Reply button, or from the Mail menu, choose Reply.

If you want to reply to everyone who received the original message, choose the Reply All button.

A Send Note form appears. The name of the original sender appears in the To box, and the title of the original message appears in the Subject box, preceded by the prefix RE: (for “reply”). The original message is included in the form, below the solid line.

2. At the top of the message box, type your reply.
3. If you want to insert comments within the message you received, use the arrow keys to move the insertion point to where you want to enter a comment. Press ENTER to start a new line after the original message, and then type the comment you want to insert.
4. Choose the Send button.



Deleting a Message

To manage the number of messages in your Inbox, you should delete messages you've already read and no longer need.

► **To delete a message from the Inbox**

1. In the Inbox, select the message you want to delete.
2. Choose the Delete button, or from the File menu, choose Delete.

The message is moved to the Deleted Mail folder, where you can retrieve it until it is deleted there. By default, Mail deletes messages in the Deleted Mail folder when you quit Mail. To change this option, choose Options from the Mail menu.

Advanced Features of Mail

This section presents some advanced features of Mail. Use Help to find more details.

Attaching Files and Embedding Objects

You can choose the Attach button from the toolbar to send one or more application files, such as Microsoft Word or Microsoft Excel documents, or batch files, programs, graphics files, or any other files that are available to you.

Mail displays the Attach dialog box, where you can select a file to attach in the same way that you select a filename in the Open or Save As dialog boxes.

Mail also includes object linking and embedding (OLE) capability, so you can copy parts of formatted documents from other applications, such as spreadsheets and word processing, into a message without losing formatting. You embed or link an object in a Mail message in the same ways as you do in any application with OLE capabilities. For information, see Chapter 10, "Object Linking and Embedding."

Creating Message Templates

If you send a specific message on a regular basis, such as a weekly progress report, you can set up a Send Note template for the message and basic addresses.

► To create a message template

1. Choose the Compose button on the toolbar, or from the Mail menu, choose Compose Note.
2. Address the message to the people you will be sending it to regularly, and type the subject and template information.
3. Close the message window by double-clicking the Send Note window's close box or by pressing CTRL+F4.
4. When Mail asks if you want to save the message, choose the Yes button. Mail displays the template message in your Inbox, but you can move this message to any folder.

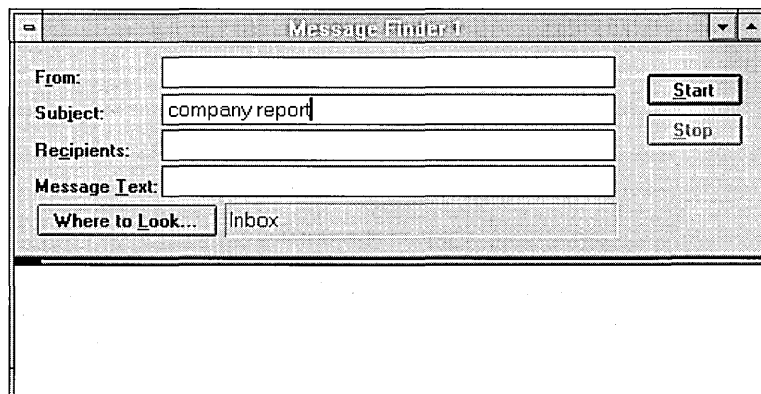
► To use a message template

1. Display the message template by doing one of the following:
 - Drag the message header to the Outbox icon.
 - Or select the message, and from the Mail menu, choose Forward.
2. Fill in the message. If necessary, change the list of recipients.
3. Choose the Send button.

Finding Messages

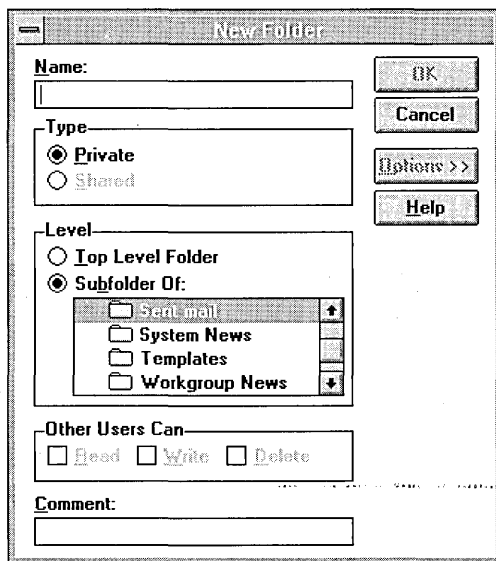


You can choose Message Finder from the File menu to search for messages you stored in Mail folders. You can also keep multiple Message Finder windows minimized on the Mail workspace, each with its own search criteria. Then, when you want to search for a message with the criteria, maximize the icon.



Using Folders

Mail stores your private messages in folders that you create and manage using the New Folder and Folder Properties commands from the File menu. Your private messages are stored on your hard disk. Shared folders are stored in your postoffice and can be accessed by other users in your postoffice.



Working Offline

You may want to create new messages or work with messages you received without being connected to the postoffice (for example, while you are traveling or working at home). If you have Mail installed on your computer, you can compose and work with messages without being connected to the postoffice. This is called working offline.

- ▶ **To move your message file to a computer or disk from your postoffice**
 1. From the Mail menu, choose Options.
 2. In the Options dialog box, choose the Server button.
 3. In the Storage box, select the Local option button.
 4. In the File box, type the path to the drive or directory where you want to save your message file, and then choose the OK button.

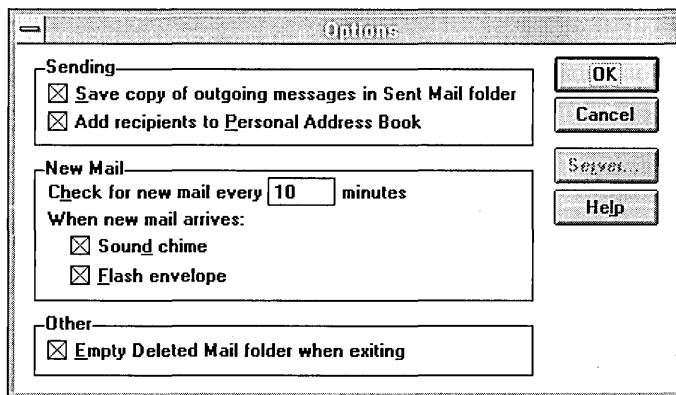
► To work offline

1. Start Mail on a computer that is not connected to the postoffice.
2. In the message that asks if you want to work offline, choose the OK button.
3. Type your password in the dialog box, and then choose the OK button.
4. If Mail cannot find your message file, specify the path to it.

After you finish composing a message, choose the Send button. The message is moved to the Outbox. To move it to the postoffice when you resume working online, follow the procedure above for copying your message file to a computer or disk, but choose the Postoffice option instead of the Local option. When you connect to the Mail system, the messages in your Outbox are sent automatically.

Defining Other Mail Options

You can choose the Options command from the Mail menu to define various preferences for sending mail, checking for new mail, choosing the server, and emptying the Deleted Mail folder. For more information, see Help.



Setting Up the Mail System

The following sections explain the concepts and procedures related to setting up and administering Mail in Windows NT and using Mail with other networks and other messaging systems. The rest of this chapter is written for the administrator who is responsible for creating and managing the workgroup postoffice (WGPO).

Planning a Workgroup Postoffice

Before your workgroup can use Mail, each user needs to connect to a postoffice. If your workgroup does not have an existing postoffice, an administrator in your workgroup needs to create and manage a WGPO using the Postoffice Manager.

This section describes the Mail messaging system and the workgroup postoffice to help you plan your WGPO.

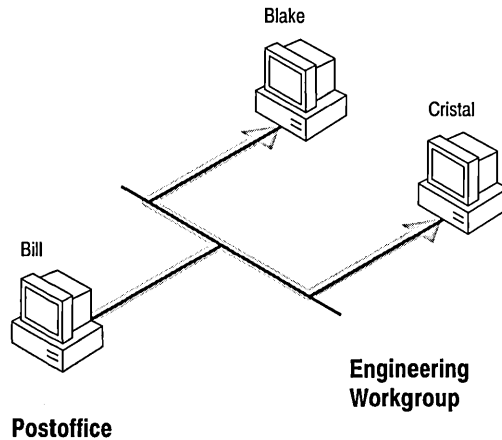
The Mail Messaging System

The Windows NT messaging system consists of the Mail application and the WGPO. The Mail application runs on each user's computer, and the WGPO is stored in a shared directory on a computer running Windows NT.

If your company already has a messaging system, you can use the Mail application with the postoffice or messaging (mail) server that is part of that system. For information, see "Using Mail with Other Messaging Systems," later in this chapter.

The WGPO contains all the information about Mail user accounts and serves as a collective mail-drop facility for users in your workgroup. To communicate, users must be connected to the same postoffice and have an account on that postoffice.

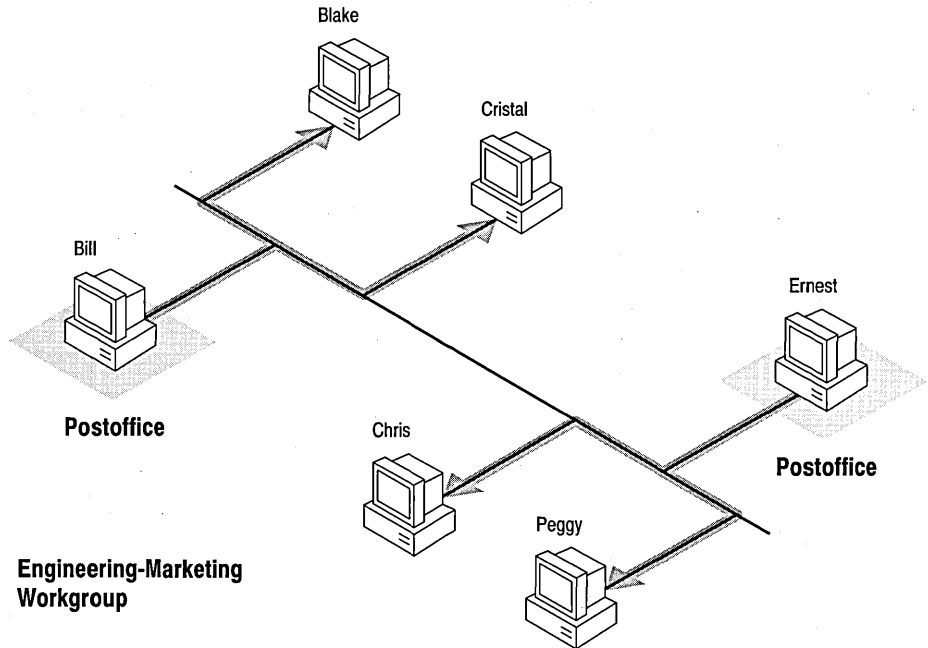
The following figure shows three users in a workgroup with a WGPO. Bill, Blake, and Cristal belong to a workgroup called Engineering. To allow users in the Engineering workgroup to use Mail, Bill created a WGPO on his computer and accounts for himself, Blake, and Cristal. Because he created the WGPO, he will be its administrator. Bill, Blake, and Cristal use their respective computers to run Mail, and their message files are stored on their computers as well. They can now use Mail to send messages and files to each other.



Two users connected to different WGPOs cannot exchange messages.

The following figure shows a new workgroup that includes the original Engineering workgroup and three new users from Marketing, Ernest, Chris, and Peggy. Ernest created another WGPO on his computer, and he created accounts for himself, Chris, and Peggy. In this configuration, Bill, Blake, and Cristal can communicate with each other. Similarly, Ernest, Chris, and Peggy can communicate. However, Ernest, Chris, and Peggy cannot communicate with Bill, Blake, and Cristal because they are not connected to the same postoffice.

If Ernest deletes his postoffice and Bill creates accounts for Ernest, Peggy, and Chris on his postoffice, all six can communicate with each other.



You can create a WGPO on a computer that is part of your workgroup, on a Windows NT Advanced Server, or on an existing network such as Novell NetWare.

Creating a Workgroup Postoffice

This section explains how to create a workgroup postoffice (WGPO). The person who creates the WGPO should plan to manage it. Creating the WGPO requires that you complete the following actions:

- Verify that there is enough disk space on the computer where you will install it.
- Create the WGPO and an account for the administrator.
- Share the WGPO so that all users in your workgroup can use it.

Planning for Disk Space

Before creating a WGPO, verify that your computer meets the following requirements.

On the computer where the WGPO will be installed, there must be:

- 360K of available disk space for an empty postoffice.
- 16K of available disk space for each user account.

On each user's computer, there must be:

- Enough available disk space for each user's mailbox, depending on the number and type of messages stored in a mailbox. A typical small mailbox requires about 100K of disk space; a large mailbox can use several megabytes of disk space.

Creating the Postoffice and the Administrator Account

After you verify that the computer has enough disk space to create a WGPO, you can create a WGPO and an Administrator account. The Administrator account is the first account you create in the WGPO. After you create the Administrator account, you can modify it, but you cannot remove it.

This section describes how to create the WGPO on a Windows NT workstation or Advanced Server. If you want to create the WGPO on a network server, see "Using Mail with Other Networks and Other Messaging Systems," later in this chapter.

Important The computer where you create a WGPO must be turned on at all times so that users can exchange mail.

You should create only one WGPO per workgroup. Only the users connected to the same WGPO can communicate with each other.

► To create a WGPO and the Administrator account

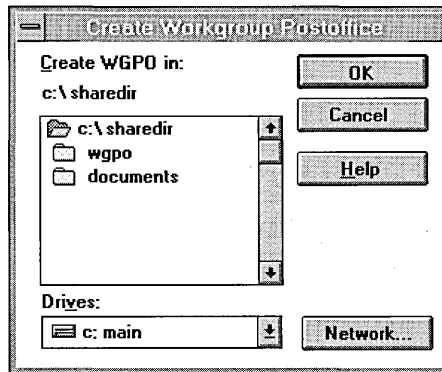
1. Start Mail.

If a WGPO has not been assigned to your workgroup, Mail starts the Workgroup Postoffice Manager and displays the Welcome To Mail dialog box, as described in "Connecting to a Postoffice," earlier in this chapter.

2. In the Welcome To Mail dialog box, select the Create A New Workgroup Postoffice option button, and then choose the OK button.

A message reminds you that there should be only one WGPO in a workgroup and that you will be responsible for managing any new WGPO you create.

3. To create a new postoffice, choose the Yes button.
Or choose No to return to the Welcome To Mail dialog box so that you can connect to an existing postoffice.
4. In the Create Workgroup Postoffice dialog box, select a location for the WGPO. You can create the WGPO either on your hard drive or on a network server:
 - To create the WGPO on your hard drive, select a drive from the Drives box and a directory from the Create WGPO In list, and then choose the OK button.
 - To create the WGPO on a network server, choose the Network button, and select a server and shared directory from the dialog box. Then choose the OK button.



5. In the Administrator Account Details dialog box, fill in the appropriate information to create the Administrator account.
The requirements and optional information in this dialog box are the same as those described in “Creating an Account,” earlier in this chapter.
When you fill in this dialog box, type names that are easy to read. You can use extended characters (such as letters with accents), but it is not recommended. Only alphanumeric characters are allowed in the Mailbox and Password boxes. The Postoffice Manager is not case-sensitive; that is, “BLAKER,” “BlakeR,” and “blaker” are considered to be the same.
6. Choose the OK button.
When the message reminds you to share the WGPO directory that you just created, choose the OK button.

Important If you are not able to create a WGPO, it is probably because you don't have enough disk space or, if you are creating the WGPO on a server, because you don't have write permission on that server. In either case, the solution is to find another location with enough disk space and where you have sufficient privileges to create the WGPO.

Sharing the Workgroup Postoffice

After you create a WGPO, you must share the WGPO directory that contains the data files with all users on the postoffice.

▶ To share a workgroup postoffice on a Windows NT Workstation

1. Open File Manager and select the WGPO directory.
2. From File Manager's Disk menu, choose Share As.
3. In the Share Name box, type a name for the postoffice. The default name is WGPO.
4. If you want to, you can enter a comment in the Comment box. This comment appears in the shares list Connect Network Drive dialog box.
5. In the User Limit box, set a limit on the number of users who can connect to the shared directory at the same time.

By default, no limit is set.

6. Choose the Permissions button and give all members of the postoffice Full Control access to the WGPO share.

For information on setting permissions, see "Setting Permissions Through Shared Directories" in Chapter 4, "File Manager," or press F1 while the Access Through Share Permissions dialog box is displayed.

7. In the New Share dialog box, choose the OK button.

In the File Manager window, the WGPO directory is shown as a shared directory.

▶ To share a WGPO on a Windows NT Advanced Server

1. Create a directory on the Windows NT Advanced Server where the WGPO will be located. This can be a domain controller or backup server.
2. Share the directory you just created. Make sure you don't share the parent directory.
3. Provide full access permissions to the directory.
4. Create a WGPO as explained in "Creating a Workgroup Postoffice," earlier in this chapter.

After you create a WGPO, the Postoffice Manager command appears on the Mail menu when you start Mail. This command appears only on the computer where you create the WGPO.

Managing Your Workgroup Postoffice

After you create a WGPO and an Administrator account, you can manage the WGPO with the Postoffice Manager.

With the Postoffice Manager, you can complete the following actions:

- Add users to the WGPO
- Modify existing user accounts
- Remove users from the WGPO
- Manage the disk space where the WGPO is stored

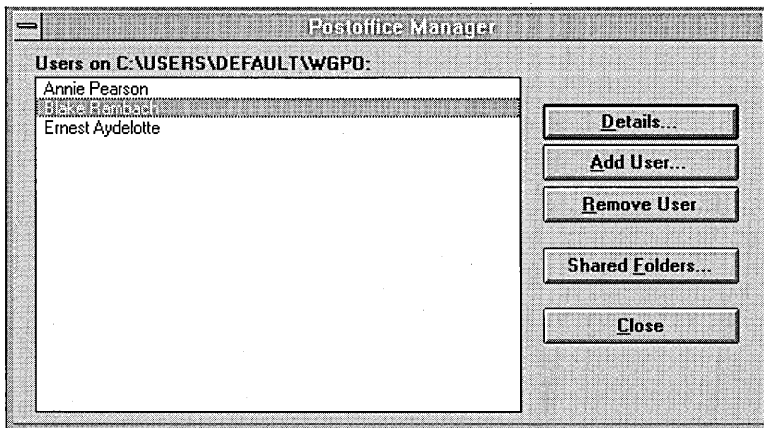
You may also need to change the name of the WGPO, move or remove a WGPO, or manage the Mail system files, as described in this section.

Starting the Postoffice Manager

Before you can start the Postoffice Manager, you must start Mail.

- ▶ **To start the Postoffice Manager**
 - From the Mail menu, choose Postoffice Manager.

In the Postoffice Manager dialog box, you can add users, modify user accounts, and remove users.



Adding a User

To add a user to a WGPO, you must provide the user's name, mailbox name, and password. Optionally, you can also provide the user's phone number(s), office location, department, and comments about the user's account.

Note Users can create their own WGPO account. If you create user accounts, be sure to give the necessary account information to the users.

► **To add a user**

1. From the Mail menu, choose Postoffice Manager.
2. From the Postoffice Manager dialog box, choose the Add User button.
3. In the Add User dialog box, fill in the appropriate information, and then choose the OK button.

For a complete description of the entries in the Add User dialog box, see “Creating an Account,” earlier in this chapter.

Modifying a User Account

With the Postoffice Manager, you can modify any information about the user's account.

► **To modify a user account**

1. From the Mail menu, choose Postoffice Manager.
2. From the Postoffice Manager dialog box, select the username you want to modify.
3. Choose the Details button.

A dialog box appears, showing the user's account information, which is identical to the information defined in “Creating an Account,” earlier in this chapter.

4. Change the appropriate entries, and then choose the OK button.

Removing a User

With the Postoffice Manager, you can remove a user from a WGPO.

Note You cannot remove the Administrator account.

▶ **To remove a user**

1. From the Mail menu, choose Postoffice Manager.
2. From the Postoffice Manager dialog box, select the username you want to remove.
3. Choose the Remove User button.

When the message asks you to confirm that you want to remove the selected username, choose the Yes button.

Managing Disk Space

One of the most important administrative tasks is managing the disk space where the WGPO is stored. To manage disk space, you need to check the current status of shared folders and recover unused disk space by compressing shared folders.

A shared folder is a public folder stored in the WGPO directory, unlike users' private folders, which are stored on their own computers. All users in a workgroup can open shared folders and see the messages they contain. Any user in the WGPO can create a shared folder and choose the appropriate access permissions (Read, Write, or Delete).

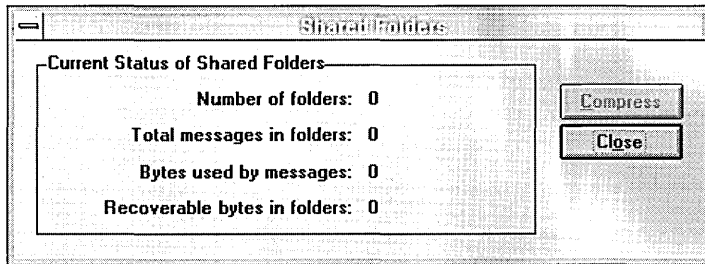
By checking the status of shared folders, you determine the following:

- The number of shared folders
- The number of messages stored in shared folders
- The amount of disk space the messages use
- The amount of disk space you can recover by compressing shared folders

► **To check the status of shared folders**

1. From the Mail menu, choose Postoffice Manager.
2. From the Postoffice Manager dialog box, choose the Shared Folders button.

The Shared Folders dialog box shows the current status of shared folders in a WGPO.



Compressing shared folders recovers disk space. When the Mail system runs out of disk space, this is the first step to take. If you still require more space, you can delete old messages and unused folders. You might also need to move the WGPO to a different location (see “Moving a Workgroup Postoffice,” later in this chapter).

If the shared folders contain a large number of messages, the compression process may take a long time.

Important Do not attempt to compress shared folders while others are using them.

► **To compress shared folders**

1. Before compressing a shared folder, ask all users in a workgroup to close the folder.
2. From the Mail menu, choose Postoffice Manager.
3. From the Postoffice Manager dialog box, choose the Shared Folders button.
4. In the Shared Folders dialog box, choose the Compress button.
5. Choose the Close button.

Managing the Mail System Files

When you create a WGPO or when users connect to a postoffice, the Mail system files are modified. For each user, Mail creates a message file, *username.MMF*. This file stores messages, message folders, and the Personal Address Book for the user. The WGPO updates this file when it receives messages. The message file for each user is stored on his or her computer. Your message file is located in the directory where Windows NT was installed (the default is C:\WINNT).

The Mail system files are automatically managed by Mail, so you shouldn't need to alter them unless you want to change specific functionality or you want to restore these files to a particular state.

The following sections describe how these files are modified when you create a WGPO and when a user connects to a WGPO. They also describe how to back up and restore the Mail system files.

When you create a WGPO, the Postoffice Manager makes the following changes to the system files for the Administrator account:

- The WGPO directory is created in the specified location.
- A message file is created for the Administrator account, with the default name of *username.MMF*.

Backing Up and Restoring the Mail System Files

When a user connects to a WGPO, a message file is created for the user, with the default name of *username.MMF*. Mail automatically manages this file for each user. In general, you don't need to alter the Mail system files; however, you might want to restore them to a given state.

You should back up the Mail system files regularly. Then, if there is a problem, you can recover your mail and the Mail environment from the last backup copy. The following procedures explain how to back up and restore your *username.MMF* file and restore all folders in your mailbox.

If you want to back up or restore only some of the folders in your mailbox, use the Export Folder and Import Folder commands. For information about using Export and Import, see Help.

► **To back up your *username.MMF* file**

1. From the Mail menu, choose Backup.
2. In the File Name box, specify the name and location of your backup file; for example, C:\USER\BILL.MMF.
3. Choose the OK button.

▶ **To restore an username.MMF file**

1. Open File Manager and select the backup copy of your message file.
2. From the File menu, choose Rename.
3. In the To box, type `c:\WINNT\username.MMF` (assuming that, by default, you installed Mail in the same directory that contains your Windows NT files).
4. Choose the OK button.

The backup file becomes your message file, and your mailbox displays the messages and folders you had when you last backed up the file. New messages that you received after you backed up the message file do not appear in your Inbox.

Important If a message file becomes corrupted, a message appears with this information and also presents an option to repair the file. The user or the administrator for the postoffice can repair the file immediately or quit Mail and repair it later. However, the user cannot use Mail until the corrupted file is repaired.

Restoring a User's Password

If a user forgets a password, the administrator for the postoffice can define a new password.

▶ **To define a new password for a user**

1. Sign in to Mail and start the Postoffice Manager.
2. In the Postoffice Manager dialog box, select the name of the user, and then choose the Details button.
3. In the Password box, type a new password, and then choose the OK button.
4. In the Postoffice Manager dialog box, choose the Close button.

The user can now sign in to Mail with the new password.

Caution If the administrator for the postoffice forgets the password, that password cannot be recovered. The administrator must create a new WGPO.

Using Mail with Other Networks and Other Messaging Systems

You can also create a workgroup postoffice on a file server that is part of an existing network, such as a Novell NetWare server.

If you want to use Mail with another network, you need to set up support for that network in Windows NT, using the Control Panel. For information about the necessary drivers and any further instructions, contact your network vendor.

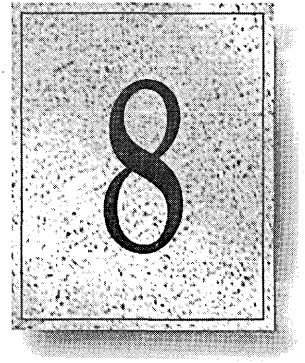
Using Mail with a NetWare Network

To use Mail with a Novell NetWare network, you need to create a WGPO on a NetWare server and grant full trustee rights to the WGPO directory.

▶ **To create a WGPO on a NetWare server**

1. Create a directory on the NetWare server where the WGPO will be located.
2. Grant full trustee rights to this directory.
3. Use the Control Panel to set up NetWare support in Windows NT, as described in “Configuring the Network” in Chapter 5, “Control Panel.”
4. Restart Windows NT.
5. Log on to your NetWare server.
6. Use File Manager to assign a drive letter to the NetWare directory where you want to create the WGPO.
7. Create the WGPO as explained in “Creating a Workgroup Postoffice,” earlier in this chapter.

CHAPTER 8

Schedule+

Schedule+ is a personal scheduling tool that you can use to track important appointments and tasks, block out time for meetings, and record notes.

This chapter describes the basic features and how to use Schedule+ in the following topics:

- An overview of Schedule+
- Using the Appointment Book
- Using the Task list
- Using the Planner to schedule a meeting
- Using the Messages window to schedule a meeting
- Advanced features of Schedule+

Although this chapter contains the basic information you need to use Schedule+, your main source of information is the online Help. To get help, press F1 wherever you are working in Schedule+.

Overview

Schedule+, which you can choose to install on your system when you install Windows NT, can be used to schedule individual events and tasks, and to set automatic reminders for events.

Schedule+ can also be used as a workgroup scheduling tool. When you need to meet with coworkers, you can view the times they are available. Then you can schedule the meeting in one step—without leaving your desk or contacting each person individually.

You can also designate another Schedule+ user as your assistant, who can schedule appointments and set up meetings for you.

A scheduling tool is most effective when it's always accessible for reference and for recording impromptu appointments. With Schedule+, you can print copies of your schedule, and you can use Schedule+ from a portable or home computer that has the software installed.

In Schedule+, you can work online or offline, and then merge your changes into the copy of your schedule on the postoffice later. For more information, see "Advanced Features of Schedule+," later in this chapter.

Starting and Quitting Schedule+

You use your mailbox name and password to sign in to Schedule+. (If you are already signed in to Mail, you won't be prompted to sign in.)

► **To start Schedule+ and sign in**



1. From the Main group in the Program Manager, choose the Schedule+ icon.
2. In the Name box of the Sign In dialog box, type your mailbox name and press TAB.
3. In the Password box, type your password for Mail, and then press ENTER.

When you're finished working with Schedule+, you can either quit Schedule+ or quit and sign out.

▶ **To quit Schedule+ and keep running Mail and Reminders**

- From the File menu, choose Exit.

Choose this method to quit if you want to continue using Mail or receiving reminders while you aren't working with Schedule+. You can restart Mail without signing in.

▶ **To quit Schedule+, Mail, and Reminders**

- From the File menu, choose Exit And Sign Out.

Choose this method to quit if you're finished working with Schedule+, Mail, and the Reminders program (MSRMND32.EXE), which tracks reminders you set and notifies you in advance of these events. The next time you start Schedule+, the Reminders program starts automatically. (If any reminders were set to occur when Reminders wasn't running, they are not displayed when you start Schedule+.)

Organizing Your Screen

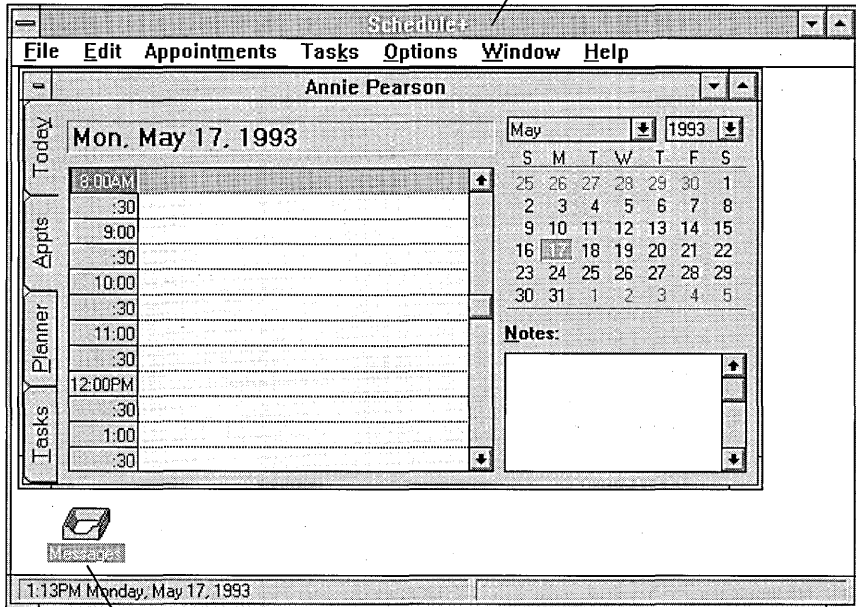
Organizing the workday requires two types of tasks: scheduling events and communicating with coworkers about scheduled events. Schedule+ provides a window for each type of task:

- The Schedule window. This window has your name on the title bar and tabs on the left side for your Appointment Book (Appts), Planner, and Task list (Tasks). When you want to work with your appointments or tasks, schedule meetings with others, or schedule a conference room or other resource, you work in the Schedule window.
- The Messages window (if your computer is connected to your postoffice). When you receive meeting requests or replies to your meeting requests, the messages appear in this window.

► To display the Schedule window

- From the Window menu in Schedule+, choose your name.

The Schedule window is where you schedule events, tasks, or resources.



In this example, the Messages window is represented as an icon.

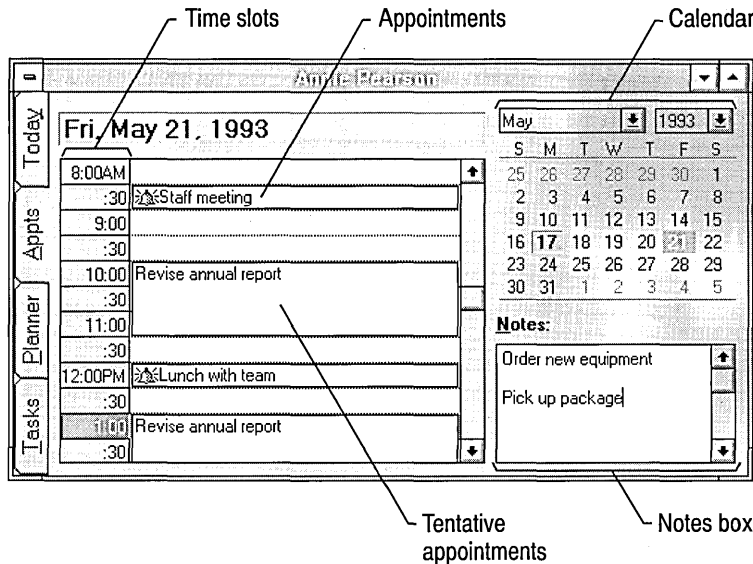
► To display the Messages window

- From the Window menu, choose Messages. Or double-click the Messages icon to restore the window.

For more information about the Messages window, see “Using the Messages Window to Schedule Meetings,” later in this chapter.

Using the Appointment Book

The Appointment Book displays your daily schedule. A time slot can contain a combination of *appointments* and *tentative appointments*. Appointments appear as “busy” times on your schedule when other users view it. Tentative appointments appear in gray time slots in the Appointment Book and don’t appear as busy times on your schedule.



If you have an appointment that occurs regularly, you can schedule it once in your Appointment Book and designate it as recurring. Schedule+ automatically schedules the remaining occurrences in your Appointment Book.

You can also set Schedule+ to remind you before specific appointments or before all appointments, and you can designate specific appointments to be private so that other users can see that you are not available during that time, but they cannot see the description of your appointment. Schedule+ puts icons in time slots containing recurring appointments, meetings, private appointments, or appointments with reminders.

You can change the date you’re viewing by choosing a new one in the calendar next to your appointments, and you can quickly return to today’s date by choosing the Today tab on the left. You can also leave yourself notes for any day by typing them in the Notes box for that day.

Adding an Appointment

You can add up to six appointments and tentative appointments for a particular time slot. You can also set options to control which users (if any) can view your appointments from their Appointment Book.

▶ **To add an appointment to your Appointment Book**

1. If your Appointment Book is not already displayed, click the Appts tab.

To maximize the Schedule window, double-click the title bar or press ALT, HYPHEN, X. To restore your Schedule window to its original size, double-click the title bar again or press ALT, HYPHEN, R.

2. If you need to change the date, from the Edit menu, choose Go To Date. In the Go To Date dialog box, type the new number for the month, day, and year over the existing numbers. Then choose the OK button or press ENTER.

Or click the month box in the top right corner of the Appointment Book to display a menu, and then click the month you want. Then click the year box to display a menu, and then click the year you want. Or finally, in the calendar, click a number to change the date.

The status bar at the bottom of the Schedule+ workspace displays the selected time slot.

3. To select the appointment time, click in the box corresponding to the starting time, and then drag the mouse to block out the entire meeting time.

Or press SHIFT+TAB to move the selection to the appointment list, if it is not already there. Press the DOWN ARROW until the time slot you want is highlighted, and then press SHIFT+DOWN ARROW to include all the time slots you want in the selection.

4. In the selected time slot, type text to describe the appointment.

► **To set a reminder for the appointment**

1. Double-click the time slot for the appointment. Or select it and then, from the Edit menu, choose Edit Appt.

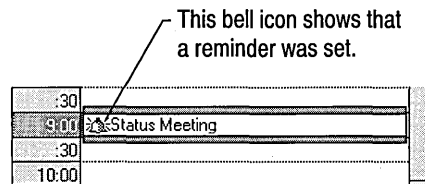
The screenshot shows the 'Appointment' dialog box. It has a title bar with a minus sign and the word 'Appointment'. Below the title bar is a 'When' section with 'Start:' set to '9:00AM' on 'Fri 12/11/92' and 'End:' set to '9:30AM' on 'Fri 12/11/92'. There are 'Choose Time...' and 'Tentative' checkboxes. To the right are 'OK', 'Cancel', and 'Invite...' buttons. Below this is a 'Description:' field containing the text 'Status Meeting'. At the bottom, there is a checked checkbox for 'Set Reminder for: 15 minute(s) Beforehand' and an unchecked checkbox for 'Private'.

2. In the Appointment dialog box, select the Set Reminder For check box. Schedule+ automatically enters 15 minutes for you, but you can specify a different amount of time.

You can also change the text in the Description box of the Appointment dialog box. The change will appear in your Appointment Book.

3. To return to the Appointment Book, choose the OK button.

A small bell icon appears in the time slot of the appointment in the Appointment Book, indicating that you set a reminder.



You can choose General Options from the Options menu to specify whether Schedule+ automatically sets reminders for all new appointments and tasks. When you remove the reminder option, you must specifically set reminders for any appointments and tasks you want to be reminded of.

Adding a Tentative Appointment

When you add an appointment to the Appointment Book, that time is blocked out in your Planner. When other people view your Planner to set up a meeting, they know that you're not available at that time. Sometimes, though, you might want to schedule an event in your Appointment Book but still leave yourself available for appointments during that time slot. For these times, you can add a tentative appointment to your Appointment Book.

Tentative appointments appear in gray time slots in your Appointment Book, and they do not appear in your Planner. When other people look at your schedule, you appear to be available for meetings during that time slot.

► **To add a tentative appointment**

1. In your Appointment Book, select the time slot you want.
2. Type text to describe the tentative appointment.
3. Double-click the time slot. Or from the Edit menu, choose Edit Appt.
4. In the Appointment dialog box, select the Tentative check box, and then choose the OK button.

Your Appointment Book now displays the tentative appointment in a gray time slot. When you or other viewers look at your Planner, you don't see the tentative time slot marked as busy, so it appears that you are available for meetings during this time. Except for being "invisible" in your Planner, tentative appointments are just like regular appointments—you can set the same options for either type.

If you decide later to make this tentative appointment a regular appointment, you can clear the Tentative check box for the appointment. When you clear the Tentative check box, the appointment appears as a regular appointment.

Adding a Recurring Appointment

If you have a meeting that occurs regularly, you can have Schedule+ enter it automatically on the appropriate days. You can designate a new or existing appointment to be recurring. For example, if you attend a staff meeting that occurs every other Monday, you can book that time on your schedule.

▷ **To add a recurring appointment**

1. If the Appointment Book is not already displayed, click the Appts tab, or press ALT+A.
2. From the Appointments menu, choose New Recurring Appt.
3. In the Recurring Appointment dialog box, choose the Change button.

4. In the Change Recurrence dialog box, select the appropriate option button to specify whether this appointment should occur daily, weekly, biweekly, monthly, or yearly.

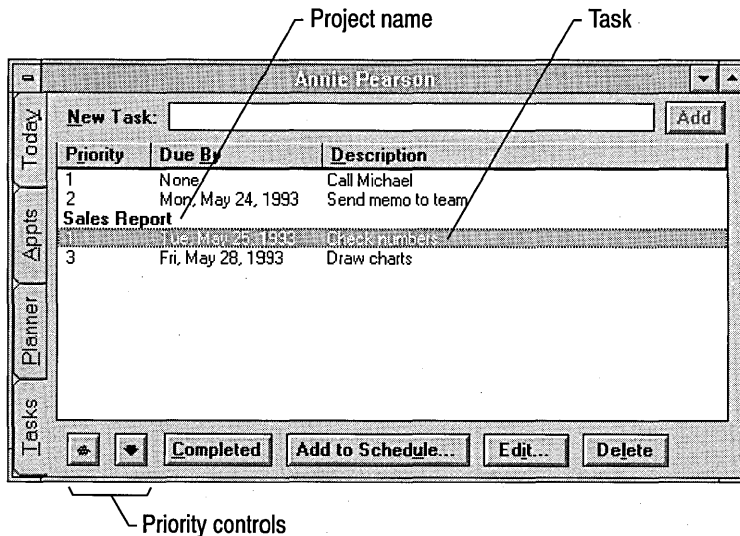
5. If the meeting occurs every week, select one or more check boxes to specify the day on which the meeting occurs.

6. In the Duration box, specify a date when the recurring appointment begins.
7. If there's an end date for the recurring appointment, in the Duration box, select the Ends option button and enter a date in the text box.
Otherwise, select the No End Date option button.
8. Choose the OK button.

You can also designate an existing appointment to be a recurring appointment by selecting it and then performing the steps described above.

Using the Task List

When you are working on a task over a period of time, you can track it in the Schedule+ Task list. To reserve time for working on a particular task during the day, you can copy it to a specific time slot in your Appointment Book.



Adding a Task to the Task List

Your Task list helps you keep track of tasks over a period of time. When you create a task, you give it a priority letter or number. If you need to complete the task by a certain date, you can note that, too. Tasks can be sorted by priority, due date, or alphabetically by description. You can group related tasks into projects, and then sort them by project.

► **To add a task to the Task list**

1. Display the Task list by clicking the Tasks tab or pressing ALT+T.
2. In the New Task box of the Task list, enter a description of the task.
3. Choose the Add button to add the new task to your Task list, or press ENTER.
4. If you want to define a due date for the task, from the Task list, double-click the task, or select it and choose the Edit button.

If you do not want to set a due date, make sure None is selected in the Due Date box (the default). No due date will be assigned to the task, regardless of the date displayed in the By box.

5. In the Due Date box of the Task dialog box, select the By option button and then change the date to the one you want.

To change each element of the date, select the element, and then either type the correct day or number over the existing one or click the arrows beside the box until the day or number you want appears. Schedule+ automatically fills in the correct day of the week.

6. In the Start Work box, type a number and then select whether the work should start days, weeks, or months before it is due.

For example, type **1** and select Day(s) to specify that the task will become active one day before it is due.

7. In the Priority box, type a number to indicate the priority for the task.

The default priority indicators are the numbers 1–9. If you want to change the priority indicator to letters, type the letter. You can mix letters and numbers in your Task list; number priorities are higher than letter priorities.

- In the Choose Time dialog box, select the date and time slot you want to schedule the task for, and then choose the OK button.

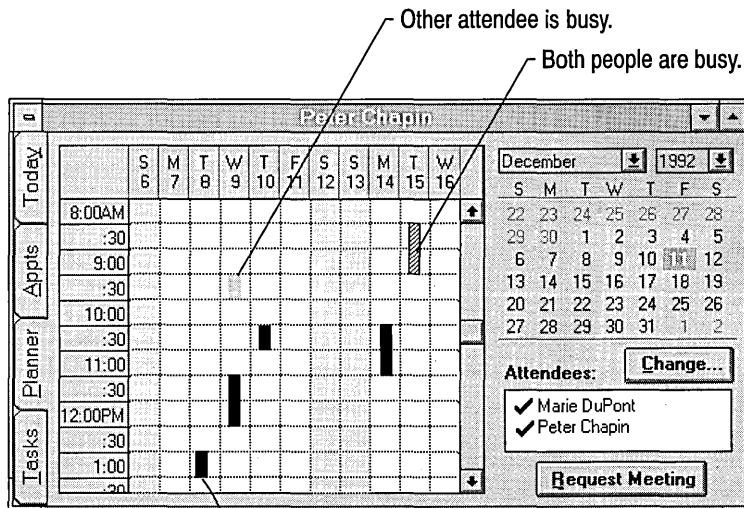
The task remains in your Task list, but now it is also booked as an appointment in your Appointment Book for the day and time slot you chose. If the Private option is selected in the Task dialog box, other users cannot see the description for this task in your appointment book, although the time is reserved.

Using the Planner to Schedule Meetings

With the Schedule+ Planner, you can scan appointments several days at a time or compare other people's schedules to your own to determine when others are available for a meeting. You can also schedule resources.

Scheduling Attendees

When you compare potential attendees' schedules to your own, their appointments show a different-colored bar from your appointments. Empty slots are times when everyone is available for a meeting. When two or more people have overlapping appointments, the color bar shows a pattern of diagonal stripe. Unless you change the colors, your busy time slots contain a blue color bar. Other users' busy time slots contain a gray color bar. You can change these display colors. For details, from the Options menu choose the Display command, and then press F1 for help.



After you see the schedules for everyone, you can decide the time and date for the meeting and send requests from the Planner. The Auto-Pick feature automatically highlights the next time slot when all attendees are available.

Note To schedule meetings with other Schedule+ users, you must be working online—your computer must be connected to your postoffice.

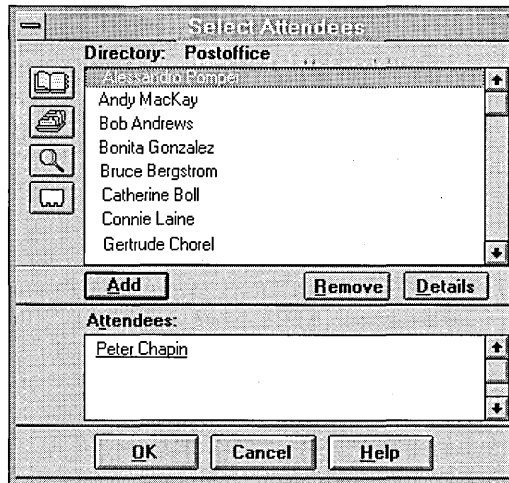
► **To set up a meeting**

1. Display your Planner by clicking the Planner tab or pressing ALT+P.
2. To select a date for a meeting, from the Edit menu, choose the Go To Date command, and then type the correct numbers.

The vertical color bars in the time slots indicate your current appointments.

Note that your name automatically appears in the Attendees box.

3. Choose the Change button.



The names listed in the Select Attendees dialog box are the Schedule+ users on your postoffice. If any conference rooms or other resources have been set up on Schedule+, the rooms and resource names also appear in the address list.

4. From the address list, select the name of a person you want to invite to the meeting, and then choose the Add button or press ENTER.

The person's name appears with yours in the Attendees box.

Repeat this step for each additional person you want to invite.

5. Choose the OK button.

In your Planner, the names you selected appear in the Attendees box, and those users' schedules are overlaid on yours. The color bars indicate busy time slots. The empty time slots indicate when all attendees are available.

To view the schedule for a particular individual, select the names of the other attendees in the Attendees box and choose the Remove button to remove their schedule information from the grid.

6. In the Planner, select a time slot when all the attendees are available by dragging across the desired time, or press the appropriate arrow keys until the time slot is selected.
7. Choose the Request Meeting button, or press ENTER.
The attendees, date, and time you selected in your Planner are entered automatically in the Send Request dialog box.
8. In the Subject box of the Send Request dialog box, type a brief description of the meeting.
9. If you want to receive a response, select the Ask For Responses check box.
These responses will be collected in your Messages window and in your Mail Inbox.
10. Choose the Send button.

When Schedule+ has successfully sent the request to the attendees, it books the meeting automatically for the appropriate date and time slot in your Appointment Book.

Scheduling Resources

You can use Schedule+ to reserve resources, such as conference rooms, equipment, or services.

A technician, conference room, piece of equipment, or anything else can be assigned an Appointment Book by the Schedule+ administrator. The administrator who designates an account as a resource account can set it up so that an assistant controls the resource's schedule, or can give users access privileges to reserve the resource directly.

- ▶ **To schedule a room or resource while you are scheduling a meeting**
 - Include the room or resource in the Attendees list.

▷ **To schedule a room or resource without inviting people to a meeting**

1. Display your Planner.
2. If the conference room or resource isn't in the Attendees box, choose the Change button and select the name of the room or resource from the address list. Then choose the OK button.

If the name of the resource you want to invite isn't in the address list currently shown, check another address list. You can view other address lists the same way you do in mail.

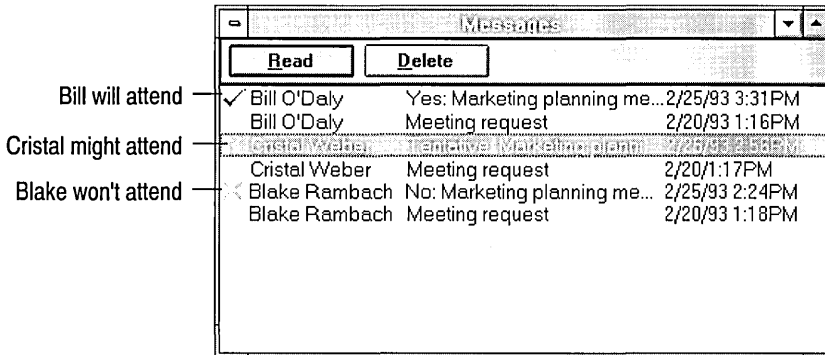
3. Select a time slot for using the resource, based on the times when it is available.
4. Choose the Request Meeting button.
5. In the Subject box, type a brief description of the meeting (optional).
6. Optionally, in the message area, type any message you want to include in your meeting request.
7. Choose the Send button.

If the room or resource has been set up so that you can enter your own requests in its Appointment Book, the appointment is booked automatically. If an assistant controls the schedule for the resource, he or she sends you a reply to your request.

Using the Messages Window to Schedule Meetings

If you are connected to a postoffice, the Messages window is available. The Messages window contains meeting requests and meeting responses. Meeting requests invite you to meetings other users have set up, and meeting responses are other users' replies to your meeting requests.

To use the Messages window, you must make it the active window by double-clicking its icon, clicking the restored window, or choosing Messages from the Window menu.



Schedule+ messages appear in your Mail Inbox, as well as in your Schedule+ Messages window. You can read, respond to, and delete messages from either place. For more information about your Mail Inbox, see Chapter 7, "Mail."

When you accept a request, Schedule+ automatically notifies the sender that you will attend and then schedules the meeting in your Appointment Book. When you decline a request, Schedule+ notifies the sender that you won't attend and makes no changes to your Appointment Book. When you tentatively accept a request, Schedule+ notifies the sender that you might attend and schedules the meeting as a tentative appointment in your Appointment Book.

When you invite people to a meeting, they reply by sending meeting responses to let you know whether they'll attend. The meeting responses arrive in your Schedule+ Messages window as entries in the message list. A check mark in a meeting response entry means the person is planning to attend; an X means the person is not planning to attend; and a question mark means the person might attend. Entries in bold letters are requests or responses you haven't read.

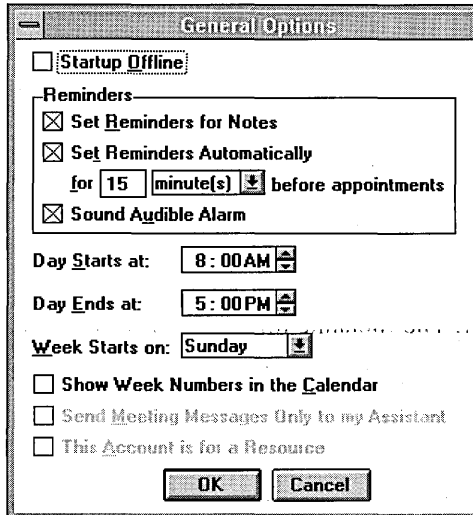
When you read a Schedule+ meeting request in the Mail Inbox or Schedule+ Messages window, you can accept, decline, or tentatively accept the invitation, using the buttons at the top of the request.

Although you can see whether someone is planning to attend by looking at the symbol in the message list, you can also display the message to see whether the person provided more information in the reply.

Advanced Features of Schedule+

Some of the advanced features of Schedule+ are described here briefly. For more information, see online Help.

- You can choose General Options from the Options menu to define how Reminders are sent, the start and end times for your daily schedule, and other items.

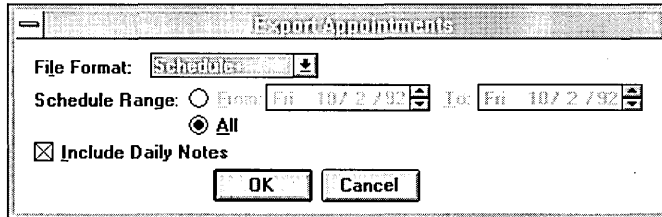


- You can allow other users to see or update your schedule.

You can choose Set Access Privileges from the Options menu to specify which users can see your Appointment Book and Task list. When other users check your schedule to coordinate an event, they usually can view only the times you are available or busy.

If you want another person to update your schedule for you, you can designate that person as your assistant in the Set Access Privileges dialog box. Your assistant can modify your schedule and send and receive meeting requests on your behalf.

- You can archive data and exchange data with other schedule programs. To create and manage your Schedule+ archives, choose Create Archive or Open Archive from the File menu. To exchange appointment information with other scheduling programs, choose Export Appointments or Import Appointments from the File menu.

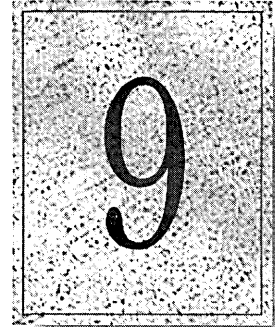


- You can work offline and then merge changes back into your schedule on the postoffice.

When your computer is connected to your postoffice, you are working *online*, and your appointments are recorded in a file on the postoffice and on your computer. The filename for this file has your username plus the .CAL filename extension. If you have the Schedule+ software on another computer, such as a portable or home computer, you can use the Move Local File command from the File menu to copy this file to the other computer.

While you are working *offline* (without connection to your postoffice), you can add and modify appointments. When you return to your office computer and reconnect to Schedule+ on the postoffice, Schedule+ automatically merges the changes made offline into the copy of your schedule on the postoffice.

Command Prompt



The command prompt is the character-based interface to Windows NT and its subsystems. Any supported command or application can be run at the command prompt regardless of the operating system it was designed for: Windows NT, Windows 3.1, MS-DOS, MS OS/2 1.x, or POSIX. The command prompt also supports batch programs, redirection between subsystems, cutting and pasting information between subsystems, command line editing, and file management for the NTFS, FAT, and HPFS file systems.

This chapter explains how to use the Windows NT command prompt. The chapter includes the following topics:

- An overview of the Windows NT command prompt
- Lists of available commands
- An explanation of command syntax
- An explanation of command prompt functions
- A comparison of Windows NT and MS-DOS commands and Windows NT and LAN Manager commands

Overview

The Windows NT command prompt is a single interface providing seamless operation and integration of applications from four different operating systems. The Windows NT command prompt is a major enhancement to the command line interface on current personal computer operating systems allowing you to:

- Start any Windows NT, Windows 3.1, MS-DOS, character-based MS OS/2 version 1.x, or POSIX-compliant programs.
- Issue Windows NT commands. The command prompt retains and enhances almost all the commands used in MS-DOS (except new utilities in version 6.0) and contains several new commands.
- Administer or use network resources. Many LAN Manager commands are available.
- Cut and paste information between applications with the Clipboard.
- Use piping or redirection of data between subsystems.

Starting and Quitting the Command Prompt



Start the command prompt by double-clicking the command prompt icon.

The command prompt window displays the command prompt in monospaced characters followed by a blinking cursor. The default command prompt is the current drive and directory enclosed in brackets.

- ▶ **To quit the command prompt**
 - Type **exit** at the command prompt, or choose Close from the Control menu, or double-click the Control-menu box.
- ▶ **To quit the command prompt when it, or an application started at the command prompt, fails to respond**
 1. From the Control menu, choose Settings.
 2. In the Special box, choose the Terminate button.

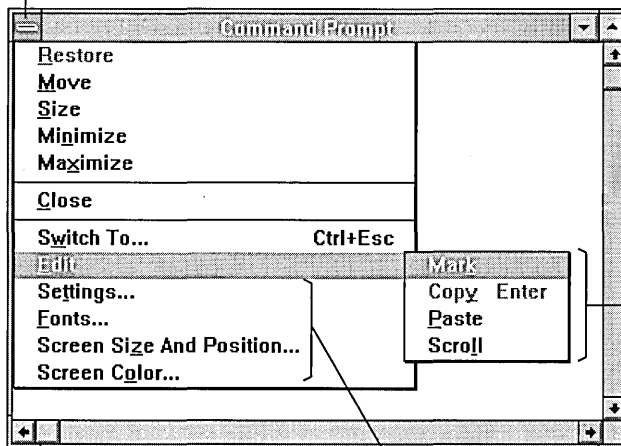
Use Terminate as a last resort. You should quit applications by using the application's Quit or Exit command.

Changing the Command Prompt Display

You can configure the appearance of the command prompt window using the Control menu. The icon in the upper-left corner of any window is that window's Control menu. The Control menu allows you to:

- Cut and paste information between any two windows.
- Toggle between window mode and full-screen mode.
- Enable QuickEdit mode.
- Change fonts used in window mode.
- Set the screen buffer size and the position of the window.
- Change the colors of text and background for the main screen and pop-up boxes.
- Hide the mouse pointer for character-based subsystem applications.

Click the Control-menu box to display the Control menu.



Copy information between windows using the Edit command.

Use these menu commands to change command prompt window behavior and display.

▷ **To open the Control menu**

- Click the Control-menu box once, or press ALT+SPACEBAR.

The Control menu opens and you can select from the list of commands. (If you are in full-screen mode, the application will minimize and the control menu will appear from the icon.) For information on Control menu commands not listed below, see Chapter 2, “Windows NT Basics.”

Control menu settings are stored based on the initial window title. The settings for each command prompt icon are independent for each unique title. This allows you to have different defaults for different needs.

An application’s internal display settings will usually override font and color settings made in the Control menu.

Changing Window Modes

The command prompt can be used in either window or full-screen mode. You can also use QuickEdit mode which allows you to use your mouse to cut and paste, bypassing the Edit menu.

▷ **To toggle between window and full-screen mode**

- Press ALT+ENTER.

By default, the command prompt opens as a window on your desktop.

▷ **To change the default window display options**

1. From the Control menu, choose Settings.
2. In the Display Options box, choose either Window or Full Screen.
3. To use this display option every time you start the command prompt from this icon, ensure that the Save Configuration check box is selected. If this box is not selected, the display option will be in effect only while the current command prompt window is open.
4. Choose the OK button.

▷ **To turn QuickEdit mode on or off**

1. From the Control menu, choose Settings.
2. Select the QuickEdit Mode check box.
3. Choose the OK button.

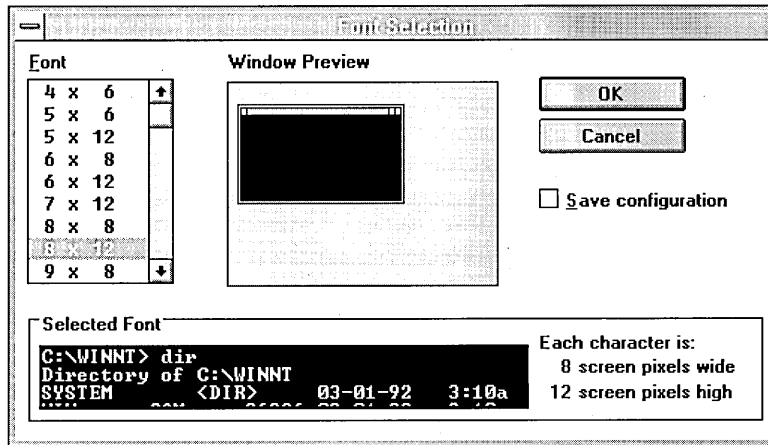
You can always use the Edit menu commands, whether QuickEdit mode is on or off. For more information about QuickEdit, see “Transferring Information to or from a Command Prompt Window,” later in this chapter.

Changing Fonts for Window Mode

You can choose from many font sizes for the window mode of the command prompt display. Fonts for the command prompt are measured in screen pixels. Default fonts are saved based on the title of the window. The size of the window will change relative to the font selected, but you can always resize the command prompt window up to the maximum screen buffer size, as discussed in the following section.

► **To change fonts for the command prompt**

1. From the Control menu, choose Fonts.



2. In the Font box, choose a font size.

The Selected Font box displays an example of the selected font and its width and height. The Window Preview box displays how the current window size will change based on the font you choose, although you can later resize the window up to the maximum screen buffer size.

3. To use the font every time you start the command prompt from this icon, ensure that the Save Configuration check box is selected. If this box is not selected, the new font is displayed only while the current command prompt window is open.
4. Choose the OK button.

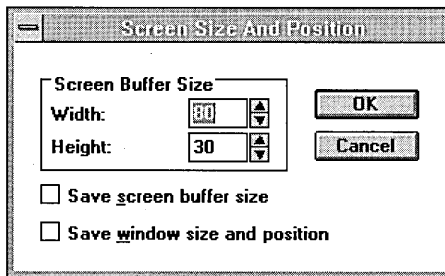
Changing the Screen Size and Position

The *screen buffer* size is the size reserved in memory for the command prompt display. The buffer size is measured by the number of characters wide by the number of lines high. The position is the current window position on the screen.

Scroll bars are displayed if the current size of the window is smaller than the screen buffer size settings. You cannot resize a window to be larger than the area set by the screen buffer settings. The settings have no effect when you are using a full screen display.

► **To change the screen buffer size**

1. From the Control menu, choose Screen Size And Position.



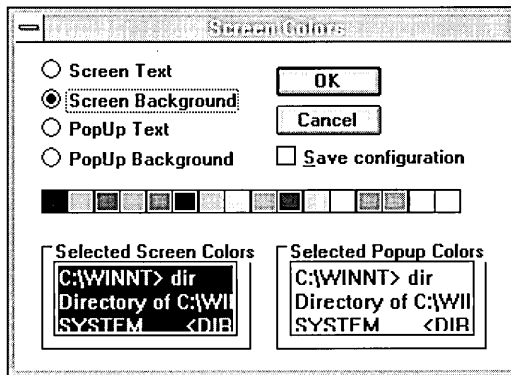
2. In the Screen Buffer Size box, set the width and height of the window using the up or down arrows next to the settings, or type the new value.
The width setting determines the number of characters in width. The height setting determines how many lines are stored in memory.
3. To use these screen buffer size settings every time you start the command prompt from this icon, ensure that the Save Screen Buffer Size check box is selected. If this box is not selected, your screen buffer settings are displayed only while the current command prompt window is open.
4. Ensure that the Save Window Size And Position check box is selected if you want to use the current window size and position every time you start the command prompt.
5. Choose the OK button.

Changing Screen Colors

You can specify the color of the text and background of the command prompt window. You can also specify the color of the text and background of pop-up windows that originate from the command prompt. Pop-up windows (for example, command history windows) are smaller character-based windows that present information to choose from.

► To change screen colors

1. From the Control menu, choose Screen Colors.



2. In the Screen Colors dialog box, choose the colors for screen text, screen background, pop-up text, and pop-up background by clicking the element you want to change, and then clicking the color you want.

The Selected Screen Colors or Selected Popup Colors box displays your choice.

3. To use the same colors every time you start the command prompt from this icon, ensure that the Save Configuration check box is selected. If this box is not selected, your settings are displayed only while the current command prompt window is open.
4. Choose the OK button.

Getting Help for the Command Prompt

Online Help is available for all commands at the command prompt and in a Windows NT help file.

Help at the Command Prompt

Online Help is available for all Windows NT commands. The following table shows how to access the different types of help available at the command prompt and the information provided.

Syntax	Information provided
help	Names of native system commands.
<i>command</i> /?	Description, syntax, parameters, and switches for commands. This syntax also provides help for commands that are not listed when you type help .
help <i>command</i>	Description, syntax, parameters, and switches for native system commands.
net help	Names of available network commands.
net help <i>command</i>	Description, syntax, parameters, and switches for network commands.
net <i>command</i> / help	Description, syntax, parameters, and switches for network commands.
net <i>command</i> /?	Syntax only for network commands.

Online Command Reference

The Windows NT online Command Reference is available to provide command syntax and parameters, details about a command, and examples of the command in use. To use the online Command Reference, double-click the Help icon in the Main program group.

Command Prompt Commands

Any supported Windows NT command can be run at the same command prompt. Windows NT commands are classified as follows:

- Native commands
- Subsystem commands
- Configuration commands
- TCP/IP utilities
- Special purpose utilities
- Command symbols

Native Commands

A *native* command takes advantage of the 32-bit operating system. Most commands familiar to MS-DOS users are now native Windows NT system commands.

Some commands, such as **dir** and **chdir**, are *internal*, meaning the command is processed by CMD.EXE and resides in memory at all times. Internal commands can be run only at the command prompt. Other commands, such as **chkdsk** and **xcopy**, are *external*, meaning the command is stored in its own file and loads from disk when you use the command. External commands can be run at the command prompt, from the Program Manager dialog box in the File menu, or from the Task List's New Task box. Batch commands are for use in batch programs only, as described later in this chapter.

Note Many of the new utilities provided in MS-DOS version 6.0 are not available in Windows NT version 3.1, or the functionality is provided by a different means. For more information, see "Differences from MS-DOS Commands," later in this chapter.

Command	Purpose
at	Schedules commands and programs to run on a computer at a specified time and date.
attrib	Displays or changes file attributes.
break	Sets or clears extended CTRL+C checking.
call	Calls one batch program from another (batch command only).
chcp	Displays or sets the active code page number.
chdir (cd)	Displays the name of or changes the current directory.
chkdsk	Checks a disk and displays a status report.
cls	Clears the screen.
cmd	Starts a new session of the Windows NT command interpreter.
comp	Compares the contents of two files or sets of files.
convert	Converts FAT and HPFS disk partitions to NTFS partitions.

Command	Purpose
copy	Copies one or more files to another location.
date	Displays or sets the date.
del	Deletes one or more files.
dir	Displays a list of files and subdirectories in a directory.
diskcomp	Compares the contents of two floppy disks.
diskcopy	Copies the contents of one floppy disk to another.
doskey	Edits command lines, recalls commands, and creates macros.
echo	Displays messages or turns command echoing on or off.
endlocal	Ends localization of environment changes in a batch file (batch command only).
erase	Deletes one or more files. (See del .)
exit	Quits the Windows NT command interpreter (CMD.EXE).
fc	Compares two files or sets of files, and displays the differences between them.
find	Searches for a text string in a file or files.
findstr	Searches for strings in files using literal text or regular expressions.
for	Runs a specified command for each file in a set of files.
format	Formats a disk for use with MS-DOS or Windows NT.
goto	Directs Windows NT to a labeled line in a batch program (batch command only).
graftabl	Enables Windows NT to display an extended character set in full-screen mode.
help	Provides Help information for Windows NT commands.
if	Performs conditional processing in batch programs (batch command only).
keyb	Configures a keyboard for a specific language.
label	Creates, changes, or deletes the volume label of a disk.
mkdir (md)	Creates a directory.
mode	Configures a system device.

Command	Purpose
more	Displays output one screen at a time.
move	Moves one or more files from one directory to the specified directory.
net accounts	Displays or sets password and logon requirements of servers in a domain.
net computer	Adds computers to Windows NT Advanced Server domains (Advanced Servers only).
net config	Displays the controllable services that are running.
net config server	Displays or changes settings for the Server service while the service is running.
net config workstation	Displays or changes settings for the Workstation service while it is running.
net continue	Reactivates suspended services.
net file	Displays the names of all open shared files on a server and the number of file locks, if any, on each file. This command also closes individual shared files and removes file locks.
net group	Adds, displays, or modifies global groups.
net help	Provides a list of network commands and topics you can get help with, or provides help with a specific command or topic.
net helpmsg	Provides help with a network error message.
net localgroup	Adds, displays, or modifies local groups.
net name	Adds, deletes, or displays messaging names on a workstation.
net pause	Pauses services or shared printers.
net print	Displays or controls print jobs.
net send	Sends messages to other computers on the network.
net session	Lists or disconnects sessions between a server and workstations.
net share	Creates, deletes, or displays shared resources.
net start	Starts a service or displays a list of started services.
net start alerter	Starts the Alerter service.
net start clipbook server	Starts the Clipbook Server service.
net start computer browser	Starts the Computer Browser service.

Command	Purpose
net start directory replicator	Starts the Directory Replicator service.
net start eventlog	Starts the Eventlog service.
net start messenger	Starts the Messenger service.
net start net logon	Starts the Net Logon service.
net start network dde	Starts the Network Dynamic Data Exchange service.
net start network dde dsdm	Starts the Network Dynamic Data Exchange Server service.
net start nwlink	Starts the NWLink service.
net start nwnblink	Starts the NWLink NetBIOS service.
net start remoteaccess	Starts the Remote Access service.
net start rpclocator	Starts the RPC Locator service.
net start rpsess	Starts the RPC subsystem.
net start schedule	Starts the Schedule service.
net start server	Starts the Server service.
net start ups	Starts the Uninterruptible Power Supply service.
net start workstation	Starts the Workstation service.
net statistics	Displays the statistics log.
net stop	Stops a network service.
net time	Synchronizes the workstation's clock with that of a server or domain, or displays the time for a server or domain.
net use	Connects a workstation to or disconnects a workstation from a shared resource, or displays information about workstation connections.
net user	Adds or modifies user accounts or displays user account information.
net view	Displays a list of servers or displays resources being shared by a server.
path	Displays or sets a search path for executable files.
pause	Suspends processing of a batch file and displays a message (batch command only).

Command	Purpose
popd	Changes to the directory stored by the pushd command.
print	Prints a text file while you are using other Windows NT commands.
prompt	Changes the Windows NT command prompt.
pushd	Stores the current directory for use by the popd command, and then changes to the specified directory.
recover	Recovers readable information from a bad disk.
rem	Records comments (remarks) in batch files. Also available as a configuration command for the MS-DOS and OS/2 subsystems.
rename (ren)	Renames a file or files.
replace	Replaces files.
restore	Restores files that were backed up with MS-DOS backup .
rmdir (rd)	Removes a directory or directory tree.
set	Displays, sets, or removes Windows NT environment variables.
setlocal	Begins localization of environment changes in a batch file (batch command only).
shift	Shifts the position of replaceable parameters in batch files (batch command only).
sort	Sorts input.
start	Starts a separate window to run a program or command.
subst	Associates a path with a drive letter.
time	Displays or sets the system time.
title	Sets the title for the command prompt window.
tree	Graphically displays the directory structure of a drive or path.
type	Displays the contents of a text file.
ver	Displays the Windows NT version number.
verify	Tells Windows NT whether to verify that your files are written correctly to a disk.
vol	Displays a disk volume label and serial number.
xcopy	Copies files and directory trees.

Subsystem Commands

Windows NT includes 16-bit commands for the MS-DOS and other subsystems. These are older commands, such as **edlin** or **graphics**, and MS-DOS-specific commands, such as **debug** or **exe2bin**. These 16-bit commands are included to maintain MS-DOS compatibility.

Other MS-DOS subsystem commands, such as **share**, perform functions that are now inherent to Windows NT or the MS-DOS subsystem. The commands are accepted to preserve compatibility with existing files, but the commands have no effect because the functionality is automatic in Windows NT.

Command	Purpose
append	Allows programs to open data files in specified directories as if they were in the current directory.
backup	Backs up one or more files from one disk onto another.
debug	Runs Debug, a program testing and editing tool for MS-DOS applications.
edit	Starts MS-DOS Editor, which creates and changes ASCII files.
edlin	Starts Edlin, a line-oriented text editor.
exe2bin	Converts .EXE (executable) files to binary format.
expand	Expands one or more compressed files.
fastopen	Starts the Fastopen program.
graphics	Loads a program that can print graphics.
loadfix	Loads a program above the first 64K of memory, and then runs the program.
loadhigh (lh)	Loads a program into the upper memory area.
mem	Displays the amount of used and free memory for the MS-DOS subsystem.
nlsfunc	Loads country-specific information.
qbasic	Starts the QBasic™ programming environment.
setver	Sets the version number for MS-DOS that Windows NT reports to a program.
share	Starts the share program.

Configuration Commands

You configure the MS-DOS subsystem with configuration commands, such as **device** or **lastdrive**. Place these commands in the CONFIG.NT file in the \WINNT\SYSTEM32 directory. These commands affect only the MS-DOS subsystem. Many of them, such as **buffers** and **break**, are ignored because the MS-DOS subsystem does not use them. They are accepted for compatibility only.

You configure the OS/2 subsystem with CONFIG.SYS commands, such as **devicename** or **libpath**. You must use an OS/2 editor to edit C:\CONFIG.SYS. No other method can be used to change the OS/2 subsystem CONFIG.SYS file. These commands affect only the OS/2 subsystem.

For more information on Windows NT subsystems, see Chapter 11, "Other Application Environments."

Command	Purpose
buffers	Allocates memory for a specified number of disk buffers when the system starts.
codepage	Specifies which code pages your system is prepared to use (OS/2 only).
country	Enables a subsystem to use international time, dates, currency, case conversions, and decimal separators.
device	Loads into memory the device driver you specify.
devicehigh	Loads into high memory the device driver you specify.
devinfo	Specifies the information a device needs in order to use a particular code page (OS/2 only).
dos	Specifies that the MS-DOS subsystem is to maintain a link to its upper memory area or is to load part of itself in the high memory area (HMA).
dosonly	Prevents starting applications other than MS-DOS-based applications from the COMMAND.COM prompt.
driveparm	Defines parameters for block devices (OS/2 only).
echoconfig	Displays messages when the MS-DOS subsystem CONFIG.NT file is read.
fcbs	Specifies the number of file control blocks (FCBs) the command prompt can have open at the same time.
files	Sets the number of files that the command prompt can access at one time.

Command	Purpose
install	Loads a memory-resident program into memory.
lastdrive	Specifies the maximum number of drives you can access.
libpath	Specifies the location of OS/2 dynamic-link libraries (OS/2 only).
ntcmdprompt	Runs the Windows NT command interpreter, CMD.EXE, rather than COMMAND.COM after running a TSR or after starting the command prompt from within an MS-DOS application.
protshell	Specifies the name and location of the MS OS/2 command interpreter (OS/2 only).
shell	Specifies the name and location of the command interpreter for the MS-DOS subsystem.
stacks	Supports the dynamic use of data stacks to handle hardware interrupts.
switches	Forces an enhanced keyboard to behave like a conventional one.

TCP/IP Utilities and Services

The TCP/IP utilities offer network connections to non-Microsoft hosts such as UNIX® system computers. You must have the TCP/IP network protocol installed to use the TCP/IP utilities.

For more information about the TCP/IP utilities and network protocol, see Appendix A, "Network Protocols."

Command	Purpose
arp	Displays and modifies the IP-to-Ethernet address translation tables.
finger	Displays information about users on a remote system.
ftp	Transfers files to and from a node running ftp service; similar to tftp .
hostname	Prints the name of the current host.
nbtstat	Displays protocol statistics and current TCP/IP connections using NBT.
net start snmp	Starts the Simple Network Management Protocol (SNMP) service.

Command	Purpose
net start tcpip	Starts the TCP/IP service.
net start tcp/ip netbios	Starts the NetBIOS over TCP/IP service.
net start tcp/ip netbios helper	Starts the NetBIOS over TCP/IP service.
net start telnet	Starts the TELNET service.
netstat	Displays protocol statistics and current TCP/IP connections.
ping	Verifies connections to a remote host or hosts.
rcp	Copies files between computers.
rexec	Provides remote execution facilities similar to rsh . Rexec is password protected.
route	Manually manipulates network routing tables.
rsh	Runs commands on remote hosts.
telnet	Enables terminal emulation.
tftp	Transfers files to and from a node running ftp service using trivial file transfer protocol; similar to ftp .

Special Purpose Utilities

Special purpose utilities are native 32-bit utilities, but they have a very limited purpose and may not appear in future versions of Windows NT.

Command	Purpose
aclconv	Restores OS/2 2.x ACLs to NTFS volumes.
diskperf	Starts, stops, and displays system disk performance counter use.
ipxroute	Manages the source routing variables of the NWLink protocol on a token-ring network. This command is available only if the NWLink protocol has been installed.
portuas	Converts a LAN Manager user account subsystem to a Windows NT user account database.

Command Symbols

Eleven command symbols allow you to manipulate the input or output of a command and permit conditional execution of a command. Used with commands and filter commands, the command symbols are powerful tools.

Symbol	Purpose
>	Redirects output.
>>	Appends redirected output to existing data.
<	Redirects input.
	Pipes output.
	Runs the command following the symbol only if the command preceding the symbol fails.
&	Separates multiple commands on the command line.
&&	Runs the command following the symbol only if the command preceding the symbol is successful.
()	Groups commands.
^	Allows input of command symbols as text. Escape character.
; or ,	Separates parameters.

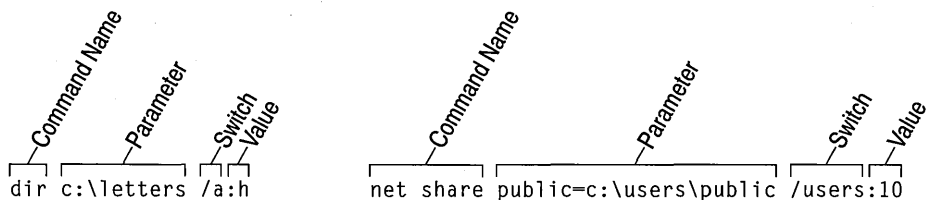
Sort, **more**, and **find** are the native filter commands that allow you to sort input and output, cause output to the screen to be displayed one screen at a time, and search for specified text in a file.

For complete syntax and explanations of the command symbols and filter commands, see the online Command Reference.

Command Syntax

Syntax is the order in which you must type a command and the elements that follow the command. Windows NT commands have up to four elements: command name, parameters, switches, and values.

These two examples contain all four elements. Each element is explained below.



The first example lists all hidden files in the C:\LETTERS directory. The second example allows up to 10 users to connect to the C:\USERS\PUBLIC directory.

Command Names

The command name, which you type first, states the action you want Windows NT to carry out. Some commands (such as the **cls** command, which clears your screen) consist only of a command name. Most Windows NT commands require more than a name. All network commands are preceded by the word **net**, for example, **net share** or **net use**.

Parameters

Windows NT sometimes requires additional information, which you specify in one or more parameters after the command name. A parameter defines or creates the object you want Windows NT to act on. For example, the **del** command requires a parameter that is the name of the file you want to delete.

Some commands require more than one parameter. For example, to rename a file by using the **rename** (**ren**) command, you must include the original name of the file in addition to the new name. The following command renames LETTER.TXT to MEMO.TXT: **ren letter.txt memo.txt**.

Caution Some Windows NT commands accept semicolons to separate parameters. For example, if you wanted to delete all files on drive A and mistakenly typed **del a;*.***, Windows NT would erase the file A in the current directory and all files in the root directory of the current drive.

Position in the syntax line determines how a command works and whether a parameter is a *source* (first) or a *destination* (second). In the example above, the source, LETTER.TXT, specifies the location of data to be transferred or used as input to a command. The destination, MEMO.TXT, specifies a location to which the data specified by source is to be transferred.

Using Special Characters in Parameters

In a Windows NT command, a computer name, share name, username, or group name can contain special characters (for example, PROFIT&LOSS).

- ▷ **To type a parameter with a special character**
 - Type the escape character (^) before the special character. For example, type **net use g: \\profit^&loss\reports**

Switches

Switches modify how a command performs a task. A switch is a forward slash (/) or a hyphen (-) usually followed by words, letters, or numbers. Some Windows NT commands do not have switches, whereas others have several.

If a command has more than one switch, you type them one after the other, separated with a space. Switches may be in any position or order after the command name. Some commands accept more than one switch after a forward slash. Other commands, such as TCP/IP utilities, accept a hyphen (-) instead of the forward slash.

The terms “parameter” and “switch” are often interchanged, since both elements follow the command name. The only meaningful difference between a switch and parameter is the presence of a forward slash or hyphen to indicate a switch and the parameter position in the syntax line to indicate whether the parameter is a source or destination. The term “argument” is also used to refer to parameters or switches.

Using the /Yes and /No Switches

With some network commands, Windows NT issues a prompt that requires a user response before a task can be completed. You can append the **/yes (/y)** or **/no (/n)** switch to a command to force a Yes or No answer for all responses. For example, stopping the Workstation service causes Windows NT to stop dependent services; Windows NT will prompt you before stopping each dependent service unless the **/yes** switch is included, as in the following: **net stop workstation /y**.

Values

Values determine how a switch works. A value is a colon (:) or an equal sign (=) followed by a word, letter, or number and must immediately follow the switch it modifies without a space. The following example of the **format** command contains two values, the file system to use (NTFS) and a volume label (Backup2): **format d: /fs:ntfs /v:backup2**.

Check the syntax for the specific command in online Help to determine if the command you want to use requires an equal sign or a colon.

Using the Command Prompt

This section explains how to:

- Start applications and use batch programs.
- Cut and paste information to or from a command prompt window.
- Simplify entering repetitive commands.
- Pause or cancel execution of a command.

Starting Programs at the Command Prompt

You can start any program at the command prompt by typing the filename of the program.

▶ **To start a program at the command prompt**

- Type the program's executable file name, and then press ENTER.

For example, typing **clock** will start Clock (from the Accessories group).

The command prompt window used to start the program is unavailable until you stop the program.

▶ **To start a program at the command prompt and retain use of the command prompt widow**

- Type **start** followed by the program's executable file name, and then press ENTER.

For example, typing **start calc** will start Calculator (from the Accessories group).

The command prompt window still accepts commands.

You can also pass additional parameters to a program at the command prompt. For example, the command **notepad letter.txt** starts Notepad and automatically loads the file LETTER.TXT.

When starting Event Viewer, User Manager, or Server Manager at the command prompt, you can improve their performance on networks with slow speeds by using the **/l** switch to run in low speed mode or the **/h** switch to run in high speed mode. These options are also available within each program; it is necessary to use these command prompt switches only if you choose to start these programs at the command prompt.

Other programs may accept parameters specific to the program. Each program determines the parameters it will accept at the command prompt. To determine whether a program will accept parameters at the command prompt, see the documentation for that program.

While a program or command is running, the window or icon title displays the program or command currently running. When the command finishes running, the program or command is removed from the window or icon title.

Batch Programs

Batch programs (also called batch files) allow you to simplify routine or repetitive tasks. A *batch program* is an unformatted text file that contains one or more commands and has a .BAT or .CMD filename extension. When the filename is typed at the command prompt, the commands in the file are executed sequentially.

Any command can be included in a batch file. In addition, several commands allow conditional processing of the commands in the batch file. For example, the **if** command carries out a command based on the results of a condition. Other commands allow you to control input and output and call other batch programs.

Transferring Information to or from a Command Prompt Window

You can transfer information to or from the command prompt using either QuickEdit mode or the Edit menu commands.

Note To quickly switch a command prompt or subsystem application between a full screen and a window, press ALT+ENTER.

Copying and Pasting Information using QuickEdit Mode

QuickEdit mode allows you to copy and paste text in command prompt windows using only your mouse, bypassing the Control menu's Edit commands. QuickEdit mode copies data only when the command prompt is running as a window; however, you can paste in QuickEdit mode when the command prompt is either a window or a full screen. The data is treated as text. Use the Settings command from the Control menu to turn QuickEdit mode on or off.

Note When QuickEdit mode is on, the mouse is disabled in all programs started at that command prompt. Use the **start** command to retain use of the mouse when starting a program from a command prompt window with QuickEdit mode enabled.

- ▶ **To cut and paste text at the command prompt using QuickEdit mode**
 1. If necessary, use the Settings command from the Control menu to turn QuickEdit mode on.
 2. Position the arrow cursor at the beginning of the text you want to copy. Press the left mouse button. Keeping the left mouse button depressed, drag the cursor to the last character of the section you want to copy and release the left mouse button. The portion of the screen you want to copy is highlighted.
 3. Press the right mouse button to copy the highlighted area to the Clipboard. The highlight will disappear.
 4. Press the right mouse button to copy the contents of the Clipboard to the command prompt cursor. If the area copied was more than one line, a carriage return (ENTER) is added at the end of each line.

You must still use the Edit Paste command to paste the contents of the Clipboard into Windows applications.

Copying and Pasting Information Using the Edit Menu

The Edit menu commands allow you to copy and paste information in any window, not just command prompt windows. The data is transferred as text or as a bitmap to the Clipboard depending on how it was copied.

- ▶ **To copy selected information as text from a command prompt window or character-based application running in a window**
 1. Press ALT+SPACEBAR to open the Control menu.
 2. From the Control menu, choose Edit.
 3. From the Edit menu, choose Mark.
 4. Select the information you want to copy using a mouse.
 5. Press the right mouse button to transfer the selected information to the Clipboard or choose Edit Copy from the Control Menu.

- ▶ **To copy the contents of an entire screen onto the Clipboard as a bitmap**
 1. Make sure the information you want to copy is on the screen.
 2. Press PRINT SCREEN.

The contents of the screen are copied onto the Clipboard.

▶ **To copy a window and its contents onto the Clipboard as a bitmap**

1. Make sure the window you want to copy is the active window.
2. Press ALT+PRINT SCREEN.

A bitmap of the active window is created and placed onto the Clipboard. The application you want to transfer the information to must be able to read bitmap (.BMP) files.

▶ **To paste information into an application as text**

1. Make sure the information you want is on the Clipboard.
2. Switch to the destination window.
3. Place the insertion point where you want the information from the Clipboard to appear.
4. If the application is running in full-screen mode, press ALT+SPACEBAR to open the Control menu.
5. From the window's Control menu, choose Edit.
6. From the Edit menu, choose Paste. If the area copied was more than one line, a carriage return (ENTER) is added at the end of each line.

Editing Commands with Doskey and Editing Keys

Windows NT provides Doskey to give you quick access to your most recent commands and enable you to assign frequently used command(s) to a single keystroke. Doskey is always available; you do not need to load the program into memory. Doskey is also available for character-based programs that accept buffered input.

The UP ARROW and DOWN ARROW keys cycle through commands previously entered. Press F7 to display all of the previous commands in a pop-up box; then use the UP ARROW and DOWN ARROW keys to select a command and press ENTER (or press ESCAPE to cancel). Doskey also allows you to assign multiple commands to a single key or typed alias.

In addition to Doskey, several editing keys allow you to use and edit the last command you typed. Press F1 to display the last command one character at a time, or press F3 to display the entire command. Use the BACKSPACE or LEFT ARROW key to move the cursor in a command. The INSERT key toggles between insert and overwrite mode.

For more information on Doskey and the command editing keys, see the online Command Reference.

Pausing or Canceling a Command

You can pause or stop the output of a command.

▷ **To pause the output of a command**

- Press CTRL+S or PAUSE.

Press any key except PAUSE to restart the output of the command. You can stop and restart the output of a command as many times as you want.

▷ **To stop Windows NT from completing a command**

- Press CTRL+BREAK or CTRL+C.

Your command is canceled, and the command prompt appears.

Important Any action Windows NT carried out before you pressed CTRL+BREAK or CTRL+C cannot be undone.

Differences from MS-DOS Commands

Windows NT retains and enhances almost all the functionality of MS-DOS. This section explains the significant differences between Windows NT commands and MS-DOS commands.

New Windows NT Commands

This table explains new Windows NT system commands.

Command	Function
at	Schedules commands and programs to run on a computer at a specified time and date.
aclconv	Restores OS/2 2.x ACLs to NTFS volumes.
convert	Converts file systems from FAT or HPFS to NTFS.
diskperf	Starts, stops, and displays system disk performance counter use.
dosonly	Prevents starting applications other than MS-DOS-based applications from the COMMAND.COM prompt.
echoconfig	Displays messages when reading the MS-DOS subsystem CONFIG.NT file.
endlocal	Ends localization of environment variables.

Command	Function
findstr	Searches for text in files using regular expressions.
ntcmdprompt	Runs the Windows NT command interpreter, CMD.EXE, rather than COMMAND.COM after running a TSR or after starting the command prompt from within an MS-DOS application.
popd	Changes to the directory last set with the pushd command.
pushd	Saves the current directory for use by the popd command, and then changes to the specified directory.
setlocal	Begins localization of environmental variables.
start	Runs a specified program or command in a secondary window.
title	Sets the title of the command prompt window.
&&	Command following this symbol runs only if the command preceding the symbol succeeds.
 	Command following this symbol runs only if the command preceding the symbol fails.
&	Separates multiple commands on the command line.
()	Groups commands.
^	Escape character. Allows input of command symbols as text.
; or ,	Separates parameters.

Changes to MS-DOS Commands

This table lists changes and improvements to MS-DOS commands.

Command	Changed features
chcp	Changes code pages for full-screen mode only.
cmd	CMD.EXE replaces COMMAND.COM.
del	New switches provide many more functions.
dir	New switches provide many more functions.
diskcomp	Switches /1 and /8 are not supported.
diskcopy	Switch /1 is not supported.
doskey	Available for all character-based programs that accept buffered input. Several other enhancements improve doskey .
format	20.8 MB floptical drive supported. Switches /b , /s , and /u are not supported.
keyb	KEYBOARD.SYS is no longer used.
label	The symbols ^ and & can be used in a volume label.

Command	Changed features
mode	Extensive changes.
more	New switches provide many more functions.
path	The %PATH% environment variable can be used at the command prompt.
print	Switches /b , /u , /m , /s , /q , /t , /c , and /p are not supported.
prompt	New character combinations allow you to add ampersands (\$a), parentheses (\$c and \$f), and spaces (\$s) to your prompt.
recover	Recovers files only.
rmdir	New /s switch deletes directories containing files and subdirectories.
sort	Does not require TEMP environment variable. File size is unlimited.
xcopy	New switches provide many more functions.

Unavailable MS-DOS Commands

The following MS-DOS commands are not available at the command prompt. See also the following section, "MS-DOS Version 6.0 Commands."

Command	New procedure or reason for obsolescence
assign	Not supported in Windows NT.
ctty	Not currently supported.
dosshell	Unnecessary with Windows NT.
emm386	Unnecessary with Windows NT.
fdisk	Disk Administrator prepares hard disks for use with Windows NT.
join	Increased partition size and an improved file system eliminate the need to join drives.
mirror	Not supported in Windows NT.
sys	Windows NT will not fit on a standard 1.2 MB or 1.44 MB floppy disk.
undelete	Not supported in Windows NT.
unformat	Not supported in Windows NT.

MS-DOS Version 6.0 Commands

The MS-DOS version 6.0 upgrade contains many new utilities that are either available in Windows NT in another form, or are incompatible with Windows NT architecture. Certain commands may be supported in future versions of Windows NT.

The following commands, introduced in MS-DOS version 6.0, are not supported in Windows NT version 3.1.

Command	Comment
choice	The choice batch program command is not currently supported.
dblspace	The Dbldspace program is not currently supported.
defrag	The Defrag program is not currently supported.
deltree	The rmdir /s command deletes directories containing files and subdirectories.
fasthelp	This MS-DOS 6.0 command is the same as the Windows NT command help . Windows NT also provides an online Command Reference in the Windows NT Help icon in the Main program group.
include	Multi-configurations for the MS-DOS subsystem are unnecessary. Use the PIF Editor Windows NT button to specify the location and name of unique AUTOEXEC and CONFIG files for each MS-DOS program you want to use.
interlnk	The Interlnk program is not supported.
intersrv	The Intersrv program is not supported.
memmaker	Windows NT automatically optimizes the MS-DOS subsystem's memory use.
menucolor	Multi-configurations for the MS-DOS subsystem are unnecessary. Use the PIF Editor Windows NT button to specify the location and name of unique AUTOEXEC and CONFIG files for each MS-DOS program you want to use.
menudefault	Multi-configurations for the MS-DOS subsystem are unnecessary. Use the PIF Editor Windows NT button to specify the location and name of unique AUTOEXEC and CONFIG files for each MS-DOS program you want to use.
menuitem	Multi-configurations for the MS-DOS subsystem are unnecessary. Use the PIF Editor Windows NT button to specify the location and name of unique AUTOEXEC and CONFIG files for each MS-DOS program you want to use.
msav	The Msav program is not currently supported.
msbackup	Windows NT provides the Backup utility (in the Administrative Tools group) for computers with tape drives, or the backup and xcopy commands for computers without tape drives.

Command	Comment
mscdex	It is unnecessary to configure the MS-DOS subsystem to use a CD-ROM drive. Windows NT provides access to CD-ROM drives for the MS-DOS subsystem.
msd	Use WINMSD.EXE in the \WINNT\SYSTEM32 directory.
numlock	The numlock command is not currently supported.
power	The Power utility is not currently supported.
smartdrv	Windows NT automatically provides caching for the MS-DOS subsystem.
submenu	Multi-configurations for the MS-DOS subsystem are unnecessary. Use the PIF Editor Windows NT button to specify the location and name of unique AUTOEXEC and CONFIG files for each MS-DOS program you want to use.
vsafe	The Vsafe program is not currently supported.

Differences from LAN Manager Commands

Windows NT retains many LAN Manager commands. This section explains the significant differences between Windows NT commands and LAN Manager commands.

New Windows NT Network Commands

This table explains new network related commands.

Command	Function
ipxroute	Manages the source routing variables of the NWLink protocol on a token-ring network. This command is available only if the NWLink protocol has been installed.
net computer	Adds computers to Windows NT Advanced Server domains (Advanced Server only).
net localgroup	Manages local groups.
net start clipbook server	Starts the Clipbook Server service.
net start computer browser	Starts the Computer Browser service.
net start eventlog	Logs any significant system, security, and application occurrences that require users to be notified.
net start locator	Starts the RPC Locator service.

Command	Function
net start network dde	Starts the Network Dynamic Data Exchange service.
net start network dde dsdm	Starts the Network Dynamic Data Exchange service.
net start rpsvc	Starts the RPC subsystem.
net start schedule	Starts the Schedule service, enabling the at command.
net start tcpip	Starts the TCP/IP service.
net start tcp/ip netbios	Starts the NetBIOS over TCP/IP service.
net start tcp/ip netbios helper	Starts the NetBIOS over TCP/IP service.
net start telnet	Starts the Telnet service.
portuas	Converts a LAN Manager user account subsystem to a Windows NT user account database.

Changes to LAN Manager Commands

This table identifies changes to LAN Manager commands.

Command	New or changed feature
net accounts	Server roles cannot be set. Windows NT security controls lockout.
net config	Peer functionality is an inherent part of Windows NT and no longer requires separate commands.
net config server	Most network services are self-configuring. The switches /autodisconnect , /srvcomment , and /hidden can be configured. The switch /srvhidden is now /hidden .
net config workstation	Most network services are self-configuring. The switches /charcount , /chartime , and /charwait can be configured.
net continue	Use Print Manager to control printing. See net pause in this table for the list of services that can be paused.
net group	Manages global groups and is only for computers that are members of a domain.
net pause	You can pause these network services: Alerter, Clipbook Server, Computer Browser, Directory Replicator, Messenger, Net Logon, Server, Telnet, and Workstation. Use Print Manager to manage printers.
net print	Use Print Manager to manage printers.
net send	Sending files is not supported.

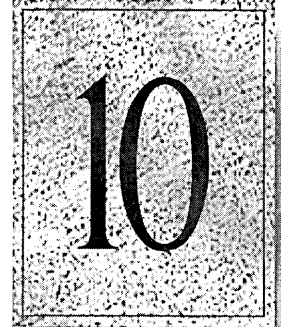
Command	New or changed feature
net share	Remote administration is automatic. Use Print Manager to share printers. Communication-device queues are not supported in this release.
net start	You can start these network services: Alerter, Computer Browser, Directory Replicator, Eventlog, Messenger, Net Logon, Network DDE, Network DDE DSDM, NWLink, NWNBLink, RemoteAccess, RFC NetBIOS over TCPIP, RFC NetBIOS over TCPIP Helper, RPCLocator, RPCSS, Schedule, Server, Snmp, Tcpiip, Telnet, UPS, and Workstation. Services can be configured to start automatically.
net start alerter	Self-configuring.
net start directory replicator	Use Server Manager to configure the Directory Replicator service. Previously called net start replicator .
net start messenger	Self-configuring.
net start net logon	Self-configuring. Service name is now two words.
net start server	Use Server Manager to configure the Server service.
net start snmp	New options permit logging.
net start workstation	The Workstation service is configured at setup and in various applications.
net statistics	Peer functionality is an inherent part of Windows NT and no longer requires separate commands. The statistics log cannot be cleared.
net stop	See net start in this table for the list of services that can be stopped.
net use	The /persistent switch has only yes and no values. Communication-device queues are not supported in this release.
net user	Switches /logonserver , /maxstorage , /operator , and /privilege are not supported.
net view	New /domain switch permits viewing of domains and computers in a specified domain.

Unavailable LAN Manager Commands

This table lists LAN Manager commands that are no longer available at the command prompt. The table tells how to accomplish the command, or explains why the command no longer exists.

Command	New procedure or reason for obsolescence
net	Use the Windows NT administrative tools to administer the network.
net access	Use File Manager to set permissions on files.
net admin	Use the Windows NT administrative tools to administer the network.
net audit	Use Event Viewer to track network resource use.
net comm	Communication-device queues are not currently supported.
net config peer	Not needed with Windows NT.
net console	Use Windows NT security features to prevent unwanted access.
net copy	Identical functionality is not available in Windows NT, however, you can use File Manager or the system copy command to copy files.
net device	Use Print Manager to display information about shared printers.
net error	Use Event Viewer to track network resource use.
net forward	You cannot forward network messages with Windows NT.
net log	Message logging is not supported.
net logoff	Logging off is inherent to Windows NT.
net logon	Logging on is inherent to Windows NT.
net move	Identical functionality is not available in Windows NT, however, you can use File Manager or the system copy and delete commands to move files.
net password	Press CTRL+ALT+DEL to change your password.
net run	Programs cannot be executed remotely in Windows NT.
net separator	Use Print Manager to control separator pages.
net start netpopup	Windows NT processes network messages automatically.
net start netrunc	Not supported in Windows NT.
net start nvalert	The Nvalert service is not currently supported.
net start peer	Peer functionality is an inherent part of Windows NT.
net start remoteboot	The Remoteboot service is not currently supported.
net start timesource	The functionality is included in the Server service.
net status	The information can be found using net config server and net share .
net version	Use winver to determine the current Windows NT version.
net who	Use Server Manager to view connections to a server.

Object Linking and Embedding



In Windows NT, you can share information between applications using the special object linking and embedding (OLE) capabilities of Windows-based applications.

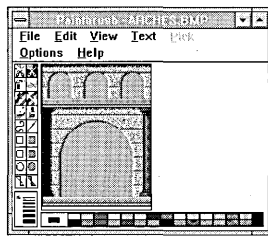
This chapter provides an overview of methods for sharing information between applications or documents, including the following topics:

- An overview of object linking and embedding
- Linking or embedding an object with menu commands
- Linking or embedding objects with OLE applications
- Maintaining linked or embedded objects

Overview

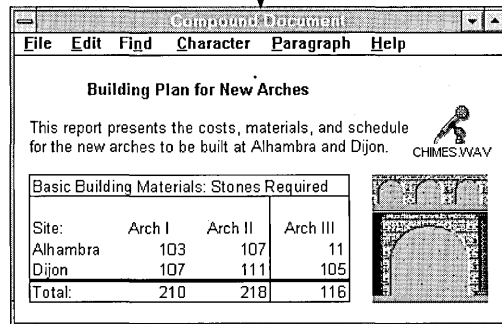
With object linking and embedding, you can combine information from several applications into one compound document. You can also edit the information, without knowing which application was used to create it.

The applications included with Windows NT that have OLE capabilities are Cardfile, ClipBook Viewer, Mail, Paintbrush, Sound Recorder, and Write. For more information about how to use the OLE features of these Windows NT accessories, see the online Help for each. For information about the OLE capabilities of other Windows-based applications, see the documentation for those applications.



Basic Building Materials: Stones Required			
Site:	Arch I	Arch II	Arch III
Alhambra	103	107	11
Dijon	107	111	105
Total:	210	218	116

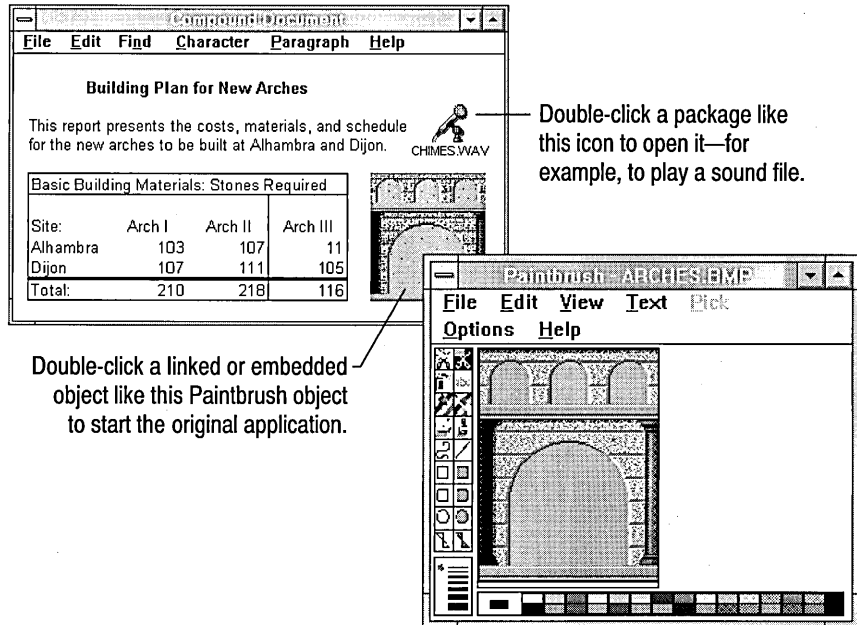
Use object linking and embedding to display information from other applications in a compound document.



The following are basic OLE terms:

- An *object* is any document, part of a document, or command created in a Windows-based application that has OLE capabilities. For example, a single cell in a spreadsheet, a range of cells, or an entire spreadsheet might be inserted as a linked or embedded object in a word processing document. When you choose an object to edit it, the application associated with that object starts automatically.

- A *package* is an embedded icon that contains an object. A package can be inserted into any document created in an OLE application. When you choose a package, Windows executes any command associated with the package or runs the application in which the packaged information was originally created.
- A *compound document* is any document that contains a linked or embedded object or package.

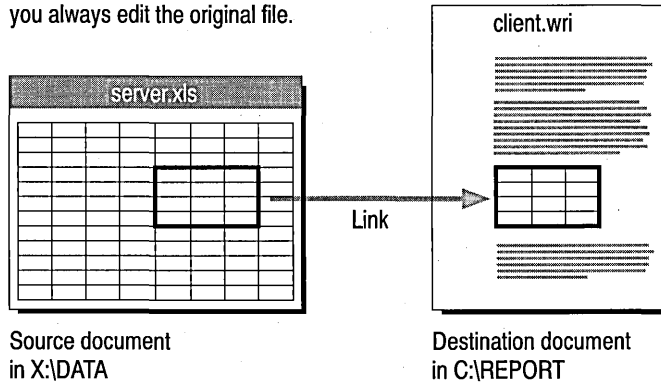


Two kinds of documents can be involved when you create linked or embedded objects and packages:

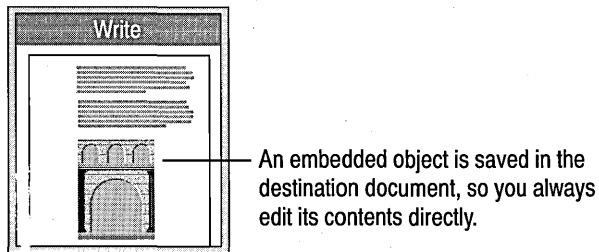
- A *source document* is the file where the information in the object or package was originally created. For example, if you want to paste art from Paintbrush into another document, the .BMP or .PCX file that contains the original artwork is the source document. If an object is embedded, it no longer has a source document.
- A *destination document* is the file where the object or package is inserted. For an embedded object, this is sometimes also called the *container document*. For example, if you paste art from Paintbrush into a document created in Microsoft Write, that text file is the destination document.

You can insert a *linked object* in a destination document to display information that was created and saved in another document. The information in the destination document can be updated dynamically (that is, continuously and automatically) whenever the source document changes.

The content of a linked object is saved in the source document, so you always edit the original file.



You can insert an *embedded object* in a destination document to present information created in another application; the information in the embedded object need not exist in another file outside your document. Use an embedded object when you want to make changes while working in your document, but do not need to save the information separately.



You can also insert a package in a document when you want users to be able to run a command from within a compound document or when you need only to display a representation of the information the source document contains. For example, if some readers will want to view background information, you might place a background document as a package in a summary report; readers can choose the package to open that document or ignore it.

OLE applications can act as either client or server:

- A *client application* is any Windows-based application that can display and store linked or embedded objects. For example, if you paste art into a Write document, then Write is the client application. The OLE client application stores all information for an embedded object, such as its page position and how the object is activated and displayed.
- A *server application* is any Windows-based application in which you can edit an object that you selected in an OLE client application. For example, if you choose art you pasted in a Write document, then the server application runs (for example, Paintbrush).

You can create a compound document that includes formatted text, graphics, and information from a spreadsheet or a database, plus icons that run sound recordings or play multimedia devices. The more hardware your system has for creating and playing multimedia through sound boards, CD-ROM, and other media players, the more complex and rich a document you can create using object linking and embedding.

But even using a basic PC and the applications included with Windows NT such as Write and Paintbrush, you can take advantage of linking and embedding to create compound documents. You use applications and features in Windows with which you may already be familiar, including several Edit menu commands in Windows-based applications, plus ClipBook Viewer, File Manager, and Object Packager.

Feature or application	Used for
Edit-menu commands in Windows-based applications	Creating objects, editing object content, and repairing or removing links. For details, see "Linking or Embedding an Object with Menu Commands."
ClipBook Viewer	Saving and sharing Clipboard contents, and linking objects saved on another computer. For details, see "Using ClipBook Viewer."
File Manager	Linking or embedding files in documents through copying or drag-and-drop. For details, see "Using File Manager to Create a Package."
Object Packager	Creating and editing packages that contain files, parts of documents, or commands. For details, see "Using Object Packager to Create a Package."

File Security and Linked Objects

Because an embedded object is simply part of the document that contains it, the access restrictions that apply to the document also apply to embedded objects within the document.

The security of linked objects, however, is defined with the source document. The object you see in the destination document is only a representation of data contained in the source document. Suppose, for example, a word processing document contains a linked chart that was created in a spreadsheet product. The word processing document contains a copy of the chart, which you can view or print. But to edit the chart, you must have write permission for the source document, the file that contains the chart.

Linking or Embedding an Object with Menu Commands

The procedures for linking or embedding objects with menu commands are generally the same as those you use for copying and pasting information.

The following table shows typical commands used for sharing information in Windows-based applications. Check the documentation for your application to find the actual command names used.

Command	Action
Paste	Inserts information from the Clipboard into the destination document.
Paste Link	Inserts a linked object from the Clipboard. The information appears in the destination document but is defined and stored in the source document.
Paste Special	Displays a dialog box so you can choose the data format for the object before pasting it, and also choose either to paste a linked object or to paste only the information.
Links	Displays the Links dialog box so you can update the display of an object, cancel links, repair broken links, or edit an object.
Insert Object	Displays a dialog box so you can choose the type of object to insert, and then embeds the object you create in the destination document. This command is a shortcut for running the server application to create the information, copying the information to the Clipboard, and then pasting it into the destination document with Paste Special.

Command	Action
Object (command name varies)	Starts the server application so you can edit or open a linked or embedded object. The actual command name depends on the selected object, such as Package Object or Picture. This command name might also be, for example, Edit Object, depending on the action allowed for that object. If several actions are possible, choosing this command displays another menu that lists other commands.

Some Windows-based applications such as Microsoft® Excel provide macros to control linking and embedding actions, using dynamic data exchange (DDE). For more information, see the technical reference for your application.

The following sections describe basic procedures for linking and embedding objects using the menu commands in your Windows-based applications.

Creating a Linked or Embedded Object

You can use the copy-and-paste commands from the Edit menu of OLE applications to create linked or embedded objects.

► **To create an embedded object using the Edit menu commands**

1. Open the source document, select the information to be embedded, and then choose Copy from the Edit menu.
2. Open the destination document, and then move the insertion point to where you want to insert the embedded object.
3. Choose Paste from the Edit menu.

The result depends on the OLE capabilities of the applications used to create the source and destination documents. If you choose the Paste command in an application that does not support OLE, a static copy of the information is placed in the document. But if the application supports OLE, the information is placed in the best available format. For example, in Microsoft Write when there is text on the Clipboard, the information is pasted as text, not as an object. If the information is in Bitmap format, then the information is pasted as a Picture object.

You can also create an embedded object while working in the destination document by choosing the Insert Object command. For more information, see the documentation for your application.

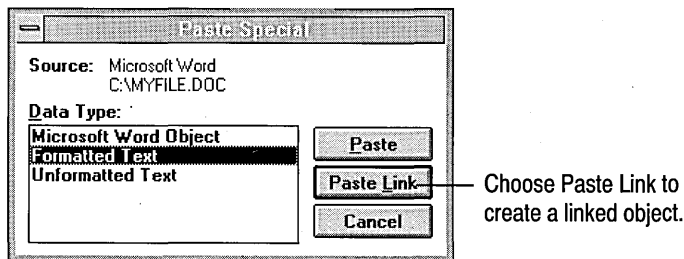
► **To create a linked object using the Edit menu commands**

1. In the server application, open the source document.
If you want to create a linked object, make sure the file for the source document has been saved.

2. Select the information to be linked.
3. From the server application's Edit menu, choose Copy.
4. In the client application, open the destination document, and then move the insertion point to where you want to insert the linked or embedded object.
5. Choose Paste Link from the client application's Edit menu.

If the Paste Link command is not available, but you know there is information on the Clipboard, then the source document has not been saved. You must save the document before copying information, or save the information on the Clipboard in your local ClipBook as described in "Using ClipBook Viewer," later in this chapter.

In some applications, you can choose Paste Special if you want to choose the data type before pasting. Choosing the Paste button in this dialog box without choosing another data type has the same effect as choosing Paste from the Edit menu. The Paste Link button is available only if the format you select is supported by the application used to create the destination document.



Note If you copy a linked object and paste it into another destination document, the link to the original source document is also copied and pasted.

Linking or Embedding Objects with OLE Applications in Windows NT

In addition to the accessories included with Windows NT such as Write and Sound Recorder that have OLE capabilities, several applications in Windows NT can be used to manage activities related to creating linked or embedded objects. These applications include the ClipBook Viewer for managing the Clipboard contents, and also File Manager and Object Packager for creating packages.

Using ClipBook Viewer



ClipBook Viewer provides temporary or permanent storage for information you want to transfer or share between applications and among members of your workgroup. You start ClipBook Viewer in the same way you do other applications, by choosing its icon in the Program Manager Main group. For information about all the options available in ClipBook Viewer, choose the Help button or press F1.

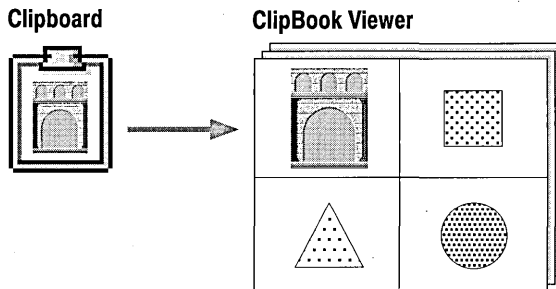
The following list shows the tools on the ClipBook Viewer toolbar. You can use these tools to choose commands and switch views.

Use	To	Use	To
	Connect to a ClipBook on another computer		Paste the contents of the Clipboard into the ClipBook
	Disconnect from a ClipBook on another computer		Delete contents of the Clipboard or selected ClipBook page
	Share a ClipBook page		Display the titles of the pages saved in the ClipBook
	Stop sharing a ClipBook page		Display thumbnail pictures of each page in the ClipBook
	Copy a selected ClipBook page onto the Clipboard		Display the contents of a selected ClipBook page

Saving and Sharing Information with ClipBook Viewer

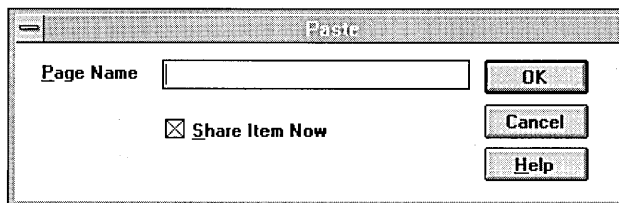
You can use the Cut, Copy, and Paste commands in Windows-based applications to place part or all of a document onto the Clipboard for pasting into another document. To store information placed on the Clipboard, you can paste it into your local ClipBook. Each item you paste into the ClipBook is called a *page*.

Your local ClipBook can hold up to 127 pages of information, and each page can have a name of up to 47 characters. The amount of information each page can hold is limited only by available storage space on your computer's hard disk.



► **To save information in ClipBook Viewer**

1. Cut or copy any amount of information in your Windows-based application.
2. From the Edit menu in ClipBook Viewer, choose Paste. Or choose the Paste button from the toolbar.
3. In the Paste dialog box, type a name for the page, and then choose the OK button.



You can copy information from ClipBook pages to place into documents created by other OLE applications, and you can share ClipBook pages with other users.

► **To share a ClipBook page**

1. In ClipBook Viewer, select the page you want to share.
2. From the File menu, choose Share. Or choose the Share button on the toolbar.
3. In the Share ClipBook Page dialog box, select the Start Application On Connect check box if the page contains data other than a bitmap or plain text. Other users cannot establish links to formatted data unless the application used to create the information is already running on your computer.
4. If the Start Application On Connect check box is selected, select the Run Minimized check box if you want the application to start as a minimized icon.
5. If you want to change users' permissions to access the shared page, choose the Permissions button. For help in setting permissions, see "Setting Permissions on a ClipBook Page," later in this chapter.



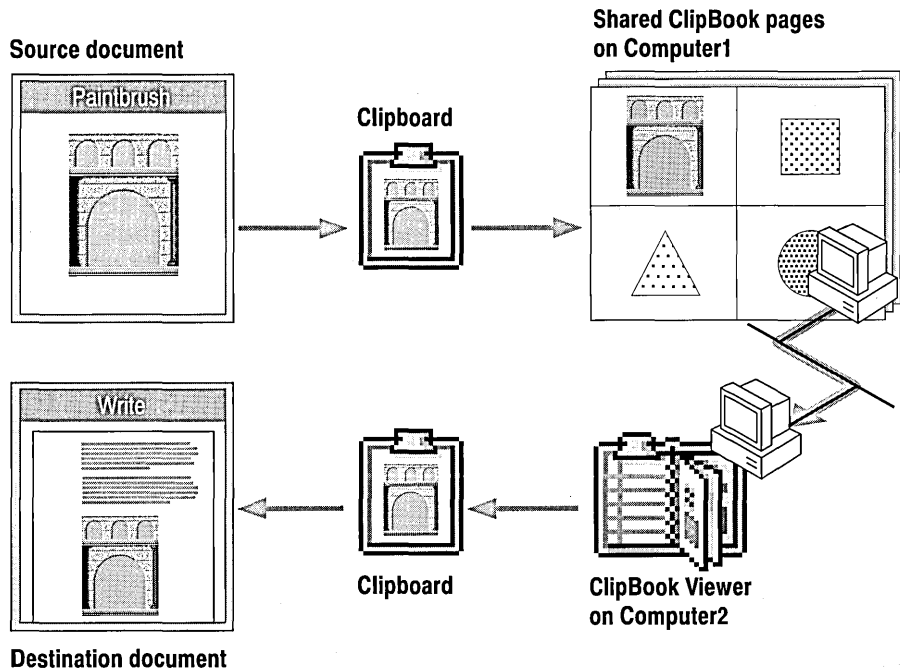
By default, you have full control over a page you create, and everyone else has Read and Link access.

After you share a page, other workgroup members who know the correct password for the page can connect to your computer and use the shared page in their documents. You can also use ClipBook Viewer to connect to another person's computer, and then use any shared ClipBook pages from that computer in your documents, as described in the following section.

Linking an Object from Another Computer

If the source document is stored on a different computer, you can use ClipBook Viewer to place a linked object in a destination document stored on your computer. To take advantage of this, the object must be pasted as a page on the other computer's ClipBook, and the page must be designated as shared.

When you use ClipBook Viewer to link objects, the changes made in the source document are made automatically in all destination documents that contain the object.



► To link an object stored on another computer



1. Start ClipBook Viewer, and then from the File menu, choose Connect. Or choose the Connect button from the toolbar.
2. In the Select Computer dialog box, type the name of the computer you want to connect to, or select the name from the Computers list, and then choose the OK button.

ClipBook Viewer displays the shared pages available in the ClipBook on the other computer.

3. Select the page that contains the information you want to place as a linked object in your document.



4. From the Edit menu, choose Copy. Or choose the Copy button from the toolbar.
5. From the Edit menu of the destination document, choose Paste Link.
Or, if the application has a Paste Special command, choose Paste Special. Select the format for displaying the information, and then choose the Paste Link button.
6. Open the destination document where you want to place the linked object.
7. Save the destination document.

Maintaining the Security of Shared ClipBook Pages

You can control the access that individual users and groups have to shared ClipBook pages. You can also audit users who access shared pages, and you can take ownership of a page.

Setting Permissions on a ClipBook Page

Setting permissions on a ClipBook page specifies the access that a group or user has to it. Permissions are cumulative, except that the No Access permission overrides all other permissions. For example, if a user is a member of a group with Read permission and a member of a group with Change permission, the user will have Change permission.



To change permissions on the ClipBook page, you must be the owner of the page, or have been granted permission to do so by the owner.

► To change or remove permissions on a ClipBook page

1. Select a ClipBook page from the ClipBook window.
2. From the Security menu, choose Permissions.
3. Select the name of the group or user whose permission you want to change.
4. Choose a permission from the Type of Access box.

Or, to remove ClipBook page permissions, select the name of the group or user in the ClipBook Permissions dialog box, and then choose the Remove button.

5. Choose the OK button.

► To add a group or user to the ClipBook permissions list

1. From the Security menu, choose Permissions.
2. In the ClipBook Permissions dialog box, choose the Add button.

The Add Users And Groups dialog box displays the groups on the computer or in the domain shown in the List Names From box. You can select another computer or domain from the List Names From box.

Domains appear only if your computer is a member of a domain on a Windows NT Advanced Server network. The domains shown have a trust relationship with the domain your computer belongs to.

3. You can use options in the Add Users And Groups dialog box to display users, find the users in a group, or find the domain to which a group or user belongs.
 - To display the names of users on the selected computer or domain, choose the Show Users button.
 - To list a group's members, select the group, and then choose the Members button. Users are listed in a new dialog box. On a Windows NT Advanced Server network, global groups that are members of a local group appear in the list. To see a global group's members, select the group and choose the Members button. To include the group in the Add Users And Groups dialog box, choose the Add button. To include some of the group's users, select those users, and then choose the Add button.
 - To add a domain group or domain user, you must know which domain contains the group's or user's account. On a Windows NT Advanced Server network, choose the Search button to find the domain of a group or user. In the Find Account dialog box, type the name of the group or user in the Find User Or Group box, and specify the domains you want to search. Then choose the Search button. To include the groups or users in the Add Users And Groups dialog box, select them in the Search Results box, and then choose the Add button.
4. To add groups or users to the permissions list, select them and choose the Add button, or double-click the name of the group or user. Or you can type the names of groups and users in the Add Names box, separating the names with a semicolon.

If the account of the group or user is not located on the computer or domain shown by the List Names From box, you must specify the location. Type the computer or domain name followed by the group or user name and separate the names using a backslash, for example **shipping\ernesta**. You can type the name without waiting for Windows NT to list groups in the Names box.

5. In the Type of Access box, select the permission for the groups or users shown in the Add Names box.
6. Choose the OK button.

For help with any dialog box, choose the Help button, or press F1 while using the dialog box.

Auditing ClipBook Pages

You can monitor, or audit, how specified individual users or members of groups are using shared ClipBook pages. You can audit both successful and failed actions. Windows NT stores the information generated from auditing in the security log. For information on the security log, see Chapter 15, "Event Viewer."

To audit ClipBook pages, you must set the file and object access. Set audit policy in User Manager.



To audit pages, you must be logged on as a member of the Administrators group.

► To audit a ClipBook page

1. In the ClipBook window, select the ClipBook page.
2. From the Security menu, choose Auditing.
3. Select the name of the group or user.
4. Select the events to audit, and then choose the OK button.

You can modify the auditing list for a shared ClipBook page at any time. You can add groups or users, and you can remove them.

► To add a group or user to the auditing list

1. In the ClipBook window, select the ClipBook page.
2. From the Security menu, choose Auditing.
3. In the Auditing dialog box, choose the Add button.

The Add Users And Groups dialog box displays the groups on the computer or in the domain shown by the List Names From box. You can select another computer or domain by using the List Names From box.

4. You can use options in the Add Users And Groups dialog box to display users, find the users in a group, or find the domain to which a group or user belongs.
 - To display the names of users on the current computer or domain, choose the Show Users button
 - To list a group's members, select the group and choose the Members button. Users are listed in a new dialog box. On a Windows NT Advanced Server network, global groups that are members of a local group appear in the list. To see a global group's members, select the group and choose the Members button. To include the selected group in the Add Users And Groups dialog box, choose the Add button. To include some of the group's users, select those users, and then choose the Add button.

- To add a domain group or domain user, you must know which domain contains the group's or user's account. On a Windows NT Advanced Server network, choose the Search button to find the domain of a group or user. In the Find Account dialog box, type the name of the group or user in the Find User Or Group box and specify the domains you want to search. Then choose the Search button. To include the groups or users in the Add Users And Groups dialog box, select them in the Search Results box and choose the Add button.
5. To add groups or users to the audit list, select them in the Names box and choose the Add button, or double-click the name of the group or user. Or you can type the names of groups and users in the Add Names box. Separate names with a semicolon.

If the account of the group or user is not located on the computer or domain shown by the List Names From box, you must specify the location. Type the computer or domain name followed by the group or user name and separate the names using a backslash, for example, **shipping\ernesta**. You can type the name without waiting for Windows NT to list groups in the Names box.
 6. Choose the OK button.

► **To remove ClipBook page auditing for a group or user**

1. In the ClipBook window, select the ClipBook page.
2. From the Security menu, choose Auditing.
3. In the Auditing dialog box, select the name of the group or user in the list.
4. Choose the Remove button.

For help with any dialog box, choose the Help button, or press F1 while using the dialog box.

Taking Ownership of a ClipBook Page

When you create a ClipBook page, you become the owner of it. By granting permissions, the owner controls how the ClipBook page is used.

To take ownership of a ClipBook page, you must either have Full Control access to the page or you must be logged on as a member of the Administrators group.

Although an administrator can take ownership, an administrator cannot transfer ownership to others. This preserves security. For example, only an administrator who takes ownership and changes permissions can gain access to a ClipBook page on which the original owner has set No Access permission.

- ▶ **To take ownership of a ClipBook page**
 1. Select the ClipBook page in the ClipBook Viewer window.
 2. From the Security menu, choose Owner.
 3. Choose the Take Ownership button.

Viewing the Contents of the Clipboard

With the Windows NT Clipboard, you can view information that has been cut or copied. You can view the contents of the Clipboard in a variety of formats, and you can save it as either a page in a ClipBook or as a file. You can also open files created in Clipboard and paste them in other documents.

- ▶ **To start Clipboard in ClipBook Viewer**



- In the ClipBook Viewer window, choose the Clipboard icon.

The View menu lists all the formats you can use to display the information currently on the Clipboard. Formats that are internal descriptions used by applications cannot be displayed on the screen. Such formats are also unavailable on the menu.

- To view the Clipboard contents in another format, choose a format name from the View menu. To return to the format that appeared when you first started Clipboard, choose Default Format.

The formats available depend on the source application. For example, a graphics application such as Paintbrush might provide formats that other graphics applications can use, such as Bitmap, Picture, and Enhanced Metafile. The Native, ObjectLink, and OwnerLink formats cannot be displayed in Clipboard, but are used by the client application to identify what kind of information is on the Clipboard.

- To save the Clipboard contents in a file that you can later open for pasting into documents, choose Save As from the File menu, and then specify a filename. Clipboard automatically adds the .CLP filename extension to the file.
- To open a Clipboard file for pasting contents into a document, choose Open from the File menu, and then select a filename from the list provided.

Embedding a Package

A package is an embedded icon that contains an object, a file or part of a file, or a command. You might choose to embed a package in a document in various situations. For example, you can embed an icon:

- To represent non-visual information, such as a sound clip for multimedia. At any time, you can choose the icon to play the recording.

- To represent a specific document or executable file in a Mail message, so your readers can easily view or use the file contents.
- To serve as a navigational link that connects information in various parts of other documents.

You can create, edit, and insert a package in several other ways, as described in the following sections. The following table summarizes these methods.

To create a package	To insert a package in a destination document
Copy a file in File Manager.	From the client application's Edit menu, choose Paste or Paste Link.
Drag a file icon from File Manager.	Drop the file icon in the window of the destination document.
Start Object Packager and follow the steps in Help.	From the client application's Edit menu, choose Paste.

Using File Manager to Create a Package

You can copy a file in File Manager and then use the Edit menu commands in your application to insert it as a package in a destination document. Or you can drag a file icon from File Manager to an application window if you want to link or embed the file as a packaged object.

For example, in a summary document you might embed a file package to serve as a token for another report or supporting details. Anyone who reads the summary document online can choose the icon to view the supporting report.

The embedded file must be associated with a file type and its filename extension defined in the Associate dialog box in File Manager. For information about how to add or change these associations, see Chapter 4, "File Manager."

► To link or embed a file package with Edit menu commands



1. In File Manager, copy the file you want to link or embed.
2. From the Edit menu in the destination document, choose Paste or Paste Link.

► To embed a file package with drag-and-drop

1. Start File Manager.
2. Start the client application and open the destination document.
3. To embed a file as a packaged object, drag its icon from File Manager, and then drop it in the window that contains the destination document.

The icon for the associated application is displayed in the destination document, with the filename as its label.

Note If you want to create a file package with File Manager, the server application must have been written for Windows NT or Windows 3.1. If your application was written for an earlier version of Windows or for another operating system, you must use Object Packager to create the file package. Also, if you want the package to contain a linked document, you must use File Manager to place the file in Object Packager.

Using Object Packager to Create a Package



Object Packager is an application provided with Windows NT that you can use to create packages for placement in documents. With Object Packager, you can:

- Create a package that contains a document or an executable command.
- Create a package that contains a linked object.
- Edit a package's contents, icon, or label.

Creating a package with Object Packager is the best choice when you want, for example, to share an object by including it in an electronic mail message. This way, all users can view the object contents without having to receive large files that may or may not be important to individual recipients.

► To start Object Packager

1. From the File menu in Program Manager, choose Run.
2. In the Command Line box, type **packager** and then press ENTER.
To get help with Object Packager features and commands, press F1.

Note If you place information in Object Packager that was created in an application that does not support OLE, the Picture option is not available.

► To create a package in an e-mail message

1. Save the source document in a shared directory.
2. Start Mail and compose your e-mail message.
3. From the Edit menu in Mail, choose Insert Object, and then in the Object Type box select Package.
4. From the Edit menu in Object Packager, choose Command Line, and then type a complete path name for the file that you saved in a shared directory in step 1.
For example, type `\\server1\public\filename.txt` to identify a file saved in the root directory of the network server named `\\server1\public`.

5. Choose the Insert Icon button in the Object Packager window, and then select an icon for the package you are sending. You can also choose Label from the Edit menu to define a label for the package.
6. From the File menu in Object Packager, choose Exit, and then choose Yes in the message that asks if you want to update the mail message.
7. Send your e-mail message in the usual way.

Each user who receives this e-mail message can choose the icon in the message to start the server application and view the contents of the file in the shared directory.

Maintaining Linked or Embedded Objects

After you create a linked object, you can edit, change, or break the link. You can also follow several steps to solve problems you might encounter with objects in destination documents, such as fixing broken links, finding unavailable server applications, or updating a linked object.

Editing an Object

After a linked or embedded object has been inserted into a document, you can edit it by choosing the object or by using menu commands to run the server application.

If the object is a package, you must copy that package to the Clipboard and paste it into Object Packager to edit it. Then you can place the revised package back in your destination document as described earlier in this chapter.

► To edit a linked object

1. In the destination document, choose the object. The associated server application starts and the source document for the object is opened.
2. Edit the object using the server application.

After you finish editing, the changes are automatically reflected in any destination document that displays the linked object.

Or, if the object has a manual link, choose the Update Now button in the Links dialog box to update the object. (For more information, see the online Help for the Links command in the destination application.)

3. To save changes, choose Save from the server application's File menu while working in the source document.

► To edit an embedded object

1. In the destination document, choose the object to run the server application associated with the object.

2. After you finish editing, choose Update from the server application's File menu, and then choose Exit to close the server application.
3. To save changes, while working in the destination document choose Save from the client application's File menu.

The changes are saved only in the destination document, not in a separate file.

You can cancel a link so that updates in the source document are no longer made in the destination document. If you cancel a link and then decide you want to make changes, you must edit the object in the original application or source document, and then copy and paste it back into the destination document.

▶ **To cancel a link**

1. In the destination document, select the object whose link you want to cancel.
2. In the Links dialog box, make sure the selected object is highlighted in the list. Choose the Cancel Link button, and then choose the OK button.

The information contained in the linked object remains in the destination document. Only the link has been removed.

In many applications, you can temporarily lock a linked object so that its contents are not updated or changed when other links are updated. You cannot edit a linked object that is locked.

▶ **To lock or unlock a linked object**

1. Select the linked object in your document, and then from the application's Edit menu, choose Links.
2. Select or clear the Locked check box to lock or unlock a linked object, respectively, and then choose the OK button.

You can delete an unlocked object, like any other object, from the destination document by choosing the Cut or Clear command from the Edit menu.

Solving Problems with Linked or Embedded Objects

This section describes solutions to problems you might encounter with linked or embedded objects in OLE applications.

Changing a Link or Fixing a Broken Link

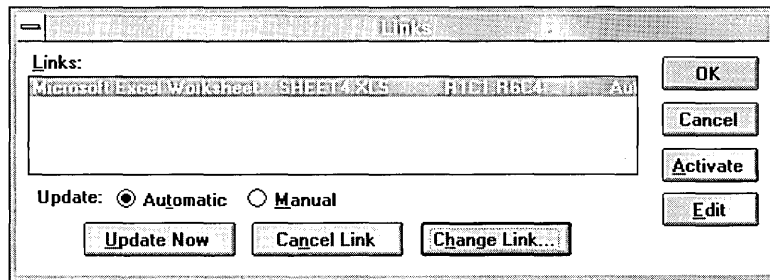
You can use the Links command in the client application to change the filename of the source document to which an object is linked. For example, you might insert a report as a linked object in a spreadsheet. If you want that linked report to show information from a new file, you can change the link without replacing the object.

Also, the link to a source document can be broken if the location of the source document changes. To repair a broken link in the destination document, you can use the Links command to change the filename or path of the source document so that the link will work correctly again.

► **To change a link or fix a broken link**

1. In the destination document, select the object whose link you want to change.
2. From the Edit menu, choose Links.

The following illustration shows an example of the Links dialog box, though it may appear somewhat different in various applications.



3. In the Links dialog box, choose the Change Link button.

The Change Link dialog box appears, with options and control buttons that work the same way as those in the Open or Save As dialog box.

4. In the File Name box of the Change Link dialog box, select the source document for the object's link, and then choose the OK button.
5. When the Links dialog box reappears with the filename of the new source document selected, choose the OK button.

If a link no longer works after you try to repair it, you might need to delete the linked object, and then start over by pasting the object from the source document.

Responding to a “Server Unavailable” Message

You might receive a “server unavailable” message when you try to create, edit, play, or update an object in a destination document. The server application cannot respond if it is currently printing or performing other actions, or if a dialog box is open. To solve this problem:

- Wait a few moments to find out if the application becomes available. If it does, the message disappears and your request is processed.
- Or choose the Cancel button in the message, and then switch to the server application. Complete or cancel the action that causes the application to be unavailable.

- Or make sure that the server application and source document are located in shared directories to which you have access. If the source document is on a different computer, make sure that computer is running.

Finding an Application if the Insert Object Command Fails

If you select an object type in the Insert Object dialog box, but the application doesn't open, then Windows NT cannot find the application. To solve this problem:

- Make sure the server application for this object type is on your computer. For example, Sound Recorder (SOUNDREC.EXE) must be on your computer before you can insert or run a Sound object.
- Make sure the directory for the server application matches the location specified in the Associate dialog box in File Manager.

Updating a Linked Object

Sometimes a linked object must be manually updated in the destination document before changes appear in the destination document, regardless of whether the object is designated for automatic or manual updating. This is true for links that contain text, spreadsheets, or pictures because these objects are represented by images reproducing the information in the source documents. This is not true for links to sound or animation files because these links are represented by icons.

If you make changes in the source document while the destination document is open, you must save the source document and update the linked object in the destination document to see the changes.

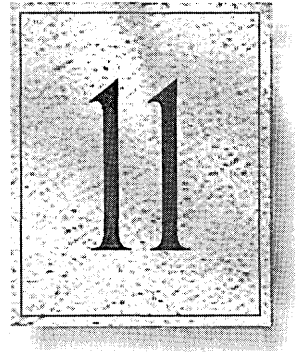
► To update a linked object

1. In the destination document, select the linked object.
2. From the Edit menu, choose Links.
3. In the Links dialog box, choose the Update Now button, and then choose the OK button.

If you still have problems when you are trying to edit a linked object from the destination location, try the following:

- Make sure the source document for the linked object you are editing is not located on another computer.
- If the source document is located on another computer, make sure that computer is running.

Other Application Environments



In addition to 32-bit applications designed for Windows NT, Windows NT supports applications designed for the following environments: Windows 3.1, MS-DOS, 16-bit OS/2, and POSIX.

This chapter provides information on these environments, including the following topics:

- How Windows NT runs applications
- The Windows 3.1 environment
- The MS-DOS environment
- The OS/2 environment
- Setting up and starting applications
- Creating program information files (PIFs)

How Windows NT Runs Applications

Windows NT is a modular operating system that uses operating subsystems to run applications. Each subsystem provides a different operating environment for applications. Windows NT runs Windows 3.1, MS-DOS, 16-bit OS/2, and POSIX based applications in addition to 32-bit applications designed for Windows NT.

The table below shows the Windows NT subsystems and the applications each subsystem supports.

Subsystem	Supports
Windows	Windows NT and Windows 3.1 based applications
MS-DOS	Windows 3.1 and MS-DOS based applications
OS/2	16-bit character-based OS/2 applications (on x86-based computers only)
POSIX	POSIX applications compliant with IEEE Std 1003.1 and compiled using Windows NT

The Windows NT Executive is the portion of the operating system at the center of Windows NT that manages processes and memory. You can think of a process as a discrete set of computing tasks. Each time you start an MS-DOS, Windows 3.1, OS/2, or POSIX application, the Executive starts a process for the application's subsystem and starts the application within the process. When you run Windows 3.1 based applications, applications run as tasks within a single process.

Each process is protected. That is, the Executive makes sure that each process runs in its own area of the computer's memory. In this way, processes cannot interfere with one another. If an application fails, that failure will not affect the rest of the system.

Any application that you can run in Windows NT runs seamlessly. That is, you can start any application from Program Manager, File Manager, or the command prompt without concern for what sort of operating environment the application requires. This seamlessness allows full interaction among applications. Windows NT supports object linking and embedding (OLE), dynamic data exchange (DDE), full clipboard operation, and named pipes.

Supported Applications

Windows NT can run most Windows 3.1, MS-DOS, and 16-bit character-based OS/2 applications. Some existing applications require special device driver support because they directly address computer hardware. Without special device drivers, these applications could cause the entire system to fail or could violate system security.

In many cases, such applications require only a new device driver in order to run on Windows NT. If you have an application for which a device driver is not supplied, check the application's manufacturer for the availability of new drivers. In other cases, the manufacturer may have upgraded the application. Check the application's manufacturer for the availability of an upgrade designed to run with Windows NT.

The following types of existing applications require either new device drivers or an application upgrade:

- Applications that directly address hardware; for example, FAX cards, scanner cards, or terminal emulation cards
- Applications that rely on their own disk device drivers; for example, applications that increase hard disk capacity
- Applications that directly address disk drives; for example, disk maintenance applications
- Applications that rely on their own graphics device drivers to address the hardware; for example, applications that use private printer drivers

Windows 3.1 Environment

Windows NT provides a complete operating environment for Windows 3.1 applications. The environment is comparable to the enhanced mode environment in Windows 3.1 where:

- Virtual memory is supported (on x86-based computers only).
- Object linking and embedding (OLE) is supported.
- Dynamic data exchange is supported.

On RISC-based computers, Windows NT provides the equivalent of the Windows Standard Mode environment.

Configuring the Windows 3.1 Environment

When you install Windows NT, the installation program checks to see whether a previous version of Windows is installed on the computer. If it is, you should install Windows NT in the same directory as the previous version of Windows. This allows Windows NT to configure its environment based on the existing environment and allows Windows NT to support all the features of currently installed Windows 3.1-based applications.

Previous versions of Windows store Windows environment information in the WIN.INI and SYSTEM.INI files. Unlike previous versions of Windows, Windows NT stores this information in its registry database. If you installed Windows NT in the same directory as Windows 3.1, when you first log on to Windows NT, Windows NT migrates any program groups that are not predefined for Windows NT (such as Main or Accessories) and the settings that configure your desktop.

Windows NT maintains the information needed to support Windows 3.1 applications by reading the WIN.INI, SYSTEM.INI, and REG.DAT files each time you start Windows NT. At startup, Windows NT retrieves the information and stores it in the registry. For example, if you installed a new application while running Windows 3.1, Windows NT will automatically gather file association and object linking and embedding (OLE) information for the new application when you start Windows NT.

If you run Windows NT only, the WIN.INI and SYSTEM.INI files will not contain any Windows environment information. However, the files are available for use by Windows 3.1-based applications that require them to store their own configuration information.

MS-DOS Environment

Windows NT provides a complete operating environment for MS-DOS applications.

- Expanded memory is emulated for applications that require it.
- On x86-based computers, character-based applications run either in a window or the full screen. Applications that use graphics run in the full screen.
- On RISC-based computers, character-based and graphics-based applications run in a window only. You can change the size of the window using the Screen Size And Position command from the Control menu.

Configuring the MS-DOS Environment

Windows NT configures the MS-DOS environment by reading the AUTOEXEC.BAT file when you log on, and by reading the AUTOEXEC.NT and CONFIG.NT files when you start an application in a new command window. The AUTOEXEC.NT and CONFIG.NT files are the Windows NT versions of AUTOEXEC.BAT and CONFIG.SYS. In addition, you can use custom startup files to configure the MS-DOS environment. For more information on custom startup files, see “Creating Program Information Files (PIFs),” later in this chapter.

When you log on to Windows NT, the path and environment variables stored in the AUTOEXEC.BAT file are appended to the Windows NT path and environment settings. Because this portion of the operating environment is established at logon, the values set for the path and environment variables are available to each application you use. If you change these values, you must log off and log on to Windows NT again so that the changes take effect.

When you start an application in a new command window, Windows NT reads the CONFIG.NT and AUTOEXEC.NT files to configure the environment for the application. If, for example, you change an application's driver in the CONFIG.NT file, restarting the application puts the change into effect. You can edit these files just as you would CONFIG.SYS and AUTOEXEC.BAT. The files are located in the C:\WINNT\SYSTEM32 directory.

As in previous versions of Windows, Windows NT allows you to customize the environment for each MS-DOS application by using program information files (PIFs).

Commands Available in CONFIG.NT

Windows NT supports the configuration commands shown in the table below. If you include commands in your CONFIG.NT file that are not supported, Windows NT ignores them. For more information on Windows NT commands, see Chapter 9, "Command Prompt."

Command	Function
country	Sets the language conventions for a specific country.
device	Loads an installable device driver. If necessary, you can load drivers that control memory, such as HIMEM.SYS, or that control character-based display, such as ANSISYS.
dos	Specifies how the upper memory area will be used.
dosonly	Prevents starting applications other than MS-DOS-based applications from the COMMAND.COM prompt.
echoconfig	Switches on the display of CONFIG.NT and AUTOEXEC.NT messages when you start an application.
fcbs	Sets the number of file control blocks (FCBs) that can be opened concurrently.
files	Sets the number of files that can be open at one time.
install	Loads a memory-resident program into memory.
loadhigh	Loads device drivers into the upper memory area.
ntcmdprompt	Runs the Windows NT command interpreter, CMD.EXE, rather than COMMAND.COM after running a TSR or after starting the command prompt from within an MS-DOS application.

Command	Function
rem	Marks lines in the CONFIG.NT file as comments (remarks).
shell	Specifies the command interpreter. Only the Windows NT command interpreter is supported.
stacks	Sets the amount of RAM reserved for processing hardware interrupts.

Commands Available in AUTOEXEC.NT

Windows NT supports a similar range of commands as MS-DOS for use in the AUTOEXEC.NT file. For more information on Windows NT commands, see Chapter 9, "Command Prompt."

Using Program Information Files

As in previous versions of Windows, when you start an MS-DOS application, Windows NT looks for a program information file (PIF) to use with the application. If you have been using a PIF to run an application in previous versions of Windows, you can continue to use it with Windows NT. However, Windows NT eliminates the need to set many PIF options and ignores options that do not apply. Windows NT also supports new options. You can specify startup files to configure an application's environment for each application you run. For more information on PIF options and creating PIFs, see "Creating Program Information Files (PIFs)," later in this chapter.

Some software manufacturers provide a PIF for an application. To determine whether a PIF has been supplied, contact the software manufacturer or search the disks for a file that has a .PIF filename extension. If you have PIFs from both Windows NT and the software manufacturer, use the PIF supplied by the manufacturer.

To use a PIF supplied with an application, copy the PIF to the directory where the application's files are located or to the directory where you set up Windows NT. Then, set up a program item so you can run the application from its PIF. For information about setting up a program item, see Chapter 3, "Program Manager."

Windows NT includes a PIF named `_DEFAULT.PIF`, located in the `\WINNT` directory. This PIF contains settings that work with most MS-DOS applications. Windows NT uses this PIF when it is the only one available for your application.

Running Memory-Resident Programs

Windows NT supports MS-DOS memory-resident programs, also called pop-up and TSR (terminate-and-stay-resident) programs. Like any MS-DOS-based application you run in Windows NT, memory-resident programs run in the window in which they are started and can be used only within that window. MS-DOS-based TSR programs can function reliably only when running alone or with other MS-DOS-based applications.

In general, you should not start memory-resident programs from your AUTOEXEC.NT or CONFIG.NT files. If you do, each time you start an application that reads these files, you will also start another copy of the memory-resident program, thereby wasting memory.

If one of your applications requires a memory-resident program to work properly, start the memory-resident program and then start the application in the same command window. You can also create a custom startup file that starts the memory resident program, and then specify that startup file in the application's PIF. For more information on custom startup files, see "Custom Startup Files," later in this chapter.

When you exit an MS-DOS-based application, Windows NT returns to the Windows NT command interpreter, CMD.EXE. However, by default, when you run a TSR or temporarily suspend an MS-DOS-based application to return to the command prompt, Windows NT runs COMMAND.COM, the command interpreter for the MS-DOS environment. This preserves the MS-DOS environment, allowing you to use the TSR immediately. Because starting and running other types of applications from the COMMAND.COM prompt can disrupt a TSR or suspended MS-DOS-based application, Windows NT provides the **dosonly** command. The **dosonly** command allows only MS-DOS-based applications to be started from the COMMAND.COM prompt. You can include the **dosonly** command in your CONFIG.NT file or the equivalent custom startup file in an application's PIF.

When COMMAND.COM is running, some features of the Windows NT command prompt, such as the Doskey display of command history, are not available. If you would prefer to run the Windows NT command interpreter after you have started a TSR or started the command prompt from within an MS-DOS-based application, you can use the **ntcmdprompt** command. However, keep in mind that the TSR may not be available for use when you are running CMD.EXE. You can include the **ntcmdprompt** command in your CONFIG.NT file or the equivalent custom startup file in an application's PIF.

► **To run a memory-resident program with another application**

1. Start the memory-resident program.

You can start the program as you would any program in Windows NT: from the command prompt, from File Manager, or from Program Manager.

2. Start the application in the same window by typing its name at the command prompt and pressing ENTER.

A convenient way to start a memory-resident program with an application is to create a batch program that starts both programs, and then create a PIF for the batch program. For example, to create a batch program that starts the pop-up program SideKick® 2.0 and the word processor XyWrite®, use Notepad to create the following program and save the file as SKXYLOAD.BAT.

```
SK2  
EDITOR
```

Then use PIF Editor to create a PIF that specifies SKXYLOAD.BAT in the Program Filename box. Give the PIF the same base name as the batch program, for example SKXYLOAD.PIF. You can start the programs from Program Manager by creating a program item for either the PIF or the batch program. You can also start both programs using the PIF or batch program in File Manager.

If you want to keep a pop-up program easily available while you are using Windows NT, you can start and run the program in a window. You can then switch to the window whenever you want, just as with any other program.

► **To run a pop-up program in a window**

1. Start the pop-up program.

You can start the program as you would any program in Windows NT: from the command prompt, from File Manager, or from Program Manager.

2. Press the appropriate key combination to display the program in the window.

A few pop-up programs require a key combination that is reserved for Windows NT, for example ALT+ESC. In such a case, create a PIF for the pop-up program and select the Reserve Shortcut Keys option for the conflicting key combination. Windows NT will reserve the key combination for use by the program so that you can display it.

OS/2 Environment

Windows NT supports 16-bit character-based OS/2 applications on x86-based computers only. OS/2 bound applications (applications that can run under both OS/2 and MS-DOS) will run on RISC-based computers using the MS-DOS subsystem.

Configuring the OS/2 Environment

When Windows NT starts for the first time, it checks the registry for OS/2 subsystem configuration information. If none is found, it looks for information in the original CONFIG.SYS file and adds the information to the registry. If the original CONFIG.SYS file does not exist or is not an OS/2 configuration file, the subsystem adds the following default information to the registry:

```
PROTSHELL=c:\os2\pmsHELL.exe c:\os2\os2.ini c:\os2\os2sys.ini
    %SystemRoot%\system32\cmd.exe
SET COMSPEC=%SystemRoot%\system32\cmd.exe
```

The subsystem updates the environment variable `Os2LibPath` with `LIBPATH` information found in the original CONFIG.SYS file. The updated `Os2LibPath` is `%SystemRoot%\system32\os2\dll` concatenated with the list of directories specified in the `LIBPATH` line of the original CONFIG.SYS file.

Windows NT supports the OS/2 configuration commands shown in the table below. If you use commands that are not supported, Windows NT ignores them.

Command	Function
protshell	Specifies the command interpreter. Only the Windows NT command interpreter is supported.
devicename	Specifies a user-defined Windows NT device driver used by OS/2 applications.
libpath	Specifies the location of OS/2 16-bit dynamic-link libraries.
set	Sets environment variables.
country	Sets a country code that defines country-dependent information such as time, date, and currency conventions.
codepage	Specifies which code pages your system is prepared to use.
devinfo=KBD	Specifies the information the keyboard needs in order to use a particular code page.

The **libpath**, **set**, and **devicename** commands are processed as follows:

- In CONFIG.SYS, **libpath** appends path information to the OS/2 library path in the Windows NT environment. At the command prompt, you can change the library path for OS/2 applications by using the **os2libpath** command.
- The following **set** commands are ignored in CONFIG.SYS:

set vio_ibmvga	set vio_vga	set prompt
set compspec	set video_devices	

- **devicename** specifies a device driver compatible with Windows NT for use with an OS/2 application. The syntax of the command is:

```
DEVICENAME=OS/2devicename [[path][NTdevicename]]
```

Devicename is the logical name OS/2 applications use to address the device. *Path* and *NTdevicename* specify the Windows NT device driver to which the OS/2 device name is mapped. If these are not specified, the device is mapped to `\DEVICE\os/2devicename`.

Changing OS/2 Configuration Information

Although the OS/2 configuration information is stored in the registry, you can edit that information just as you would edit an OS/2 CONFIG.SYS file. To edit the information, you must use an OS/2 text editor.



To change configuration information, you must be logged on as a member of the Administrators group.

► To change configuration information

1. While running Windows NT, start an OS/2 text editor in a window.
2. Open the file called `C:\CONFIG.SYS`.

Windows NT retrieves the configuration information from the registry and stores it in a temporary file that you can edit.

3. Edit the configuration information.
4. Save and close the file.
5. Exit the editor.

Windows NT stores the new information in the registry.

6. Log off from Windows NT and restart your computer.

Setting Up and Starting Applications

Set up a Windows 3.1, MS-DOS, OS/2, or POSIX application just as you would other applications, by using the Windows NT Setup program or Program Manager.

When you use the Windows NT Setup program to set up an MS-DOS application, Setup creates a PIF (program information file) or uses the PIF that accompanies the application or the Windows NT default PIF. Windows 3.1, OS/2, and POSIX applications do not use PIFs. For more information on Windows NT Setup, see Chapter 12, “System Maintenance with Windows NT Setup.”

When you use Program Manager to set up an MS-DOS–based application, Program Manager searches for a PIF to use with that application:

- If it finds one, it sets up the application and the PIF to work together.
- If no PIF is available, Windows NT uses the default PIF, named `_DEFAULT.PIF`, when you start the application.

For more information on using Program Manager to set up applications, see Chapter 3, “Program Manager.”

You can start applications for all supported application environments from Program Manager, File Manager, or from the command prompt.

▶ **To start an application from Program Manager**

1. Open the group that contains the program-item icon for the application.
2. Choose the icon. Or select it, and then press ENTER.

▶ **To start an application using the Program Manager Run command**

1. From the File menu, choose Run.
2. In the Command Line box, type the name of the file that starts the application, including the filename extension. You can also include any optional parameters that the application uses when it starts.
If the application is MS-DOS–based, you can type the name of the application’s PIF.
3. Choose the OK button.

▶ **To start an application from File Manager**

1. In the Main group, choose the File Manager icon.
2. In the directory window, choose the filename for the application. Or select the filename, and then press ENTER.
If the application is MS-DOS–based, you can use the filename of its PIF.

▶ **To start an application from the command prompt**

1. In the Main group, choose the Command Prompt icon.
2. At the command prompt, type the application’s executable filename, and then press ENTER.

Or, to run the application and retain use of the current command window, type **start** and the application’s executable filename, and then press ENTER.

Include the path to the application if necessary. You can include any startup parameters for the application after the application’s name.

When you start an MS-DOS-based application at the command prompt, Windows NT uses `_DEFAULT.PIF` to establish the MS-DOS environment. The following PIF settings in `_DEFAULT.PIF` are used to establish the environment:

EMS Memory	Application Shortcut Key
XMS Memory	Custom MS-DOS Initialization Files
Multitasking Options	Compatible Timer Hardware Emulation
Reserve Shortcut Keys	

To start an MS-DOS-based application at the command prompt using its PIF, use the **start** command. For example, to start `MYAPP.EXE` using `MYAPP.PIF`, type **start myapp**.

The first MS-DOS-based application started at the command prompt establishes the MS-DOS environment for all MS-DOS-based applications run in that window.

In a few cases, Windows NT may not recognize that a program is MS-DOS based. If an MS-DOS-based application fails to start, try starting it using the **forcedos** command. For example, to start a program called `MYPROG` in the `\OLDAPPS` directory, type **forcedos \oldapps\myprog** at the command prompt.

Creating Program Information Files

A program information file (PIF) provides information to Windows NT on how best to run MS-DOS applications. Windows 3.1, OS/2, and POSIX applications do not use or require PIFs.

Create, modify, and save PIFs using PIF Editor. On both x86-based and RISC-based computers, create PIFs using the Enhanced mode version of PIF Editor. Typically, a PIF has the same filename as the associated application's main program file, except that a PIF has the `.PIF` filename extension. During Windows NT setup, PIFs are placed in the `\WINNT` directory.

Windows NT includes a PIF named `_DEFAULT.PIF`, located in the `\WINNT` directory where you set up Windows NT. This PIF contains settings that work with most MS-DOS applications. Windows NT uses this PIF when there is no other one available for your application, or when the application is started at the command prompt.

Because Windows NT might use the default PIF with more than one MS-DOS application, you should not modify it. You can use the default PIF as a starting point for creating a new PIF.

► **To create or change a PIF**



1. Start PIF Editor by choosing the PIF Editor icon in the Main group.
PIF Editor displays a new, untitled PIF window with PIF options set to their default values.
To edit an existing PIF, choose Open from the File menu, and then specify the PIF you want.
2. Specify the PIF options for the application.
For more information on PIF options, see “Specifying PIF Options,” later in this chapter.
3. Save the PIF by choosing the Save or Save As command from the File menu.
If you are modifying the _DEFAULT.PIF file, be sure to choose the Save As command and to rename the file when you save it.
Always use the .PIF extension when you name a PIF file.

Using Multiple PIFs for an Application

You can create more than one PIF for an application. You may find it useful to do this if you run an application differently under different circumstances.

For example, you can specify in a PIF how much EMS (expanded) memory an application has access to. By using two PIFs, you could give an application access to a large amount of EMS memory when you’re using large data files, but limit its use of memory when you’re working with smaller files.

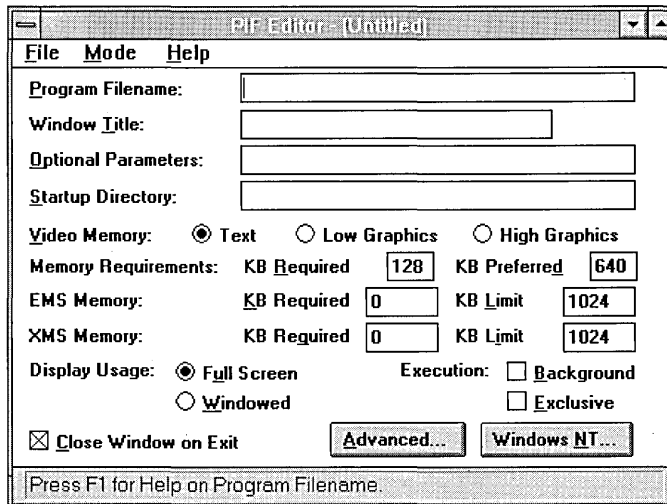
► **To set up two PIFs for an application**

1. Create two PIFs.
2. For each PIF, indicate the appropriate settings.
In this example, you would set the EMS Required: KB Limit setting to -1 for one PIF. For the other PIF, you would set the EMS Required: KB Limit setting to 1024K.
3. Save each PIF with a unique filename.
4. Create program-item icons for both PIFs in Program Manager, giving each a distinct title. Because you want to start the application from its PIF in this case, be sure to specify the PIF filename, not the application’s filename, in the Command Line box.

You can choose either icon to start the application.

Specifying PIF Options

Windows NT eliminates the need to set many PIF options for MS-DOS applications. However, Windows NT allows you to specify all PIF options in case you want to create PIFs for use when running applications with Windows 3.1. Only PIF options used by Windows NT are explained below. For information on other PIF options, including standard mode options, see your *Windows 3.1 User's Guide*.



PIF Editor - [Untitled]

File Mode Help

Program Filename:

Window Title:

Optional Parameters:

Startup Directory:

Video Memory: Text Low Graphics High Graphics

Memory Requirements: KB Required KB Preferred

EMS Memory: KB Required KB Limit

XMS Memory: KB Required KB Limit

Display Usage: Full Screen Windowed

Execution: Background Exclusive

Close Window on Exit

Press F1 for Help on Program Filename.

Program Filename

In the Program Filename box, type the name of the file that starts the application. Include the path if necessary.

For most applications, you can type the path of the main program file, which usually has the extension .EXE or .COM. For example, to create a PIF for Microsoft Word, type `c:\word\word.exe`. If you start the application from a batch program, type its path, including the filename extension (usually .BAT).

You can also specify an environment variable in this box. Using an environment variable allows you to place the variable name in the PIF and assign it a value using the **set** command in the AUTOEXEC.BAT file. When you type the variable name, enclose it in percent signs (%). For example, in your AUTOEXEC.BAT file assign the value "c:\word\word.exe" to an environment variable named "worddir" by adding the line **set worddir = c:\word\word.exe**. Then in PIF Editor specify the environment variable **%worddir%** as the Program Filename.

Window Title

You can type a descriptive name in the Window Title box. For example, type **Lotus 1-2-3** if you are creating a PIF for that application. The name you type appears under the application's icon when the application is minimized, and in the window title bar when the application is running in a window.

This entry is optional. If you leave the Window Title box blank, the application's title bar displays the name of the PIF without the filename extension.

You can also specify a title by using Program Manager. You do this by choosing the Properties command from Program Manager's File menu, and specifying a name in the Description box. Program Manager settings override PIF settings.

You can also specify an environment variable in this field. By using an environment variable, you can place a variable name in the PIF and assign it a value by using the **set** command in the AUTOEXEC.BAT file. When you type the variable name, enclose it in percent signs (%).

Optional Parameters

You can type application parameters in the Optional Parameters box. These are the same parameters you type after the application's filename when starting the program at the command prompt. For example, if you use the /c when you start Microsoft Word at the command prompt, type /c in the Optional Parameters box.

Parameters can be filenames, letters, numbers, or any type of information up to 62 characters in length. For information about valid parameters, see the application's documentation.

If you want Windows NT to prompt you for parameters whenever you start the application, type a question mark (?) in this box. You can also specify an environment variable in this field. By using an environment variable, you can place a variable name in the PIF and assign it a value by using the **set** command in the AUTOEXEC.BAT file. When you type the variable name, enclose it in percent signs (%).

This entry is optional. If the application does not require parameters, or if you do not want to use any parameters when you start your application, leave this box blank.

When you start the application by using the Run command in File Manager or Program Manager, any optional parameters you specify override the optional parameters specified in the PIF.

Startup Directory

Some applications require access to files in a particular directory before they can run. You can type a path in the Startup Directory box to specify the directory you want to be the current directory when the application starts, usually the directory where the application's program file is located. This entry is optional.

You can also specify this directory by using Program Manager. You do this by choosing the Properties command from Program Manager's File menu, and then specifying a directory in the Working Directory box. Program Manager settings override PIF Editor settings.

You can also specify an environment variable in this field. By using an environment variable, you can place a variable name in the PIF and assign it a value by using the **set** command in the AUTOEXEC.BAT file. When you type the variable name, enclose it in percent signs (%).

EMS Memory

Windows NT can simulate expanded memory for applications that use it. Use the EMS Memory options to specify how much expanded memory Windows NT should provide to an application. Although few applications actually require expanded memory, many run better if they can use it. For more information on how a particular application uses expanded memory, see the application's documentation. The following table describes the options.

Use	To
KB Required	<p>Specify how many kilobytes of expanded memory are needed to start the application. In general, you can leave this option at the standard setting of 0, indicating that the application does not require expanded memory. The KB Required option does not limit how much expanded memory the application receives; Windows NT gives it at least as much as is specified by KB Required, plus any available expanded memory up to the amount specified by the KB Limit option.</p> <p>Windows NT starts the application only if it can provide at least as much expanded memory as the KB Required option specifies. Otherwise, Windows NT displays a message indicating there is not enough expanded memory to run the application. If other applications are running, you can quit one or more of them, and then try running the application again.</p>
KB Limit	<p>Limit the amount of expanded memory provided to the application. Windows NT gives an application as much expanded memory as it requests, up to the amount you type in this box, or until no more memory is available.</p> <p>This option is useful for limiting an application's access to expanded memory, since some applications take all available expanded memory whether they need it or not. The default setting of 1024 provides the application with as much expanded memory as it requests, up to a limit of 1024K, or until no more memory is available.</p> <p>A setting of -1 allocates as much expanded memory to an application as it requests, up to a limit determined by the system. This can slow down the rest of your system.</p> <p>To prevent Windows NT from providing any expanded memory to the application, set both KB Required and KB Limit to 0.</p>

XMS Memory

Use the XMS Memory options to allocate extended memory to an application that uses memory according to the Lotus-Intel-Microsoft-AST eXtended Memory Specification (XMS) standard. Because few applications require extended memory, you can usually leave these options at their default settings. A description of the options follows.

Use	To
KB Required	<p>Specify how many kilobytes of extended memory are needed to start the application. In general, you can leave this option at the default setting of 0, indicating that this application does not require extended memory.</p> <p>The KB Required option does not limit how much extended memory the application receives; Windows NT gives it as much extended memory as the application requests, up to the limit set by the KB Limit option or until no more memory is available.</p> <p>Windows NT starts the application only if it can provide at least as much extended memory as the KB Required option specifies. Otherwise, Windows NT displays a message indicating there is not enough memory to run the application. If other applications are running, you can quit one or more of them and try running the application again.</p>
KB Limit	<p>Limit the amount of extended memory provided to the application. Windows NT gives an application as much extended memory as it requests, up to the amount you type in this box, or until no more memory is available. This option is useful for limiting an application's access to extended memory, since some applications take all available extended memory whether they need it or not.</p> <p>The default setting of 1024 provides the application with as much extended memory as it requests, up to a limit of 1024K, or until there is no more memory available.</p> <p>A setting of -1 allocates as much extended memory to an application as it requests, up to a limit determined by the system. This can slow down the rest of your system.</p>

Display Usage

Use the Display Usage options to set whether a character-based application starts in a window or in a full screen. While a character-based application is running, you can move it from a window to a full screen, or vice versa, by pressing ALT+ENTER.

Use	To
Full Screen	Start the application in a full screen.
Windowed	Start the application in a window.

While an application is running, you can set display usage from the Control menu using the Settings command. Display usage set using the Control menu overrides the setting made using PIF Editor.

On RISC-based computers, applications run in a window only and this option does not apply. On x86-based computers, graphical applications run using the full screen only. If a character-based application running in a window switches to graphics mode, for example to display a chart, Windows NT will switch the display to the full screen automatically.

Close Window on Exit

Clear this check box if you want the window (or screen) to remain open when you quit the application. This is especially useful if you are running an application that displays output on the screen. If the window closes too quickly, you won't see the output.

By default, the window closes when you quit the application.

Multitasking Options

Specifying foreground and background priority determines how CPU (processor) resources are allocated to applications. The numbers that you specify for an application set the priority for the application relative to other applications that are running. (Therefore, these numbers cannot be translated into a fixed percentage of CPU time.) The higher the priority number an application has, the more CPU resources are allocated to it.

The default foreground priority is 100. Setting a number lower than 100 allows other applications to run faster by reducing the amount of CPU time given the MS-DOS-based application in the foreground. The default background priority is 50. You can set a number from 0 to 10000.

By default, the Detect Idle Time check box is selected. This allows the system to give processing resources to other applications while the application is idle, for example while it is waiting for keyboard input. Clear this option only if your application is running too slowly or not running correctly.

► **To set multitasking options**

1. In the PIF Editor window, choose the Advanced button.
2. In the Multitasking area, set the background and foreground priorities by typing appropriate values in the Background Priority and Foreground Priority boxes.
3. Select or clear the Detect Idle Time check box.
4. Choose the OK button.

Reserve Shortcut Keys

Normally, Windows NT uses the key combinations in the table below to perform some action. Selecting one or more of the shortcut-key check boxes instructs Windows NT to ignore the specified key combination when the application is running in the foreground. Instead, the application responds to the key combination.

Use	To
ALT+TAB	Reserve the ALT+TAB shortcut key for the application. Otherwise, Windows NT switches between applications when you press this key combination.
ALT+ESC	Reserve the ALT+ESC shortcut key for the application. Otherwise, when you press this key combination, Windows NT cycles through the applications in the order each was started.
CTRL+ESC	Reserve the CTRL+ESC shortcut key for the application. Otherwise, Windows NT displays the Task List when you press this key combination.
PRTSC	Reserve the PRINT SCREEN shortcut key for the application. Otherwise, Windows NT copies the contents of the screen onto the Clipboard when you press this key.
ALT+PRTSC	Reserve the ALT+PRINT SCREEN shortcut key for the application. Otherwise, Windows NT copies the contents of the active window onto the Clipboard when you press this key combination.
ALT+SPACE	Reserve the ALT+SPACEBAR shortcut key for the application. Otherwise, Windows NT displays the application's Control menu when you press this key combination.
ALT+ENTER	Reserve the ALT+ENTER shortcut key for the application. Otherwise, when you press this key combination, Windows NT switches the application between a window (if it can run in one) and a full screen.

► **To reserve shortcut keys**

1. In the PIF Editor window, choose the Advanced button.
2. In the Other Options area, select the check boxes for the keys you want to reserve, and then choose the OK button.

Application Shortcut Key

An application shortcut key allows you to switch immediately to an application that is running in the background. By using an application shortcut key, you can switch to a particular application quickly, no matter where you are in Windows NT or which application you are using.

To assign an application shortcut key to an application, you can use the Properties command on the File menu in Program Manager, or you can use the Application Shortcut Key option in the application's PIF. Shortcut-key settings made in Program Manager override settings made in a PIF. The key combination you specify must include either the ALT or CTRL key. For example, the key combinations CTRL+Y, ALT+F4, CTRL+SHIFT+F11, and CTRL+ALT+7 are all valid application shortcut keys. You cannot specify a key combination that includes the ESC, ENTER, TAB, SPACEBAR, PRINT SCREEN, or BACKSPACE key.

After you assign an application shortcut key, the key combination works as a shortcut key only when that application is loaded. No other application (including Windows NT, Windows NT applications, and the application that uses the shortcut key) can use that key combination for any other purpose. For this reason, you should select application shortcut keys carefully. For example, suppose you specify ALT+F as the application shortcut key for Lotus Freelance. In many Windows applications, ALT+F is a shortcut key that displays the File menu. However, if Freelance is loaded when you are using Notepad, pressing ALT+F makes Freelance the active application, rather than displaying Notepad's File menu.

► **To specify a shortcut key by using Program Manager**

1. Switch to Program Manager.
2. Select the icon for the application whose shortcut key you want to specify.
3. From the File menu, choose Properties.
4. Select the Shortcut Key box, and then press the key combination you want to use for this application.
5. Choose the OK button.

If you press an invalid key combination, a message appears and Windows NT resets the key definition to its previous value.

▶ **To delete a shortcut-key definition by using Program Manager**

1. Switch to Program Manager.
2. Select the application's icon.
3. From the File menu, choose Properties.
4. Select the Shortcut Key box, and then press SHIFT+BACKSPACE.
The shortcut key is set to None.
5. Choose the OK button.

▶ **To specify a shortcut key by using PIF Editor**

1. From the File menu, choose Open.
2. Select the PIF for the application whose shortcut key you want to specify, and then choose the OK button.
3. Choose the Advanced button.
4. In the Advanced dialog box, select the Application Shortcut Key box.
5. Press the key combination you want.

Windows NT interprets any key combination you press as an application shortcut key unless you press keys that move you to another area in the dialog box (such as TAB).

6. Choose the OK button.

If you press an invalid key combination, a message appears, and Windows NT resets the key definition to its previous value.

▶ **To delete a shortcut-key definition by using PIF Editor**

1. Open the PIF for the application whose shortcut key you want to delete.
2. Choose the Advanced button.
3. Select the Application Shortcut Key box.
4. Press SHIFT+BACKSPACE to set the shortcut key to None.

Or, while pressing a key combination, press BACKSPACE to reset the shortcut key definition to its previous value.

Custom Startup Files

Windows NT allows you to create custom startup files that you can specify in an application's PIF. When you start the application, Windows NT will read the custom files you specify rather than the CONFIG.NT and AUTOEXEC.NT files. This allows you to create a custom MS-DOS environment for each application you use. For example, if one of your applications requires a memory resident program when it runs, you can include the name of that program in a custom startup file. When you start the application using its PIF, Windows NT will automatically start the memory resident program.

When you create startup files, base them on the AUTOEXEC.NT and CONFIG.NT files. That way, the basic information needed to configure the MS-DOS environment will already be included in your files. In configuration files, Windows NT uses the variable %SystemRoot% to represent the Windows directory. When processing the files, Windows NT automatically expands this variable.

► To create custom startup files

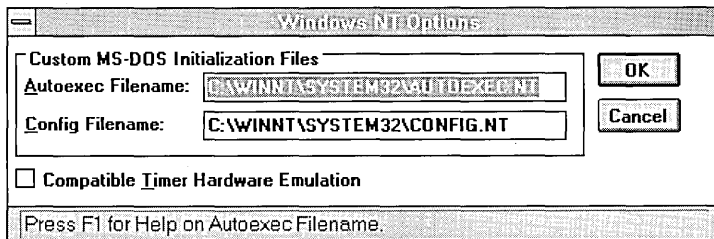
1. Using a text editor, for example Notepad, edit the CONFIG.NT and AUTOEXEC.NT files.

The files are located with your other Windows NT files in the directory \WINNT\SYSTEM32.

2. Save each file under a new name.

► To specify custom startup files in PIF Editor

1. From the File menu, choose Open.
2. Select the PIF for the application whose startup files you want to specify, and then choose the OK button.
3. Choose the Windows NT button.



4. In the Config Filename box, type the name of the file you want to use in place of CONFIG.NT.
5. In the Autoexec Filename box, type the name of the file you want to use in place of AUTOEXEC.NT.
6. Choose the OK button.

Compatible Timer Hardware Emulation

By default, Windows NT allows MS-DOS-based applications to specify the rate at which the computer's timer sends timing signals. If an application sets the rate too high, it may stop running. Some applications, such as games, are particularly sensitive. If your application starts but then fails to run correctly, try selecting the Compatible Timer Hardware Emulation check box. Selecting the check box reduces the rate at which timing signals are sent.

Use this option only if an application requires it. Selecting this option if an application does not require it can degrade the application's performance or affect the application's ability to calculate time.

► To set compatible timer hardware emulation in PIF Editor

1. From the File menu, choose Open.
2. Select the PIF for the application whose timer emulation you want to change, and then choose the OK button.
3. Choose the Windows NT button.
4. In the Windows NT Options dialog box, select the Compatible Timer Hardware Emulation check box.
5. Choose the OK button.

CHAPTER 12

System Maintenance with Windows NT Setup



You can use Windows NT Setup for system maintenance—whether Windows NT was initially installed from disks or from the network, or was installed by your equipment manufacturer. If you change the hardware or software in your computer, you need to ensure that your system configuration includes the correct device drivers and components for Windows NT.

This chapter presents the following topics:

- Changing system configuration settings
- Setting up applications to run from Program Manager
- Installing a new device driver
- Adding and removing drivers for SCSI adapters and tape drives
- Adding and removing Windows NT components
- Deleting user profiles
- Repairing your system

To change printer drivers, use Print Manager. To install and configure network components, choose the Network icon in Control Panel. To change your keyboard layout or language, choose the International icon in Control Panel.

Starting and Quitting Windows NT Setup

When you want to run Windows NT Setup for system maintenance, you start it like any other application that appears in a program group—by double-clicking its icon.



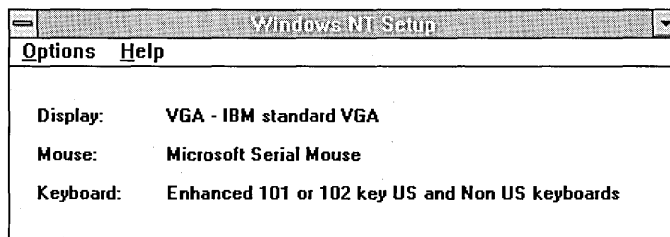
You can change some system settings only if you are logged on as a member of the Administrators group. If you cannot run Windows NT Setup or use the tools in Control Panel to change system settings, ask your network administrator for assistance.

▶ To run Windows NT Setup for system maintenance



- In Program Manager, choose the Windows NT Setup icon.

You can press F1 at any time to get help for Windows NT Setup.



Important Before running the setup program for an application created for any version of Windows, you must quit Windows NT Setup. Otherwise, the application's setup program will fail.

▶ To quit Windows NT Setup

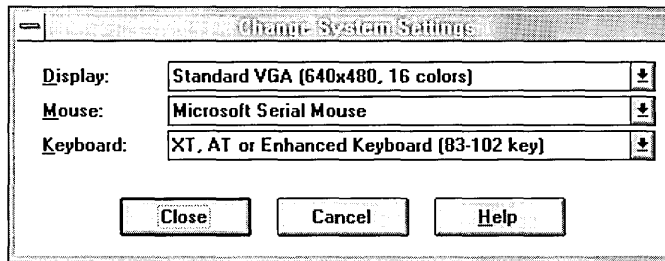
- From the Options menu, choose Exit.

Changing System Configuration Settings

You can use Windows NT Setup to change the system setting for your display, keyboard, or mouse by specifying new options in the Change System Settings dialog box. For example, if your computer currently uses a device driver for a 256-color SuperVGA display and you want the display to appear in standard VGA 16-color mode, you must use Windows NT Setup to change this setting.



To make system setting changes, you must be logged on as a member of the Administrators group for your computer.



- ▶ **To change system settings for the display, keyboard, or mouse**
 1. Make sure your hardware is set up to match the setting you are changing to.
 2. From the Options menu in Windows NT Setup, choose Change System Settings.
 3. In the Change System Settings dialog box, open the list for the setting you want to change by clicking the arrow at the right of the list.
 4. Make sure your hardware is listed, and then select the setting you want.

To install a new or updated driver file, choose Other, and then when Setup prompts you for a disk, insert a disk containing the driver file into drive A. If Setup asks you to supply a Windows NT disk, insert the disk in the drive.

To install a sound driver or a supporting driver for multimedia devices, see “Working with Device Drivers” in Chapter 5, “Control Panel.”

5. Choose the OK button.

If Setup asks you to supply a Windows NT disk, insert the disk in the drive. After you complete all Setup options and quit Windows NT Setup, a message reminds you to restart your computer for the changes to take effect.
6. To restart your computer, choose Shutdown from Program Manager’s File menu. Do not flip the power switch to restart your computer.

Setting Up Applications to Run from Program Manager

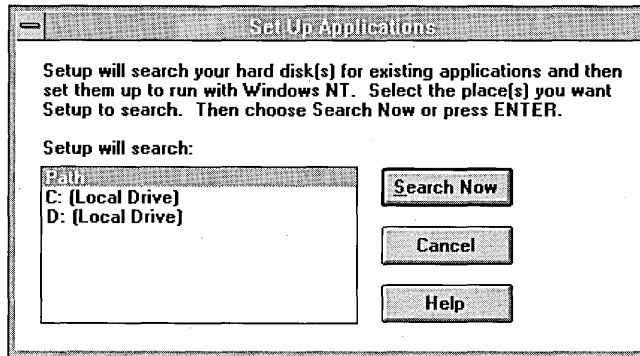


You can choose to set up applications on your hard disk that you want to run under Windows NT. To do this, you must be logged on as a member of the Administrators group.

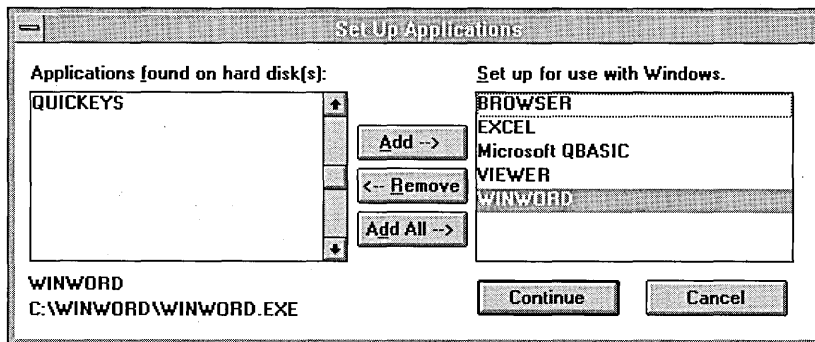
- ▶ **To set up applications to run from Program Manager**
 1. From the Options menu, choose Set Up Applications.
 2. In the Set Up Applications dialog box, specify where Setup should search for applications.

You can search either directories on your hard disk or only the directories listed in your path.

3. Choose the Search Now button.



4. If Setup finds applications with executable filenames identical to other applications, a message asks you to select the correct names for the ambiguously named applications on your hard disk. Select the application name(s) in the list, and then choose the OK button.
5. In the second Set Up Applications dialog box, select the specific applications you want in the left box, and then choose the Add button.



6. When all the applications you want to install appear in the right list, choose the Continue button.

Setup adds program-item icons for the selected applications in the common Applications group in Program Manager. You can move the program-item icons to other program groups, if you want.

For more information about running applications created for other operating environments, see Chapter 11, "Other Application Environments."

Installing a New Device Driver

New device drivers may periodically become available to supplement the device drivers supplied with Windows NT. You must use Windows NT Setup to install a new device driver.

If a new version is made available of a device driver already installed on your computer, use the procedure described in this section to install the revised driver.

To start a new device driver, use the Devices option in Control Panel or restart your computer.

Obtaining New Device Drivers

For information about obtaining new device drivers for your system, contact your hardware manufacturer or Microsoft Customer Support Services.

The Windows NT Driver Library is updated regularly to provide the most current Windows NT-compatible device drivers for printers, displays, networks, and other devices not included in the Windows NT and Windows NT Advanced Server retail packages. All drivers are tested by Microsoft for compatibility with the Windows NT and Windows NT Advanced Server operating systems. The Windows NT Driver Library is distributed through the Microsoft Download Service at 206-936-MSDL, between 6:00 A.M. and 6:00 P.M. Pacific time, Monday through Friday; it's also available through CompuServe and GENie®, or call 1-800-227-4679 to order the library from Microsoft.

Note If you bought your copy of Windows NT outside the United States, the package contains an information card listing Microsoft subsidiary telephone numbers you can call to obtain information.

Setting Up New or Revised Device Drivers

Before running Windows NT Setup to install a new device driver, check for any special installation instructions that came with the driver. There may be other steps you need to take to set up the hardware. Some drivers include information files that tell Windows NT Setup what type of files (such as font files) the driver supports. If you are not sure what your driver supports, contact the hardware manufacturer.

► **To install a device driver not supplied with Windows NT**

1. Make sure your hardware matches the setting you are changing to.
2. From the Options menu in Windows NT Setup, choose Change System Settings.
3. In the Change System Settings dialog box, click the arrow beside the display, mouse, or keyboard setting you want to change and choose Other.
Setup prompts you to insert the disk containing the device driver.
4. Insert the disk in the drive, and then choose the OK button.

If the file is located on your hard disk or on a network drive, type the path of the drive that contains the file, and then choose the OK button.

Setup displays a list of the device drivers on that disk or drive.

5. From the list of drivers, select the appropriate driver, and then choose the OK button.

If you are sure you want the displayed option, choose the OK button in the Change System Settings dialog box.

You may be asked for additional disks if more than one disk was provided by the hardware manufacturer. You might also be asked for specific Windows NT disks.

Setup copies the appropriate files to the Windows NT system driver subdirectory. The default subdirectory is `\WINNT\SYSTEM32\DRIVERS`.

After all files are copied and you quit Windows NT Setup, a message reminds you to restart your computer for the changes to take effect.

6. To restart your computer, choose Shutdown from Program Manager's File menu. Do not flip the power switch to restart your computer.

Correcting a Faulty Device-Driver Installation

Occasionally, Windows NT may not be able to run using the changes you make to the Windows NT system configuration. For example, you might specify the wrong video device driver when you change the system settings.

If a new configuration leaves your computer unable to start correctly, Windows NT will automatically restore your previous working system configuration the next time you restart your computer. Windows NT can automatically maintain a working system configuration because changes that you make in Windows NT Setup and the previous working configuration are both saved. For more information, see "Repairing Your System," later in this chapter.

Note If you cannot correctly install a new device driver, check with your hardware manufacturer to ensure that you have the current driver.

Adding and Removing Drivers for SCSI Adapters and Tape Drives



If you add or remove a tape drive or a SCSI drive such as a CD-ROM device as part of your system, you must tell Windows NT about the change by choosing the appropriate Add/Remove command from the Options menu in Windows NT Setup. This requires that you be logged on as a member of the Administrators group.

Note When you use a SCSI tape drive, the tape drive must be turned on before you start your computer. Otherwise, the driver will not load properly.

▶ **To add a driver for a SCSI device or tape drive**

1. From the Options menu in Windows NT Setup, choose Add/Remove SCSI Adapters or choose Add/Remove Tape Devices.
2. In the SCSI Adapter Setup dialog box, choose the Add button.
3. In the Select SCSI Adapter Option dialog box, select a driver from the list, and then choose the Install button.

Follow the instructions on the screen. If you are asked to insert a disk, insert the disk in the designated drive, and then choose the OK button.

4. When driver installation is complete, choose the Continue button to return to Windows NT Setup.

▶ **To remove a driver for a SCSI device or tape drive**

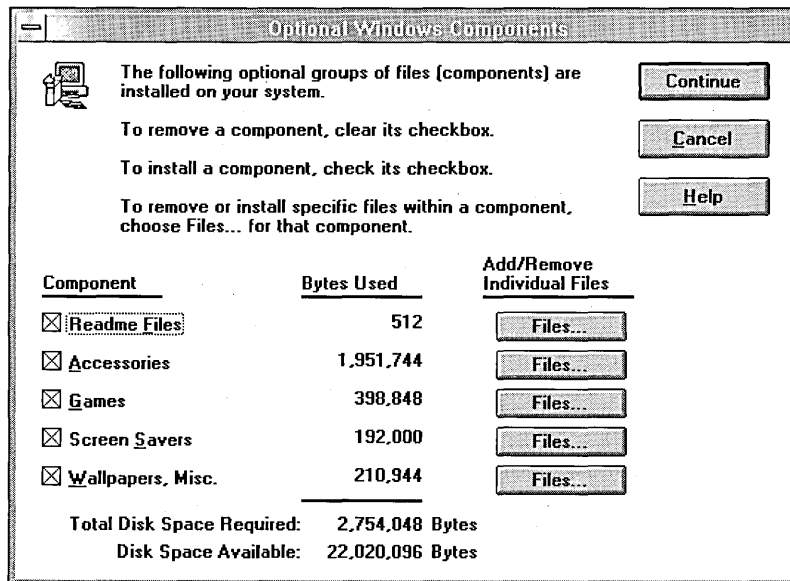
1. In the SCSI Adapter Setup list in the Add/Remove dialog box, select the SCSI device or tape device you want to remove
2. Choose the Remove button, and then choose the Continue button to return to Windows NT Setup.

When you complete any other Setup options and quit Windows NT Setup, a message reminds you to restart your computer so that the changes will take effect. To restart your computer, choose Shutdown from Program Manager's File menu. Do not flip the power switch to restart your computer. The next time you start Windows NT, the correct system configuration will appear.

Adding and Removing Windows NT Components

You can use Windows NT Setup to add and remove various components that are not essential to the operation of Windows NT. For example, you might want to remove some non-essential Windows files to free up space on your hard disk, or add components you previously removed or that you did not install during initial setup. You can decide at any time to add or remove all or parts of components such as README files, accessories, games, screen savers, and wallpapers.

Caution When you remove components, the files are deleted from your computer. If you want to add them later, you must supply the files from the Windows NT installation disks or from a source directory on your network.



► To add or remove Windows NT components

1. From the Options menu in Windows NT Setup, choose Add/Remove Windows Components.

In the Optional Windows Components dialog box, Setup lists the optional components and the hard disk space required to set them up on your computer:

- Components currently on your computer are marked with an X in the check boxes. You can remove some or all of these components.
- Total Disk Space Required shows the total hard disk space required by all selected components. This number increases or decreases as you select or clear the components' check boxes.
- Disk Space Available shows your computer's total unused hard disk space. This number changes after adding or removing components or files.

Note Windows NT Setup does not check whether the space required for the files you want to add matches the space available on disk. Check these amounts carefully before proceeding to ensure that you have adequate disk space to add the selected components.

2. To add or remove a component, do one or more of the following:
 - To add an entire component (for example, all README files), select the check box next to it.
 - To remove an entire component, clear the check box.
 - To add or remove part of a component, follow the steps in the next procedure.

3. Choose the OK button.

If you are adding a component or part of a component, a message asks you to insert the appropriate Windows NT disk. Insert the disk in the drive, and then choose the OK button.

If you are removing files, a message asks you to confirm the deletion. Choose the Yes button to delete the files.

Not all files for various components are required. For example, you may want to delete some screen saver files but keep others on your computer. You can add or remove just a portion of a Windows NT component.

► **To add or remove part of a Windows NT component**

1. In the Windows NT Setup dialog box for adding and removing components, choose the Files button next to the component you want to change.

The Customize dialog box lists that component's files. Files on the right are currently included on your computer and can be removed. Files on the left are not included and can be added.

2. In either list of files, select the names of the files you want to add or remove, and then choose the Add or Remove button. Or choose the Add All button to add all files.

Total Disk Space Required shows the total hard disk space needed for the files you want to set up on your computer. Check this number to be sure there is adequate space on your disk for the files you have selected.

3. Choose the OK button to return to the Windows NT Setup dialog box, and then choose the Continue button to add or remove the selected files.

Deleting User Profiles

A user profile defines the content and arrangement of Program Manager groups, screen colors, network and printer connections, mouse and keyboard settings, and other settings in the Windows NT environment. The user profile ensures that Windows NT will look and act in a familiar way while another user is working on your computer.

Each copy of a user profile remains on your computer until you delete it. You can remove these additional profiles from your computer with Windows NT Setup.

▶ **To delete a user profile from your computer**

1. From the Options menu in Windows NT Setup, choose Delete User Profiles.
2. In the User Profiles list, select the user profile you want to remove from your computer.
3. Choose the Delete button to remove the selected profile.
4. Repeat this process until you have removed all the profiles you want, and then choose the Close button.

Setup warns you if it cannot delete a profile because the profile is currently in use or because you are not logged on as a member of a group that can delete profiles. Otherwise, the selected profiles are deleted from your computer.

Repairing Your System

When you use NTFS, Windows NT logs all file transactions, replaces bad sectors automatically, and stores copies of key information for all files on the NTFS volume. Regardless of which file system you use, Windows NT automatically preserves the previous working startup configuration to ensure that you can always start Windows NT in spite of any changes to the system configuration that may occur during a work session. This previous working configuration is called the Last Known Good Configuration.

You can also restore corrupt or missing system files using the Emergency Repair disk you create during Setup.

Using the Last Known Good Configuration

If you encounter difficulty starting Windows NT, you may choose to start Windows NT using the Last Known Good Configuration.

▶ **To start Windows NT with the Last Known Good Configuration**

1. Start your computer and select Windows NT from the boot loader menu (if it does not start automatically).
2. After you choose Windows NT, or as soon as the screen clears and the words "OS Loader" appear on the screen, hold down the space bar.

Windows NT displays the Configuration Recovery menu, which asks you to choose between Current Startup Configuration and Last Known Good.

3. To restore the last working system configuration, choose Use Last Known Good Configuration (Configuration changes since your system was last successfully started are lost).

Using the Emergency Repair Disk

If your system files are corrupt and you are unable to recover the previous startup configuration (Last Known Good), you can use the Emergency Repair disk to restore your system to its initial setup state. To repair a Windows NT installation, you must use the Emergency Repair disk specifically created for that installation during Windows NT Setup.

If your system becomes corrupt but you did not create an Emergency Repair disk during installation, you must reinstall Windows NT from the original installation disks.

- ▶ **To restore Windows NT with an Emergency Repair disk on an x86-based computer**
 1. If you installed Windows NT using the original Setup floppy disks or CD-ROM, start Setup just as you did originally. (For example, insert Setup Disk #1 of the original Windows NT installation disks in drive A and start the computer.)

If you installed Windows NT using WINNT.EXE, insert the Setup disk created by WINNT.EXE in drive A and start the computer.
 2. In the first text-based Setup screen, type **r** to indicate that you want to repair your Windows NT files.
 3. Follow the instructions on the screen, inserting the Emergency Repair disk in drive A and providing any other Windows NT Setup disks as requested.
 4. When the final message appears, remove the Emergency Repair disk from drive A, and then press **CTRL+ALT+DEL** to restart your computer.

- ▶ **To restore Windows NT with an Emergency Repair disk on a RISC-based computer**
 1. Start the Windows NT Setup Program as instructed in your manufacturer-supplied documentation. (How you start Windows NT Setup depends on the type of RISC-based computer you are installing on.)
 2. In the first text-based Setup screen, type **r** to indicate that you want to repair your Windows NT files.
 3. Follow the instructions on the screen, inserting the Repair disk in drive A if Repair asks for it.
 4. When the final message appears, remove the Repair disk, and then press **ENTER** to restart your computer.

The Repair program automatically runs the **chkdsk** utility on the system partition and on the partition that contains the Windows NT system files. (**Chkdsk** searches for and attempts to fix hard disk errors.) Then, the Repair program optionally performs the following tasks:

- Checks the Windows NT directory tree against the log file on the Emergency Repair disk to ensure that all system files are present and none are corrupt. If any files are missing or corrupt, Repair restores the files from the appropriate Windows NT Setup disk or CD-ROM. On an x86-based computer, you are asked to insert the floppy disk or CD-ROM originally used for installation.

The Repair program will identify corrupt files on a system installed using WINNT.EXE, but it will not replace them. To repair a WINNT.EXE installation, you need to run the Repair program using the Windows NT Setup disk set or CD-ROM used to create the original network share.

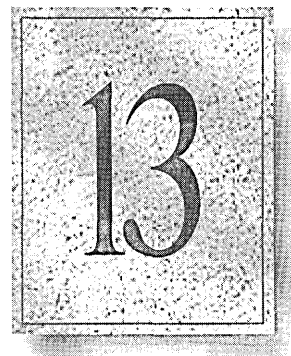
- Checks the Windows NT files on the system partition to ensure that all boot files are present and none are corrupt. If any files are missing or corrupt, Repair restores the files from the appropriate Windows NT Setup disk or CD-ROM. If you have accidentally reformatted or changed the system partition on your x86 computer so that Windows NT no longer starts, the Repair program restores your original boot configuration so that you can start Windows NT.

To repair the boot files on a WINNT.EXE installation, you may have to rerun the Repair program using the Setup disk set or CD-ROM used to create the original network share.

- Checks the configuration registry for errors. If any registry files are found to be corrupt, Repair gives you the option of restoring the original files from the Emergency Repair disk. Note that user accounts and file security added since you first ran Setup are lost, unless you have backed up the \WINNT\SYSTEM32\CONFIG directory.
- Removes security from Windows NT system files if Windows NT is installed on an NTFS partition. This option is useful if you have accidentally set permissions on a system file or directory so that Windows NT cannot access the system files it needs to start your system.

CHAPTER 13

User Manager



User Manager is a tool used to manage security for a Windows NT workstation.













This chapter presents a brief overview of User Manager, and then provides procedures for:

- Managing user accounts
- Managing groups
- Managing security policies

Overview

With User Manager you can create and manage user accounts, create and manage groups, and manage the workstation's account, user rights, and auditing policies.

The User Manager window contains two lists, one showing the user accounts of the workstation, and the other the groups of the workstation.

User Manager		
User Policies Options Help		
Username	Full Name	Description
 Administrator		Built-in account for administering the computer
 Billo	O'Daly, Bill	Accountant
 Dickm	Moseley, Dick	System Analyst
 Ernesta	Aydelotte, Ernest	Administrator
 Guest		Built-in account for guest access to the computer
 Jeant	Thompson, Jean	CAD/CAM Operator
Groups		Description
 Administrators	Members can fully administer the computer/domain	
 Backup Operators	Members can bypass file security to back up files	
 Guests	Users granted guest access to the computer/domain	
 Power Users	Members can share directories and printers	
 Replicator	Supports file replication in a domain	
 Users	Ordinary users	

Starting and Quitting User Manager

▶ To start User Manager

1. Open the Administrative Tools group.
2. Choose the User Manager icon.



▶ To start User Manager from the command line

1. From the File menu in Program Manager, choose Run.
2. In the Command Line box, type **musrmgr**.
3. Choose the OK button.

▶ To quit User Manager

- From the User menu, choose Exit.

When you quit User Manager, if the Options menu Save Settings On Exit command is enabled, the main window size and position and the setting of the Confirmation command are saved.

Who Can Use User Manager?

The actions a user can perform in User Manager are determined by the group memberships of the user account the user is logged on to.

If a user does not have sufficient authority to perform an action in User Manager, that command or option is usually shown as unavailable. In some cases, the command is displayed as available and the user is able to invoke it, but the command is not executed by the system.

Following are discussions of the User Manager abilities provided by some of the built-in Windows NT groups. If a user account belongs to more than one group, the user receives the greater of the possible abilities.

Administrators

A user who is logged on to a user account that is a member of the Administrators group can perform all User Manager functions.

Power Users

A user who is logged on to a user account that is a member of the Power Users group can use User Manager to create user accounts and groups, and to modify or delete those user accounts and groups. A Power User can also add and remove users from the Power Users, Users, and Guests groups.

Users

A user who is logged on to a user account that is a member of the Users group can use User Manager to create groups, can modify or delete those groups, and can give any user account membership in those groups.

Managing User Accounts

A user account consists of all the information that defines a user to Windows NT. This includes such things as the user name and password required for the user to log on, the groups in which the user account has membership, and the rights and permissions the user has for using the system and accessing its resources. It also includes an account description, the user's full name, and other account configuration information.

Some built-in user accounts are provided when Windows NT is installed. You can add additional user accounts, and you can modify existing user accounts.

Built-In User Accounts

The following built-in user accounts are provided when Windows NT is installed on a workstation.

Administrator

The built-in Administrator account is a member of the built-in Administrators group, and receives the rights and permissions granted to that group. It cannot be removed from that group.

The Administrator account is the account used by the person who manages the workstation's overall configuration. The Administrator has more control over the Windows NT workstation than does any other user. For example, the Administrator can create, modify, or delete user accounts and groups; manage security policies; create, administer, and connect to administrative shares; install and connect to printers; format or partition a fixed disk; back up and restore files; debug the system; take ownership of files and other objects; modify operating system software; install or update device drivers; unlock a workstation; and more.

The built-in Administrator account can be renamed, but it cannot be deleted.

During installation, Windows NT prompts the person doing the installation to enter a password for the built-in Administrator account. Guard this password carefully, not only for security purposes but also because if the password is forgotten or the person who knows the password becomes unavailable, the built-in Administrator account becomes unusable.

Following installation, it is a good idea to create an additional administrative account for each person who needs administrative-level abilities, and reserve the built-in Administrator account for emergency purposes. When each administrative user has a separate account, their actions can be audited. For information on creating user accounts, see "Adding User Accounts," later in this chapter.

Guest

The built-in Guest account is a member of the Guests group, and receives the rights and permissions granted to that group. For example, a user can log on to the Guest account, create files and delete those files, and read files that an administrator specifically permits Guests to read.

The Guest account is provided as a convenience so that occasional or one-time users of the computer can log on and be granted limited abilities. The Guest account is installed with a blank password.

The built-in Guest account can be renamed, but it cannot be deleted.

Initial User

The computer's primary user is expected to use the Initial User account. Because it is a member of the Administrators group, the Initial User account can fully administer the workstation.

The Initial User account is created if, during Windows NT installation, the computer is added to a workgroup or if it is not configured for network operation. The system prompts the installation user to provide a user name and password. An account is created under the provided user name, so there is never an account that is actually named "Initial User."

If the computer is added to a domain during Windows NT installation, the Initial User account is not created, since the user of the computer is expected to log on using an account from the domain.

Adding User Accounts

If more users need to log on than are supported by the built-in user accounts, additional user accounts can be added. A user account can be added either by creating a new user account, or by copying an existing user account.

When adding a user account you will be asked to provide a user name, which can be up to 20 characters. It must be unique, meaning it cannot be identical to any other user name or group name of the workstation. It can contain any uppercase or lowercase characters except the following:

" / \ [] : ; | = , + * ? < >

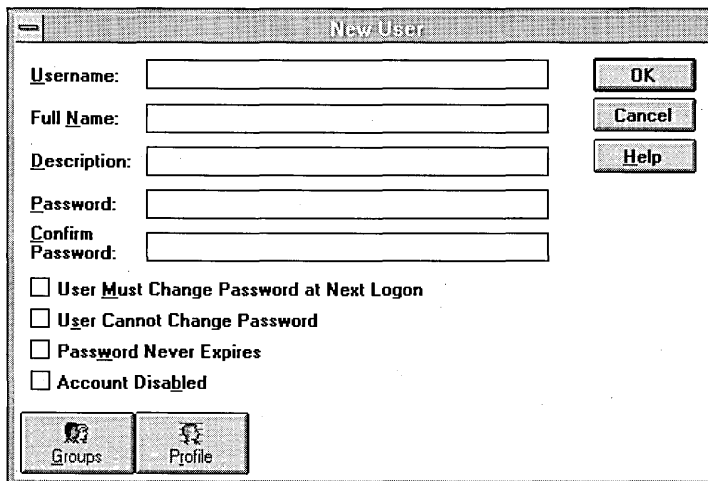
Be consistent in the way you enter user names, because when Windows NT presents lists of user accounts they are usually sorted by the user names. It is a good idea to establish a standard for user names, such as a shortened combination of the first and last names (Louisem for Louise G. Morgan).

You will also be asked to provide a full name, which is the complete name of the user. It is a good idea to establish a standard for full names, so that they always begin with either the last name (Morgan, Louise G.) or the first name (Louise G. Morgan).

Note When Windows NT displays a user name and when the distinction is necessary, Windows NT identifies the domain or workstation the user account is from by presenting the name in the form *DOMAINNAME\username* or *COMPUTERNAME\username*. This happens most often when a Windows NT workstation participates in a Windows NT Advanced Server domain and a user name from the domain is displayed. For example, a user account named Jeffho from a domain named Engineering would be displayed as ENGINEERING\Jeffho. In some situations the full name will be appended, for example, ENGINEERING\Jeffho (Howard, Jeff).

► **To create a new user account**

1. From the User menu, choose New User.



The screenshot shows the 'New User' dialog box. It has a title bar with the text 'New User' and a close button on the left. The dialog contains the following elements:

- Five text input fields: 'Username:', 'Full Name:', 'Description:', 'Password:', and 'Confirm Password:'.
- Three buttons on the right: 'OK', 'Cancel', and 'Help'.
- Four checkboxes below the input fields:
 - User **M**ust Change Password at Next Logon
 - User **C**annot Change Password
 - Password **N**ever Expires
 - Account **D**isabled
- Two buttons at the bottom: 'Groups' and 'Profile'.

2. In the Username box, type a user name of up to 20 characters.
3. In the Full Name box, type the user's complete name. This entry is optional, but recommended.
4. In the Description box, type a description of the user or the user account. This entry is optional, but recommended.
5. In both the Password and Confirm Password boxes, type a password of up to 14 characters.

Passwords are case-sensitive. Password attributes are controlled by the Account policy. For information see "Managing the Account Policy," later in this chapter.

6. Select or clear the following options.

Option	Description
User Must Change Password At Next Logon	Forces the user to change the password.
User Cannot Change Password	Prevents the user from changing the assigned password. Usually, this option is selected only for user accounts (such as the Guest account) used by more than one person.
Password Never Expires	Prevents the password from expiring, overriding the Maximum Password Age setting in the Account policy. Use this option for user accounts to which services (for example, the Replicator service) will be assigned using the Services option in Control Panel. Selection of this option overrides a selection of the User Must Change Password At Next Logon option.
Account Disabled	Prevents use of this account. For example, you might disable a new account to create an inactive template account that can be copied to create new accounts. Or, you might temporarily disable an account if it does not need to be used until a later date. For more information, see the discussion of disabled accounts under “Disabling or Deleting User Accounts,” later in this chapter.

7. To administer a user account property associated with one of the buttons at the bottom of the dialog box, choose a button and complete the dialog box that appears.

Choose	To
Groups	Specify the groups in which the user account will be a member.
Profile	Specify a logon script or home directory for the user account.

These buttons and their dialog boxes are described later in this chapter.

8. Choose the OK button.

In many situations it may be quicker and more convenient to copy an existing user account than it would be to create an entirely new one. The main benefit of copying a user account is that the group memberships are copied to the new account.

When a user account is copied, the description and group memberships are copied exactly. The profile information is copied, but it is copied conditionally as described in “Managing the User Environment Profile,” later in this chapter. The user name, full name, and password of the new account are blank, and must be entered. The User Must Change Password At Next Logon check box is always cleared, and the User Cannot Change Password and Password Never Expires check boxes are copied.

The Account Disabled check box is always cleared so that a new account is always active, regardless of the setting in the original user account. This is done so that you can create a new user account, configure it as needed, disable it, and then use it as a template. To rapidly create several similar accounts, you can repeatedly copy the disabled template account.

User Manager does not copy any rights and permissions that have been granted to a user account. However, it is recommended that these be provided only to groups, and not be granted directly to user accounts. Because the group memberships of the original account are copied to the new user account, the new user account will usually have the same abilities and access to resources as the original account.

► **To make a copy of an existing user account**

1. Select a user account from the list in the User Manager window, and then choose Copy from the User menu.
2. In the Copy Of dialog box, configure the user account as described in the previous procedure for creating a new user account.
3. When the user account is configured, choose the OK button.

Managing User Account Properties

The procedure you use to modify user accounts differs slightly, depending on whether you are modifying one user account or multiple user accounts.

When you change the properties of an existing user account, the changes take effect the next time that user logs on.

► **To modify one user account**

1. In the User Manager, double-click a user account. Or select a user account, and then choose Properties from the User menu.

The screenshot shows a 'User Properties' dialog box with the following content:

- Username: **Louisem**
- Full Name: **Morgan, Louise**
- Description: **Administrative Assistant**
- Password: *********
- Confirm Password: *********
- User Must Change Password at Next Logon
- User Cannot Change Password
- Password Never Expires
- Account Disabled
- Buttons: **OK**, **Cancel**, **Help**, **Groups**, **Profile**

For security, the password is represented by a row of asterisks, with the number of asterisks different from the actual number of characters in the password.

2. To change the Full Name or the Description, type new text in those boxes.
3. To change the password, type a password of up to 14 characters in both the Password and Confirm Password boxes.

Remember to provide the new password to the user of this account.

4. To change the settings of the Account Disabled option or the three password options, select or clear those check boxes.
5. To administer a property associated with one of the buttons at the bottom of the User Properties dialog box, choose a button and complete the dialog box that appears.

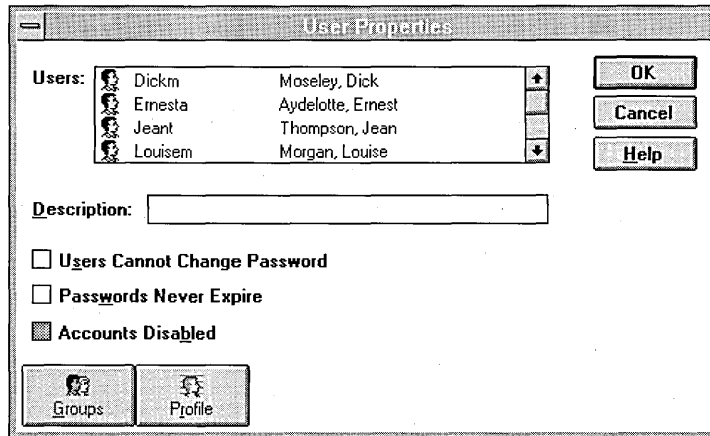
These buttons and their dialog boxes are described later in this chapter.

6. Choose the OK button.

The advantage of modifying multiple user accounts is that you can make the same change simultaneously to several accounts. For example, you might select several accounts and add them to a new local group.

► **To modify two or more user accounts in the same way**

1. In the User Manager window, select two or more user accounts.
2. From the User menu, choose Properties.



If all the selected user accounts have an identical description, that text appears in the Description box. If one or more of the accounts have a different description, the Description box is empty.

If all the selected user accounts have the same setting for the Accounts Disabled option or one of the password options, the setting for that check box is displayed. If one or more of the accounts have a different setting for one of the options, that check box is indeterminate (filled with gray).

3. To change the Description for all the selected user accounts, type new text in that box.
4. To change the settings of the Account Disabled and the two password options for all the selected user accounts, select or clear those check boxes.
5. To administer a property associated with one of the buttons at the bottom of the User Properties dialog box, choose a button and complete the dialog box that appears.

These buttons and their dialog boxes are described later in this chapter.

6. Choose the OK button.

Any changes you made are applied to all the selected user accounts.

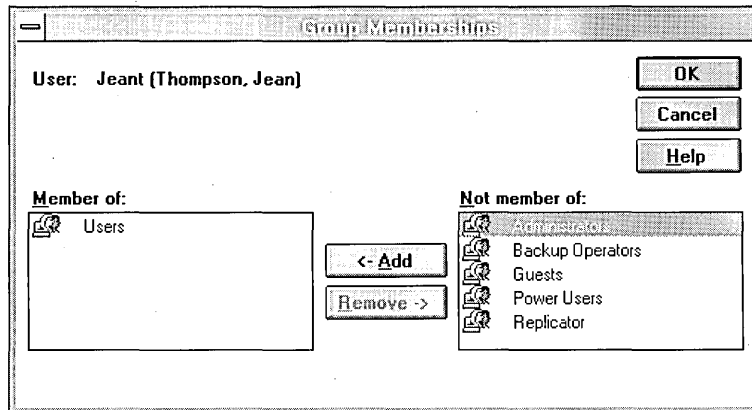
Managing Group Memberships

Use the Group Memberships dialog box to manage, for the selected user accounts, membership in the groups of this workstation.

The procedure you use to manage group memberships depends on whether you are administering one user account or multiple user accounts.

► **To manage group memberships when only one user account is selected**

1. Choose the Groups button from the New User, Copy Of, or User Properties dialog box.



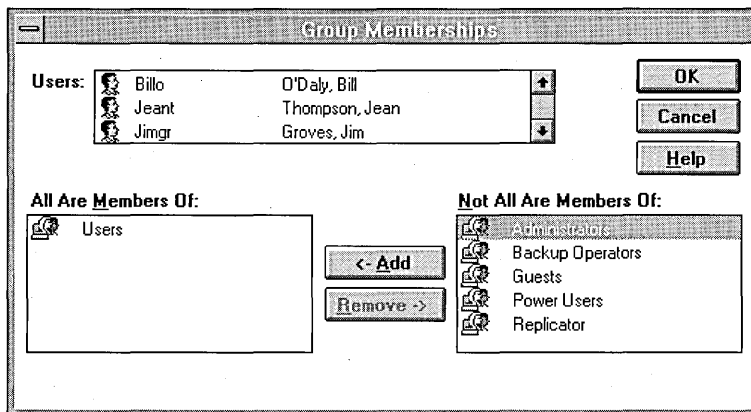
In the Group Memberships dialog box, the Member Of box lists the groups this user account belongs to, and the Not Member Of box lists the groups this user account does not belong to.

2. To add the user account to one or more groups, select one or more groups in the Not Member Of box, and then choose the Add button. Or, select one or more groups in the Not Member Of box, and then drag one of the selected group icons into the Member Of box.
3. To remove the user account from one or more groups, select one or more groups in the Member Of box, and then choose the Remove button. Or, select one or more groups in the Member Of box, and then drag one of the selected group icons into the Not Member Of box.
4. Choose the OK button.

When two or more user accounts are selected, you can use the Group Memberships dialog box to add all the selected user accounts to one or more groups of this workstation, or to remove all the selected user accounts from one or more groups of this workstation.

► **To manage common group memberships for two or more user accounts**

1. In the User Manager window, select two or more user accounts, and then choose Properties from the User menu.
2. In the User Properties dialog box, choose the Groups button.



In the Group Memberships dialog box, the All Are Members Of box lists the groups that every one of the selected user accounts belong to. If one or more of the selected user accounts do not belong to a particular group, that group is listed in the Not All Are Members Of box.

3. To add the selected user accounts to one or more groups, select one or more groups in the Not All Are Members Of box, and then choose the Add button. Or, select one or more groups in the Not All Are Members Of box, and then drag one of the selected group icons into the All Are Members Of box.
4. To remove the selected user accounts from one or more groups, select one or more groups in the All Are Members Of box, and then choose the Remove button. Or, select one or more groups in the All Are Members Of box, and then drag one of the selected group icons into the Not All Are Members Of box.
5. Choose the OK button.

When multiple user accounts are selected and the Group Memberships dialog box is open, the groups in the All Are Members Of box always have all the selected user accounts as members. But the groups in the Not All Are Members Of box may have none or some of the selected user accounts as members.

Because of this, if you need to ensure that a group has none of the selected user accounts as members, perform the following procedure.

- ▷ **To ensure that a group has none of the selected user accounts as members**
1. In the Group Memberships dialog box, move the group from the Not All Are Members Of box into the All Are Members Of box.
 2. Choose the OK button to save the change.
 3. In the User Properties dialog box, choose Groups.
 4. In the Group Memberships dialog box, move the group from the All Are Members Of box back into the Not All Are Members Of box.
 5. Choose the OK button.

Managing Profiles

Use the User Environment Profile dialog box to define the logon script name and home directory for the selected user accounts. All entries in this dialog box are optional.

Logon Script Name

Logon scripts are optional. If a logon script is assigned to a user account, it runs automatically every time the user logs on. It can be used to configure a user's working environment at every logon, and it allows an administrator to affect a user's environment without managing all aspects of it. A logon script can be assigned to one or more user accounts.

A logon script is typically a batch file (any text file with a .BAT or .CMD file name extension), but any executable program (.EXE file name extension) can also be used.

In the User Environment Profile dialog box, logon scripts are assigned to user accounts by typing the file name (for example, **clerks.bat**) in the Logon Script Name box. At logon, the system finds the logon script by looking for that file following the workstation's logon script path. If a relative path is provided in front of the file name (for example, ADMIN\CRISTALW.BAT), the system looks for the logon script in that subdirectory of the logon script path.

The logon script path for a Windows NT workstation is C:\WINNT\SYSTEM32\REPL\IMPORT\SCRIPTS. If Windows NT is installed in a location other than C:\WINNT, the system adjusts the logon script path accordingly.

The entry in the Logon Script Name box only specifies the file name (and optionally the relative path) and does not create the actual logon script. You will need to create a logon script of the specified name, and place it in the appropriate directory.

Home Directory

A home directory is a directory that is accessible to the user and contains files and programs for that user. It becomes that user's default directory for the File Open and Save As dialog boxes, for the command prompt, and for all applications that do not have a working directory defined. A home directory can be assigned to an individual user or can be shared by many users.

Home directories make it easier for an administrator to back up user files and delete user accounts, because they collect many or all of a user's files in one location.

The default home directory is `\USERS\DEFAULT`, on the local drive where Windows NT is installed. With User Manager, you can change this to another local directory or to a shared network directory. When administering the user accounts of a Windows NT workstation, you will usually assign local directories.

In most cases, User Manager automatically creates the home directory you specify in the User Environment Profile dialog box. If it can't, a message appears instructing you to manually create the directory.

In order for users to access their home directories, appropriate permissions must be granted. User Manager automatically applies those permissions if it creates the home directory. When one user account is being administered and a new home directory is created, that user is granted Full Control. When two or more user accounts are being administered and a new home directory is created, Full Control is granted to Everyone.

User Manager does not automatically apply permissions if the directory already exists. In this case, you must apply the permissions using File Manager.

Using %USERNAME% in the Home Directory Path

When entering a path for a home directory, `%USERNAME%` can be substituted for the last subdirectory in the path, and the system will later substitute the user name of the user account. This is useful when multiple user accounts are selected.

For example, say eight user accounts are selected. Under Home Directory you might select the Local Path box and type `c:\users\%username%`. When you choose the OK button and the User Environment Profile is saved, for each user account the actual user name will be substituted for the `%USERNAME%` entry.

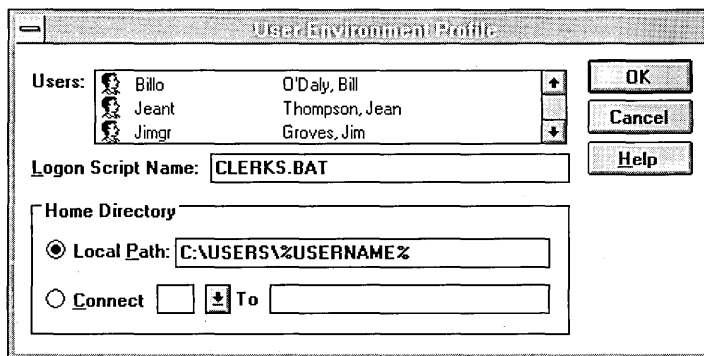
Note When assigning home directories that are on a FAT volume, if the user name of at least one of the selected user accounts is longer than 8 characters (or if it is longer than 8.3 characters when the user name contains a period), do not use the %USERNAME% wild card. User names can contain up to 20 characters, but FAT volumes restrict directory and file names to the 8.3 length convention (up to 8 characters, optionally followed by a period and up to 3 characters).

The assignment of home directories on NTFS volumes is not affected by this limit, so for NTFS volumes the %USERNAME% wild card can always be used regardless of the length of any user name.

Managing the User Environment Profile

► To configure the user environment profile

1. Choose the Profile button from the New User, Copy Of, or User Properties dialog box.



2. Optionally, to assign a logon script, type the filename in the Logon Script Name box. For example, type **clerks.bat**.
If the logon script is stored in a subdirectory of the logon script path, precede the file name with that relative path. For example, type **admins\ernesta.cmd**.
3. Optionally, to specify a local directory as a home directory, select the Local Path box and type the local path (including the drive letter). For example, you might type **c:\users\%username%**.
A local directory is recommended.
4. Optionally, to specify a network directory as the home directory, select the Connect option, specify a drive letter, and then select the To box and type a network path. For example, you might specify drive H and type **\\airedale\users\jeffho**.

Note If no home directory is specified, the system will use the default local home directory (\USERS\DEFAULT on the drive where Windows NT is installed) for each of the user accounts being administered.

5. Choose the OK button.

How the User Environment Profile Is Copied

When a user account is copied, the logon script name is copied exactly.

The home directory for the new account is copied based on this rule: if in the original account the last subdirectory in the home directory path is identical to the user name, the new account substitutes the new user name there. If not, the entry is copied exactly. Here are two examples:

- If the original account has a user name of CARYR and a home directory of C:\USERS\CARYR, then a new account with a user name of BILLO is given a home directory of C:\USERS\BILLO.
- If the original account has a user name of BLAKER and a home directory of \\HOUND\USERS\HOME, then a new account with a user name of JIMGR is given the same home directory: \\HOUND\USERS\HOME.

Disabling or Deleting User Accounts

A user's ability to log on can be rescinded by either disabling or deleting the user account. A disabled user account still exists, but the user is not permitted to log on. A disabled account continues to appear in the user account list of the User Manager window. A disabled account can be restored to enabled status at any time.

Be certain you want to delete a user account before you do so, because a deleted user account cannot be recovered. Internally, Windows NT knows every user account by its security identifier (SID), a unique number that identifies it. Every group and user account ever created on the workstation has a SID. Internal processes in Windows NT refer to a user account's SID rather than its user name. So if you delete a user account and then create another user account with the same user name, the new user account will not have any of the rights or permissions previously granted to the old user account because the user accounts have different SID numbers.

Because of this it is a good idea to first disable a user account, and then periodically delete the workstation's disabled accounts. This is a low-risk way to remove users from the workstation.

Another reason to disable an account occurs when you want to create an inactive template account that can be copied to create new accounts. You can create a new user account, configure it as needed, disable it, and then use it as a template. As

described earlier in “Adding User Accounts,” you can quickly make numerous enabled copies of a disabled template account.

▶ **To disable one or more user accounts**

1. In the User Manager window, select one or more user accounts.
2. From the User menu, choose Properties.
3. Select the Account Disabled check box.
4. Choose the OK button.

Logons are no longer allowed for those user accounts.

▶ **To enable one or more disabled accounts**

1. In the User Manager window, select one or more user accounts.
2. From the User menu, choose Properties.
3. Clear the Account Disabled check box.
4. Choose the OK button.

Logons are now allowed for those user accounts.

▶ **To delete one or more user accounts**

1. In the User Manager window, select one or more user accounts.
The built-in Administrator and Guest accounts cannot be deleted.
2. From the User menu, choose Delete.
3. If a confirmation message appears, choose the OK button.
4. When the delete message appears, choose the Yes button. If multiple user accounts are selected, choose the Yes To All button.

Renaming User Accounts

Any user account can be renamed, including the built-in user accounts provided with the system. Because it retains its security identifier (SID), a renamed user account retains all its other properties — for example, its description, password, group memberships, user environment profile, and any assigned permissions and rights. The Rename command is only available when one user account is selected.

▶ **To rename a user account**

1. In the User Manager window, select one user account.
2. From the User menu, choose Rename.
3. In the Rename dialog box, type a user name of up to 20 characters in the Change To box.
4. Choose the OK button.

Managing Groups

Groups are collections of user accounts. Giving a user account membership in a group gives that user all the rights and permissions that have been granted to the group. This provides an easy way to grant common capabilities to sets of users.

The built-in groups provided with Windows NT have been granted useful collections of rights and built-in abilities. In most cases, one of these built-in groups will provide all the capabilities needed by a particular user. For example, logging on to a user account that belongs to the built-in Administrators group gives you administrative capabilities over the workstation. To give a user account a needed set of capabilities, assign it to the appropriate built-in group.

You can also use groups to easily manage access to resources such as directories, files, or printers. You assign resource permissions to a group, and then add user accounts to that group. If you need to change the permissions provided to that set of users, you simply add or remove the permissions assigned to the group, rather than to each of the user accounts. Or, if you need to give a new user access to a specific set of resources (for example, a number of directories and files), all you have to do is add the user's account to the appropriate group, rather than changing the permissions on each individual resource. Maintaining permissions for a group is simpler than maintaining permissions for many user accounts.

In most situations the built-in groups provide all the capabilities needed by users of a workstation. However, if necessary, User Manager can be used to create and define additional groups in order to control access to specific sets of resources by specific sets of users.



All the groups that can be maintained on a Windows NT workstation are of the same type. They are called local groups, and are represented by the local group icon. Such a group is called local because it can only be granted permissions and rights for its own workstation. However, it can contain user accounts from the workstation, and if the workstation participates in a domain, it can contain user accounts and global groups from its domain and from trusted domains. Local groups provide a way for you to create handy sets of users from both inside and outside the workstation, to be used only at the workstation.



If a Windows NT workstation participates in a domain there is another type of group that can be given access to the workstation. This is a global group, and it is represented by the global group icon. Such a group is called global because it can be used in many places: its own domain, servers and workstations of the domain, and trusting domains. This means that if a workstation participates in a domain, the global groups of that domain and of trusted domains can be granted permissions and rights for the workstation and membership in local groups of the workstation. A global group can contain only user accounts from its own domain.

When adding a group you will be asked to provide a group name. It must be unique, meaning it cannot be identical to any other group name or user name of the workstation. It can contain any uppercase or lowercase characters except the following:

" / \ [] : ; | = , + * ? < >

Note When Windows NT displays a group name and when the distinction is necessary, Windows NT identifies the domain or workstation the group is from by presenting the name in the form *DOMAINNAME*groupname or *COMPUTERNAME*groupname. This happens most often when a Windows NT workstation participates in a Windows NT Advanced Server domain and a domain group name is displayed. For example, a group named Managers from a domain named Engineering would be displayed as ENGINEERING\Managers.

Built-In Groups

The actions a user can perform depend on the group memberships of his or her user account. Several built-in groups are provided with Windows NT, and by default each of these groups is granted a particular set of user rights.

In addition to rights, some of the built-in local groups are granted built-in abilities. Although rights can be directly granted to and removed from groups and user accounts, these built-in abilities are not directly administrable. The only way for you to provide these built-in abilities to a user is to make that user a member of the appropriate local group.

The rights and built-in abilities granted to the built-in groups are shown in the following table. In most situations these built-in groups provide all the capabilities needed by the users of a workstation.

	Administrators	Power Users	Users	Guests	Everyone	Backup Operators
<ul style="list-style-type: none"> ● Local group has right or ability ○ Local group does not have right or ability 						
Rights:						
Log on locally	●	●	●	●	●	●
Access this computer from network	●	●	○	○	●	○
Take ownership of files	●	○	○	○	○	○
Manage auditing and security log	●	○	○	○	○	○
Change the system time	●	●	○	○	○	○
Shut down the system	●	●	●	○	●	●
Force shutdown from a remote system	●	●	○	○	○	○
Back up files and directories	●	○	○	○	○	●
Restore files and directories	●	○	○	○	○	●
Built-in abilities:						
Create and manage user accounts	●	● ¹	○	○	○	○
Create and manage local groups	●	● ²	● ³	○	○	○
Assign user rights	●	○	○	○	○	○
Lock the workstation	●	●	○	○	●	○
Override the lock of the workstation	●	○	○	○	○	○
Format workstation's hard disk	●	○	○	○	○	○
Create common groups	●	●	○	○	○	○
Keep local profile	●	●	○	○	○	●
Share and stop sharing directories	●	●	○	○	○	○
Share and stop sharing printers	●	●	○	○	○	○

¹ A Power User can create user accounts, but can modify and delete only those accounts he or she creates.

² A Power User can create local groups. A Power User can also add and remove users from local groups he or she has created, as well as the Power Users, Users, and Guests local groups, but cannot modify the Administrators or Backup Operators local groups.

³ Users can create local groups, but a User can modify only the local groups that he or she created.

To provide these rights and built-in abilities to a user, add the user's account to the appropriate group. Following are brief discussions of each built-in group.

Administrators

The Administrators group is the most powerful group on a workstation. Administrators have more control over the Windows NT workstation than do any other users, and they manage the workstation's overall configuration. The built-in Administrator user account is a member of the Administrators group, as is the Initial User account (if one was created during installation).

If the Windows NT workstation participates in a domain, the Domain Admins group is by default a member of the workstation's Administrators group, and members of that domain group can administer the workstation. (However, this can be prevented by removing the Domain Admins global group from the workstation's Administrators group.)

Note that administrators do not automatically have access to every file on the workstation. If a file's permissions do not grant access, the administrator cannot access the file. Every file on an NTFS volume has an owner, who can set permissions on the file. If needed, an administrator can take ownership of a file and thus have access to it. But if the administrator does so, this event is recorded in the security log (if auditing of files is turned on), and the administrator cannot give ownership back to the original owner. For more information, see Chapter 4, "File Manager."

Power Users

The Power Users group provides limited administrative abilities to its member user accounts. A Power User can share directories on the network; set the computer's internal clock; install, share, and manage printers; and create common program groups.

A Power User can use User Manager to create user accounts and groups, and to modify or delete those user accounts and groups. A Power User can also add and remove users from the Power Users, Users, and Guests group.

Users

Membership in the Users group provides the abilities a user needs to perform normal tasks. Except for the built-in Administrator, Guest, and Initial User accounts, all workstation user accounts belong to the Users group. When a new user account is added, it is automatically a member of this group.

If a Windows NT workstation participates in a domain, the Domain Users group is by default a member of the workstation's Users group, and domain users have normal user access to and abilities on the workstation. (However, this can be prevented by removing the Domain Users global group from the workstation's Users group.)

Guests

The Guests group allows occasional or one-time users to log on and be granted limited abilities. The built-in Guest user account is a member of the Guests group.

Resource permissions granted to the Users group can be withheld from the Guests group, effectively restricting the abilities of Guests.

Backup Operators

Members of the Backup Operators group can back up directories and files, and restore directories and files.

Replicator

The Replicator group supports directory replication functions. The only member of the Replicator group should be a domain user account used to log on the workstation's Replicator Service. Do not add the accounts of actual users to this group.

Special Groups

In addition to the built-in groups mentioned above, some other groups are created by the system and are used for special purposes. These groups are not listed in the User Manager window.

However, when you administer a workstation and Windows NT presents lists of groups, these special groups sometimes appear in the list. For example, they can appear when assigning permissions to directories, files, shared network directories, or printers.

Group	Refers to
Everyone	Anyone using the computer. This includes all local and remote users (that is, the INTERACTIVE and NETWORK groups combined). Members can access the network, connect to the workstation's shared network directories, and print to the workstation's printers.
INTERACTIVE	Anyone using the computer locally.
NETWORK	All users connected over the network to the computer.
SYSTEM	The operating system.
CREATOR OWNER	Transfer of permissions to creators of subdirectories, files, and print jobs. For a directory, if permissions are granted to the CREATOR OWNER group, the creator of a subdirectory or file will be granted those permissions for that subdirectory or file. For a printer, if permissions are granted to the CREATOR OWNER group, the creator of a print job will be granted those permissions for that print job.

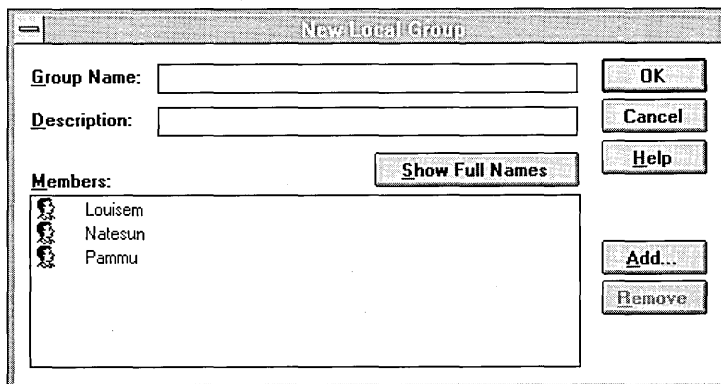
Adding Local Groups

A local group can be added either by creating a completely new local group, or by copying an existing local group.

► To create a new local group

1. In the User Manager window either select the user accounts you want to be the initial members of the new group, or select any group to ensure no user accounts are initially selected.
2. From the User menu, choose New Local Group.

If you selected one or more user accounts in step 1, the selected users are the initial members of the new group.



3. To view the full names of the listed user accounts, choose the Show Full Names button.

This can be a lengthy operation when the workstation participates in a domain, and the local group contains numerous users from other domains.

4. In the Group Name box, type a name for the new group.
5. In the Description box, type a description.
6. To add members to the local group, choose the Add button and complete the Add Users And Groups dialog box that appears.

You can add user accounts from the local workstation. If the workstation participates in a domain, you can also add user accounts and global groups from that domain and from trusted domains. For information on the Add Users And Groups dialog box, see Chapter 4, "File Manager."

7. To remove members from the local group, select one or more names from the Members box, and then choose the Remove button.
8. Choose the OK button.

The main advantage of copying a group is that the new group will have the same members as the original group. However, the permissions, rights, and built-in abilities of the original group are not copied to the new group.

▷ **To make a copy of an existing local group**

1. In the User Manager window, select one local group.
2. From the User menu, choose Copy.
3. Define the new group as described in the previous procedure for creating a new local group.

You must provide a group name. You can accept or change the description and group members, which were copied from the original account.

4. Choose the OK button.

After a local group has been created, it can be granted permissions at its workstation. These permissions might allow, for example, access to files (as set in File Manager) or printers (as set in Print Manager).

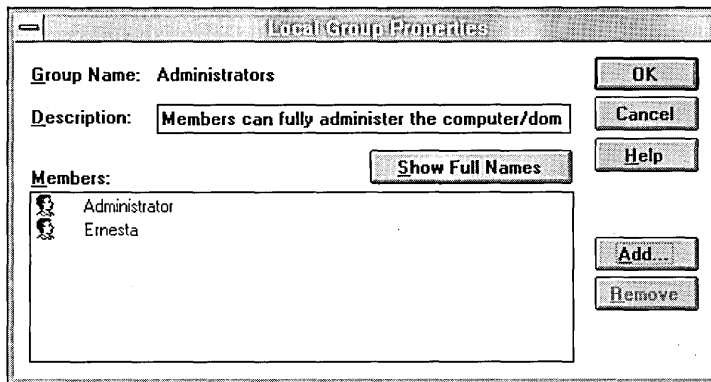
Managing Local Group Properties

The description and the membership of an existing local group can be modified.

► **To modify a local group**

1. In the User Manager window, double-click one local group. Or select the local group, and then choose Properties from the User menu.

In the Local Group Properties dialog box, the group name is displayed but cannot be changed.



2. To view the full names of the listed user accounts, choose the Show Full Names button.

This can be a lengthy operation when the workstation participates in a domain, and the local group contains numerous users from other domains.

3. To change the description, type new text in the Description box.
4. To add members to the local group, choose the Add button and complete the Add Users And Groups dialog box that appears.

You can add user accounts from the local workstation. If the workstation participates in a domain, you can also add user accounts and global groups from that domain and from trusted domains. For information on the Add Users And Groups dialog box, see Chapter 4, "File Manager."

5. To remove members from the local group, select one or more names from the Members box, and then choose the Remove button.
6. Choose the OK button.

Deleting Groups

Groups that have been created using User Manager can be deleted, but the built-in groups provided with Windows NT cannot.

Be certain you want to delete a group before you do so, because a deleted group cannot be recovered. Internally, Windows NT knows every group by its security identifier (SID), a unique number that identifies it. Every group and user account ever created on the workstation has a SID. Internal processes in Windows NT refer to a group's SID rather than its group name. So if you delete a group and then create another group with the same group name, the new group will not have any of the rights or permissions granted the old group, because the groups have different SID numbers.

Deleting a local group removes only that group: it does not delete the user accounts or global groups that are members of the deleted local group.

▶ **To delete a local group**

1. Select the local group from the group list in the User Manager window.
2. From the User menu, choose Delete.
3. If a confirmation message appears, choose the OK button.
4. When the delete message appears, choose the Yes button.

Managing the Security Policies

The following security policies can be managed with User Manager:

- The Account policy, which controls the way passwords must be used by all user accounts
- The User Rights policy, which controls the rights assigned to groups and user accounts
- The Audit policy, which defines the security events that will be audited

Managing the Account Policy

The Account policy controls the way passwords must be used by all user accounts. Changes to this policy affect each user at the next logon.

► To manage the Account policy

1. From the Policy menu, choose Account.

Computer: AIREDALE

Maximum Password Age
 Password Never Expires
 Expires In 42 Days

Minimum Password Age
 Allow Changes Immediately
 Allow Changes In 7 Days

Minimum Password Length
 Permit Blank Password
 At Least 5 Characters

Password Uniqueness
 Do Not Keep Password History
 Remember 4 Passwords

OK
 Cancel
 Help

2. In the Account Policy dialog box, define the four password parameters.

Parameter	Meaning
Maximum Password Age	The period of time a password can be used before the system requires the user to change it.
Minimum Password Age	The period of time a password must be used before the user is allowed to change it. If you select the Allow Changes Immediately option here, then under Password Uniqueness you must select the Do Not Keep Password History option.
Minimum Password Length	The fewest characters a password can contain.
Password Uniqueness	The number of new passwords that must be used by a user account before an old password can be reused. If you enter a uniqueness value here (for example, Remember 4 Passwords), then under Minimum Password Age you must specify an age value (for example, Allow Changes In 7 Days).

3. Choose the OK button.

Managing the User Rights Policy

A *right* authorizes a user to perform certain actions on the system. A user who logs on to an account to which the appropriate rights have been granted can carry out the corresponding actions. When a user does not have appropriate rights, Windows NT blocks attempts to carry out those actions.

Rights apply to the system as a whole, and are different from permissions, which apply to specific objects. A *permission* is a rule associated with an object (usually a directory, file, or printer) to regulate which users can have access to the object and in what manner. Most often the creator or owner of the object sets the permissions for the object.

Rights are not associated with a specific object. Instead, a right applies to the entire system, and may override permissions set on an object. For example, a user logged on as a member of the Backup Operators group has the right to perform backup tasks. Doing so requires the ability to read all files on the system, even files on which their owners have set permissions that explicitly deny access to all users, including members of the Backup Operators group. A right, in this case the right to perform backup, takes precedence over all file and directory permissions.

Each of the built-in groups conveys certain rights and built-in abilities to the user accounts that belong to it. For information on the capabilities of these groups see "Built-In Groups," earlier in this chapter.

The following table describes the user rights managed with the User Rights policy.

User right	Allows a user to
Access this computer from network	Connect over the network to the computer.
Back up files and directories	Back up files and directories. This right supersedes files and directory permissions.
Change the system time	Set the time for the internal clock of the computer.
Force shutdown from a remote system	This right is not currently implemented. It is reserved for future use.
Log on locally	Log on at the computer itself, from the computer's keyboard.
Manage auditing and security log	Specify what types of events and resource access are to be audited. View and clear the security log.
Restore files and directories	Restore files and directories. This right supersedes files and directory permissions.
Shut down the system	Shut down Windows NT.
Take ownership of files or other objects	Take ownership of files, directories, and other objects on the computer.

In addition to the user rights listed above, if the Show Advanced User Rights option is selected, some additional rights can be managed with the User Rights policy. Many of these advanced rights are useful only to programmers writing applications to run on Windows NT, and usually will not be granted to a group or user. For more information on their use, see the Windows NT programming documentation. These programming rights are shown in the following list.

- Act as part of the operating system
- Bypass traverse checking
- Create a pagefile
- Create a token object
- Create permanent shared objects
- Debug programs
- Generate security audits
- Increase quotas
- Increase scheduling priority
- Load and unload device drivers
- Lock pages in memory
- Log on as a batch job
- Log on as a service
- Modify firmware environment values
- Profile single process
- Profile system performance
- Receive unsolicited device input
- Replace a process level token

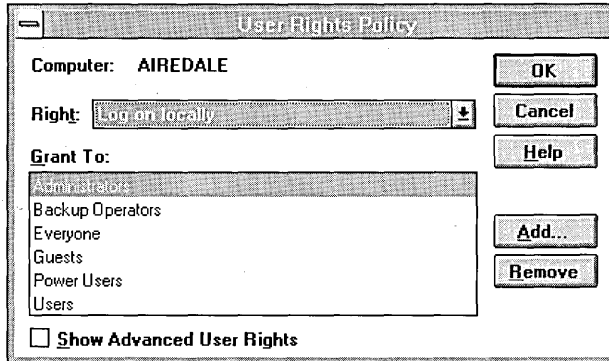
A few of the advanced rights may be of interest to workstation administrators.

Advanced user right	Allows
Bypass traverse checking	A user to change directories and travel through a directory tree, even if the user has no permissions for the traversed directories.
Log on as a service	A process to register with the system as a service.

In most situations the easiest way to provide rights to a user is to add that user's account to one of the built-in groups that already possesses the needed rights, rather than by administering the User Rights policy. However, if a special situation occurs, it is possible to assign a right to or remove it from a user or a group by employing the following procedure.

► **To manage the User Rights policy**

1. From the Policy menu, choose User Rights.



2. Select a user right from those listed in the Right box.
When you select a right, the Grant To box lists the groups and user accounts that are assigned that right.
3. To grant the selected right to additional groups or user accounts, choose the Add button and complete the Add Users And Groups dialog box that appears.
Local groups and user accounts from this workstation can be granted rights. If this workstation participates in a domain, user accounts and global groups from the local domain and trusted domains can also be granted rights. For information on the Add Users And Groups dialog box, see Chapter 4, "File Manager."
4. To remove a group or user account from the list of those granted this right, select a name in the Grant To box, and then choose the Remove button.
5. Repeat steps 2 through 4 as necessary.
6. To administer the advanced user rights, select the Show Advanced User Rights check box, and then follow steps 2 through 4.
7. Choose the OK button.

Managing the Audit Policy

Through auditing, you can track selected activities of users. The Audit policy determines the amount and type of security logging Windows NT will perform.

Windows NT can record a range of event types, from a system-wide event such as a user logging on, to an attempt by a particular user to read a specific file. Both successful and unsuccessful attempts to perform an action can be recorded.

Use the Audit policy to select the types of security events that will be audited. When such an event occurs, an entry is added to the workstation's security log. The security log can be viewed with Event Viewer.

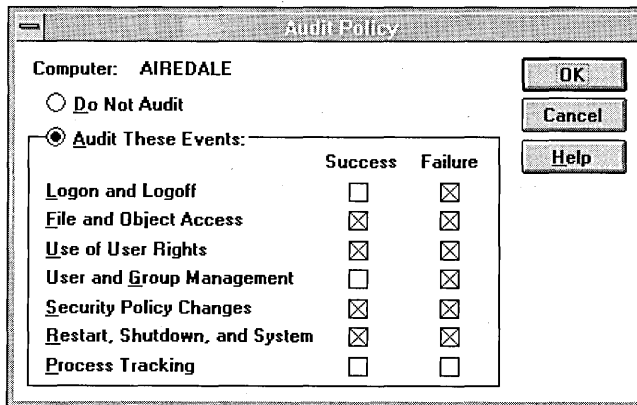
The following table describes the types of events that can be audited.

Type of event	Description
Logon and Logoff	A user logged on or off the workstation, or made a network connection.
File and Object Access	A user accessed a directory or a file that is set for auditing in File Manager, or a user sent a print job to a printer that is set for auditing in Print Manager.
Use of User Rights	A user used a user right (except those rights related to logon and logoff).
User and Group Management	A user account or group was created, changed, or deleted. A user account was renamed, disabled, or enabled; or a password was set or changed.
Security Policy Changes	A change was made to the User Rights or Audit policies.
Restart, Shutdown, and System	A user restarted or shut down the computer, or an event has occurred that affects system security or the security log.
Process Tracking	These events provided detailed tracking information for things like program activation, some forms of handle duplication, indirect object accesses, and process exit.

Because the security log is limited in size, carefully choose the events to be audited, and consider the amount of disk space you are willing to devote to the security log. The maximum size of the security log is defined in Event Viewer.

► **To manage the Audit policy**

1. From the Policy menu, choose Audit.



2. Select one of the two main auditing options.

If you select

Then

Do Not Audit

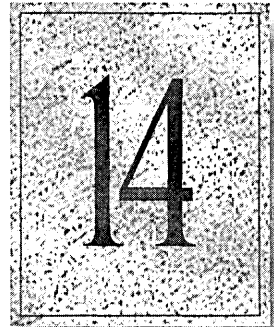
Security events are not recorded in the security log

Audit These Events

Selected events are recorded in the security log

3. If you select Audit These Events, specify the events to be audited by selecting or clearing the Success and Failure check box for each type of event.
4. Choose the OK button.

Backup



Backup is a graphical tool for protecting data from accidental loss or hardware and media failures. It makes it easy for you to use a tape drive to back up and restore your important files on either the NTFS, FAT, or HPFS file system. It also makes it easier to archive that data for legal or historical purposes and remove older, unused files, safe in the knowledge that you can recover them if necessary.

This chapter provides information on how to use the graphical commands for selective backups and restores or to create your own batch file to automate the process, and includes the following main topics:

- Backing up disk files to tape
- Restoring tape files to disk
- Maintaining tapes

Overview

In Microsoft Windows NT, doing simple backups and restores on your local tape drive has been made easy with the Backup program. This program is located in the Administrative Tools group in Program Manager.

The following list provides an overview of some of the things you can do with this graphical tool to protect your data:

- Back up and restore both local and remote files on an NTFS, FAT, or HPFS file system from your own computer using an attached tape drive.
- Select files for backing up or restoring by volume, directory, or individual filename and view detailed file information, such as size or modification date.
- Select an optional verification pass to ensure reliable backups or restorations.
- Perform any of the following common backup operations: Normal, Copy, Incremental, Differential, and Daily.
- Place multiple backup sets on a tape, and either append new backup sets or replace the old ones with new ones.
- Span multiple tapes with both backup sets and files, since there is no file-size restriction.
- Create a batch file to automate repeated backups of drives.
- Review a full catalog of backup sets and individual file and directory information so you can select files to be restored.
- Control a restore's destination drive and directory.
- Save log information on tape operations to a file. Also view tape-operation information in the Windows NT Event Viewer.

Starting and Quitting Backup

Double-click the Backup icon in the Administrative Tools group to display the main Backup window with the Drives window open and a Tapes icon. (You can also type **ntbackup** or **start ntbackup** at the command prompt.) The menu bar is supplemented with a toolbar for easier access to the most commonly used commands. The status bar at the bottom of the window provides descriptions of each of the commands and program-status information. Both context-sensitive and standard Help are provided for all Backup commands.

If this is the first time that you have used Backup or if you have just installed a new or additional tape backup device, you need to load the appropriate tape backup device driver and then restart your computer to activate it.

▷ **To load a tape driver**

1. In the Main program group, double-click the Windows NT Setup icon.

After determining your hardware configuration, the Windows NT Setup dialog box appears.

2. From the Options menu, choose Add/Remove Tape Devices.
3. In the Tape Device Setup dialog box, choose the Add button to view a list of the tape devices that are compatible with Windows NT.
4. Select a device from the list and choose the Install button.

A message advises you that the driver for this tape device is already installed and asks if you want to use the current one or install a new one.

5. Unless you have a disk for a newer version, choose the Current button.

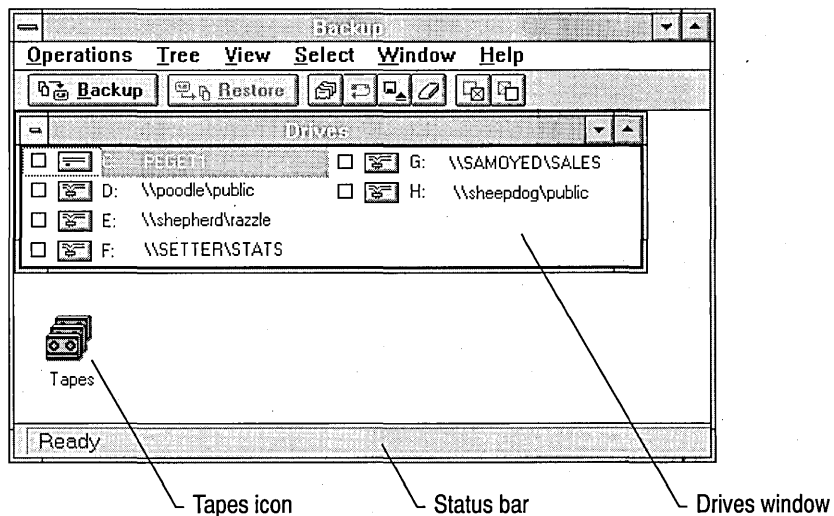
The name of the selected tape device appears within a box in the Tape Device Setup dialog box.

6. Choose the OK button.
7. From the Options menu, choose Exit.

A message advises you that your computer configuration has changed and that you must shut down and then restart your computer to use the new configuration.

8. In the Setup Message box, choose the OK button.

To avoid restarting your computer, you can also use the Devices option in Control Panel to start the tape device.





You can only back up files on a disk drive to which you normally have access. Otherwise, you need to be logged on as a member of the Administrators or Backup Operators group. Notice that backup rights enable you to bypass the protection provided by normal file permissions. Also, use caution in granting restore rights since they enable a user to ignore normal file-permission conflicts during restoration and to overwrite existing files.

The following most commonly used commands from the Operations and Select menus are also available on the toolbar:

Backup	Retention Tape	Check
Restore	Eject Tape	Uncheck
Catalog	Erase Tape	

The Tree, View, and Window menus provide commands for manipulating your windows the same as in File Manager. The View menu also enables you to display or hide the status bar and toolbar, and to change your font selection. See online Help for detailed procedures.



To quit Backup, you can choose either Exit from the Operations menu or Close from the Control menu. To remove the tape before quitting, you can choose Eject Tape from the Operations menu or click the Eject Tape button on the toolbar. If the tape device supports software control of tape ejection, the tape is rewound and ejected. If it does not, the tape is simply rewound in preparation for manual ejection.

Selecting Your Hardware

The system automatically checks for the proper hardware when you start Windows NT and initializes it each time you start Backup. Notice, however, that the tape drive must be turned on before you start Windows NT for the drivers to be loaded properly. If you have more than one tape backup device, you can use the Hardware Setup command from the Operations menu to select a different device.

Note If you do not have a tape drive, you can use the **backup** or **xcopy** commands to back up files to a floppy disk.

Windows NT currently supports both high-capacity SCSI tape backup devices for 4 mm DAT, 8 mm, and .25-inch drives and the less expensive mini-cartridge drives. You may have more than one tape drive connected to your system. However, only one tape drive may be selected at a time.

Backing Up Disk Files to Tape

Because information is the most important resource on a workstation or network, backing up that information is an administrator's most critical function. And, therefore, you need to create backup policies and standard hardware-maintenance policies for disaster avoidance rather than just recovery.

When formulating your policies, decide what needs to be backed up and what you consider to be a reasonable period of time during which essential services can be unavailable. Based on that decision, determine what steps you will take to protect critical data, which can range from a simple backup done with the Windows NT Backup program to the use of alternate sites or disk fault-tolerance methods. The Windows NT Advanced Server Disk Administrator program provides fault-tolerance functionality for creating mirror sets and stripe sets with parity.

Then decide how often you need to redo such a complete risk assessment. You will need to evaluate the continuing importance of various operations and determine likely new areas of exposure. If security is important to you, your backup policy should also provide for an independent review of the security audit log to ensure that backups are being performed according to policy.

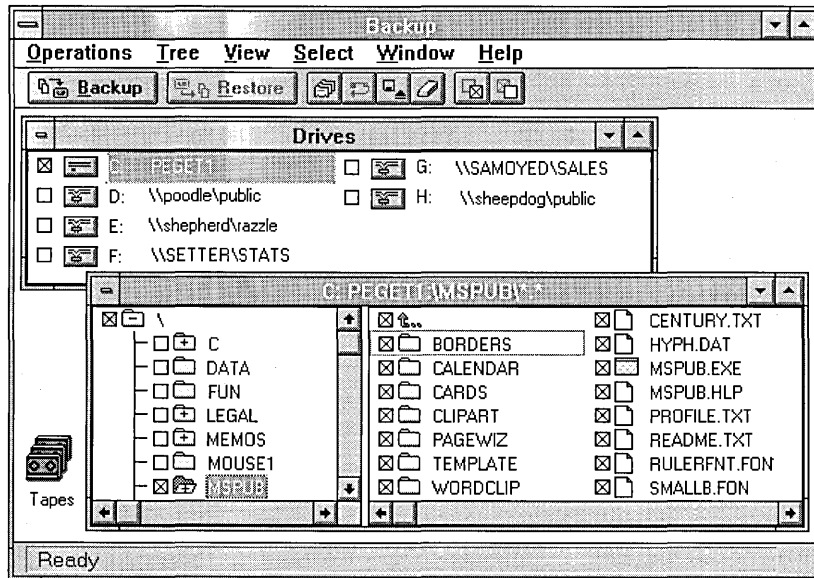
Choosing Files to Back Up

You can select either all the files on a disk or individual files only, the same way you would in File Manager. After selecting your files, choose the Check button on the toolbar to select each file's check box. Or if you only want to select a few files, just select the check box for each filename.



The Drives window will normally be open when you start the Backup program. However, sometimes you will want to minimize it and then reopen it when needed, either by double-clicking the Drives icon or by choosing Drives from the Window menu.

There will also be times when you will leave Backup, use File Manager to connect to another network drive, and then return to Backup and need to choose Refresh from the Window menu to update the Drives window and view the additional network drive.



► **To open the Disk File Selection window**

- In the Drives window, double-click the appropriate disk drive icon or letter.

Disk and Tape File Selection windows are organized the same as in File Manager, with the same viewing options for seeing the directory tree structure and the directory and filenames list. The default is a split, resizable panel showing both options. Filenames are only shown in the Directory List panel. Selecting All File Details displays filenames, size, last modification date and time, and file attributes (such as hidden, system, read-only, or archive).

► **To select all the files on a disk**



- In the Drives window, select the disk drive and then, from the Select menu, choose the Check command. Or choose the Check button on the toolbar.

–Or–

- In the Drives window, select the check box for the appropriate disk drive.

Notice that, even when a disk drive is selected, the program will not back up those files and directories that the user does not have security permission to read, including files that are hidden in a directory with no read permission and displayed with an exclamation point in the file's icon. All file attributes are preserved, including permissions.

▶ **To select files individually**

1. Open the Disk File Selection window.
2. To select a few files, select the check box for each filename.

To select several files, select the first filename and then do one of the following:

- Press and hold down the SHIFT key and then select the last contiguous filename.
 - Drag the mouse to the last contiguous filename.
 - Press and hold down the CTRL key and then select each non-contiguous filename.
3. Choose the Check command from the Select menu, or the Check button on the toolbar, to select each file's check box.



Choose the Uncheck command from the Select menu, or the Uncheck button on the toolbar, to undo all your selections.

Notice that when only some files are selected, the corresponding disk-drive and directory check boxes have a gray background.

Setting the Tape Options

After selecting one or more disk drives or files to back up, choose the Backup command from the Operations menu to open the Backup Information dialog box. The upper section provides information on the tape that you loaded. You can choose whether you want to append the new backup set after the last backup set or replace an old set with the new one. If you want to secure the tape by limiting access to it, select the check box for Restrict Access To Owner Or Administrator. If you want to confirm that the tape was backed up accurately, select the Verify After Backup check box. If you want to add a copy of your Windows NT Registry files to the backup set, select the Backup Local Registry check box.

The following table describes the options in the upper section of the Backup Information dialog box.

Item	Description
Current Tape	The current tape's name is shown here unless there is no tape loaded, it is blank, or it has an unrecognized format.
Creation Date	The creation date of the original backup set, or the date when it was last replaced, is automatically displayed here.
Owner	The owner of the tape, that is, whoever put the first backup set on the tape, is automatically displayed here.
Tape Name	You can use up to 32 characters to create or change a current tape name.
Append	This operation adds the backup set(s) to the end of the last backup set on the active tape. Tape Name and Restrict Access To Owner Or Administrator are unavailable with this operation.
Replace	This operation overwrites all the information on the tape. However, if you do not confirm the choice, another message gives you the option of appending instead.

Item	Description
Verify After Backup	You can select whether or not to perform a verification comparison of the files that are written to tape and the files on the disks.
Restrict Access To Owner Or Administrator	You can designate the tape as “secure.” Only the tape owner, or a member of the Administrators or Backup Operators group, can read, write, or erase the tape on the owner’s original computer using the Windows NT Backup program. To restore it on another computer, even if it has the same username, you must be logged on as a member of the Administrators or Backup Operators group.
Backup Local Registry	You can include a copy of the local Windows NT Registry files in the backup set.

Setting the Backup Set Options

The second section of the Backup Information dialog box shows how many backup sets have been selected, each set being a collection of related files on one drive that is backed up during a single backup operation. If you select more than one disk drive, Backup provides a scroll bar for moving between backup sets so you can enter separate descriptions, up to a length of 32 characters, and select different backup types for each drive selected.

When deciding which backup type to use, one of the criteria should be whether or not it will mark the files as having been backed up. Windows NT maintains a marker (called the *archive bit*) for each file that allows backup programs to mark the files after backing them up. When the file changes, Windows NT marks the file as needing to be backed up again.

With Windows NT Backup, you can choose to back up only those files that have this marker set, and you can choose whether or not to mark the files as having been backed up. The normal (or full) backup type is best when a large amount of data changes between backups, or to provide a baseline for the other backup types. The incremental backup type is good if you need to keep frequent “checkpoint” versions of changed data. The differential backup type simplifies the process for restoring files. To provide for long-term storage with fewer tapes, you can use a combination of a normal backup plus either incremental or differential backups.

The following table describes the different types of backup operations that you can choose.

Choose	To
Normal	Back up and mark as such all the selected files on the disk. A normal backup is the same as a full backup.
Copy	Back up, but not mark as such, all the selected files on the disk.
Incremental	Back up and mark as such only those selected files that have been modified on the disk.
Differential	Back up, but not mark as such, only those selected files that have been modified on the disk.
Daily	Back up, but not mark as such, only those selected files that have been modified that same day on the disk. (This can be useful if you want to take work home and need a quick way to select the files that you worked on that day.)

Setting the Log Options

In the final section of the Backup Information dialog box, you can choose not to log information or you can choose to create a log that contains either a summary of major operations or full details on all operations. If you choose to create a log, you can type the name of the text file into which the information on completed tape operations will be logged. You can also use the Browse button at the end of the Log File box to help you locate the correct filename for the log.

The following are descriptions of the three logging options.

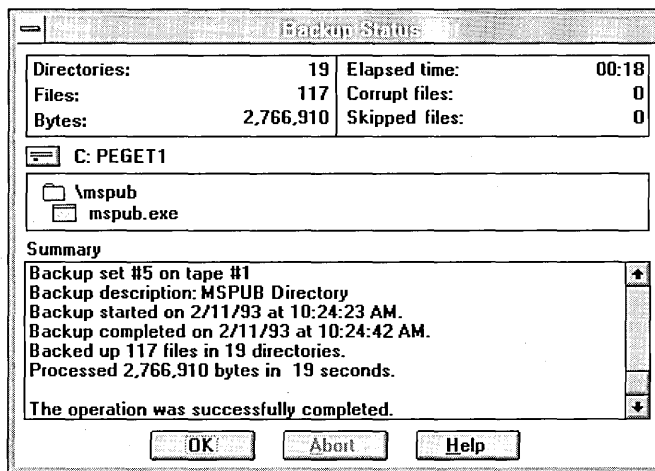
Choose	To
Full Detail	Log all operations information including the names of all the files and directories that are backed up.
Summary Only	Log only the major operations such as loading a tape, starting the backup, and failing to open a file.
Don't Log	Log no information.

When you are done, choose the OK button to display the Backup Status dialog box and start the backup process.

Checking the Backup Status

The Backup Status dialog box contains an active status area; the names of the drive, directory, and file(s) that are being backed up; and a Summary section showing a log of major operations. You can also choose to stop the backup operation. If a large backup operation reaches the end of a tape before finishing, the Insert New Tape dialog box prompts you to insert a new tape. A collection of related tapes containing several backup sets is called a *family set*.

- ▶ **To display the Backup Status dialog box and start backing up**
 - In the Backup Information dialog box, choose the OK button.



The status area at the top of the box shows the following information:

- Directories, files, and bytes processed
- Elapsed time in hours, minutes, and seconds
- Number of corrupt or skipped files (that is, files that are unable to be copied because of both read errors and open/locked files)

Additional information provided includes the selected disk drive, directory path, and filename, along with a Summary section showing the tape label and an event log.

Note If the status area shows the existence of any corrupt files, a record of them is available in a file called CORRUPT.LST. You should check that file before trying to restore the tape and then delete it. If you do not delete it, you will see a message about the existence of corrupt files whenever you try to restore from that tape or any other tape in your collection.

If you need to stop a backup job before it is completed, choose the Abort button. The current file will be completed if less than 1 MB remains. Otherwise, a message asks whether to continue or stop now and show it as a corrupted file. The Summary section then gives the final operation details and shows whether or not the operation completed successfully.

Using Batch Files to Do Backups

You can create a command-line batch file to back up one or more drives on a regular basis. The parameters included in this batch command give you most of the same functionality that is provided in the graphical user interface.

NTBackup [*operation pathnames* [*options*]]

where

operation

Backup

pathnames

{**A: B: C: ... Z:**}[\i>directory\...]*

options

{**Mode Verify Restrict_Access Description Backup_Local_Registry
Backup_Type Log_Options**}

where

Mode = /**A**[*ppend*]

Verify = /**V**[*erify*]

Restrict_Access = /**R**[*estRICT*]

Description = /**D**[*escription*] "*text*"

Backup_Local_Registry = /**B**

```
Backup_Type = /T[type] {Normal Copy Incremental Differential Daily}
```

```
Log_Options = [Log_filename] [Log_exceptions_only]
```

where

```
Log_filename = /L[ogfile] "filename"
```

```
Log_exceptions_only = /E[xceptions]
```

When the Append option is not specified, the program reuses the tape and replaces previous data. Specifying Append causes backup sets to be added after the last backup set on the tape. When more than one drive is specified and the Append option is not, the program overwrites the contents of the tape with the information from the first drive selected and then appends the backup sets for the remaining drives.

The following are two examples that show how to implement this command. Notice that a path name may also include wildcards (* and ?) to specify only certain files in a directory. For example, to back up all the batch files in the directory called C:\MYDIR, type:

```
NTBackup Backup C:\MYDIR*.BAT
```

To do a normal backup of drives C, D, and E; restrict access to the owner or administrator; apply the description "Full Backup of drives C, D, and E" to all three backup sets; perform a verification pass upon completion of the backup; and record the results of the session in the log file named C:\LOG\LOG.TXT, type:

```
NTBackup Backup C: D: E: /V /R /D "Full Backup of drives C, D, and E" /L  
"C:\LOG\LOG.TXT"
```

To do a normal Copy-type backup of the files in C:\EXCEL and not restrict access, use the description "Copy of Excel Directory," perform a verification pass upon completion of the backup; and record the results of the session in the log file named C:\LOG.TXT, type:

```
NTBackup Backup C:\EXCEL /T COPY /V /R /D "Copy of Excel Directory"  
/L "C:\LOG.TXT"
```

Restoring Tape Files to Disk

Backed-up information is useless if it cannot be restored. Windows NT provides a Restore command to give access to tapes, backup sets, and files for restoring as they are needed.

Restoration policies for everyday maintenance, as well as disaster recovery, are just as important as backup policies. Practice ahead of time on spare drives, though, so you do not risk real data. You should also periodically do trial restorations to check whether or not files have been backed up properly. These verification restores can check for possible hardware problems that do not show up with the software or whose symptoms are not easily recognized. For that reason, you should also keep a backup status log and check it regularly for error messages.

When restoring a large number of files, you will need to consider what backup type you used. If you did differential or incremental backups, you will first need to restore the selected files from the most recent normal backup, then files from all subsequent incremental backups of those files, and finally the most recent differential backup performed after the last incremental backup.

For tape-management purposes, each tape has the following information associated with it:

- A user-specified tape name
- An original tape-creation date plus the date and time that each backup set was created
- The computer name and the username of the user who created the tape
- A tape-sequence number in the case of tape sets

Choosing What You Want to Restore



You can choose to restore either the current tape, one or more backup sets, or individual files. Open the Tapes window and make your selections the same way you would in File Manager and for backing up.

All catalog information is maintained on the corresponding tape for that backup set. Family sets have the information on the last tape.

The tape name appears in the left panel of the Tapes window to the right of each tape icon. The following information is shown in the right panel of the Tapes window:

- Drive backed up
- Backup set number
- Tape number, and what number it is in a set of tapes
- Backup type
- Date and time of backup
- Backup description

When you insert a tape to be restored, only information on the first backup set appears in the right panel. If you want to restore the entire tape, you need to load the tape's catalog to display a list of any other backup sets. If you want to know which files are in each backup set, you need to load the individual catalogs for each backup set.

▷ **To load a catalog of the backup sets on a tape**

1. In the Tapes window, select the tape whose catalog you want to load.



2. Double-click that tape's icon. Or, from the Operations menu, choose Catalog. Or choose the Catalog button on the toolbar.

The Catalog Status dialog box appears and provides the option of stopping the cataloging process.

After searching the tape, a complete list of backup sets appears in the Tapes window, with question marks displayed in each of their icons to show that their individual catalogs have not been loaded.

▷ **To load a catalog for an individual backup set**

1. In the Tapes window, select the backup set whose catalog you want to load.

2. Double-click that backup set's icon. Or, from the Operations menu, choose Catalog. Or choose the Catalog button on the toolbar.

The Catalog Status dialog box appears and provides the option of stopping the cataloging process.

After searching the tape, a complete list of the directories and files in the backup set appears in a Tape File Selection window. The list in the Tapes window now appears with a plus sign in the backup set's icon to show that it has been cataloged. Corrupt files (that is, files that contain errors) and their corresponding directories are marked by an icon with a red X.

The procedures for selecting files to restore are similar to those for selecting files to back up. Notice, however, that when you load a tape, only the first backup set on the tape is displayed until you load the tape's catalog. Therefore, when you select an entire tape, you are really only selecting those sets that are already displayed, and so you must load the tape's catalog first to get the complete list of backup sets. See online Help for detailed procedures.

Building Partial Tape and Backup Set Catalogs

If a backup operation spans several tapes and you choose to restore a single backup set, you are prompted to insert the last tape to load the tape catalog information and get a complete list of all the backup sets and their locations. However, if the last tape in such a family set is missing or damaged, you must build a partial tape catalog by inserting the available tapes and loading each tape's catalog of backup sets. If the backup set that you want spans several tapes and you are looking for a specific directory, you must then load each backup set's catalog of directories and files.

Sometimes, you will want to restore from a tape with files that were not backed up with the Windows NT Backup program. If the tape has the Microsoft/Connor Software tape format (MTF), Windows NT Backup can read it. However, the tape may or may not have the full on-tape catalog (OTC) information that Windows NT Backup produces. Also, some older tape backup devices may not support creating full on-tape catalogs with the Windows NT Backup program.

► To build a catalog from a tape without a full on-tape catalog

1. Insert the MTF-compatible tape in the tape backup device.
2. Load whatever on-tape catalog information is available.

The Catalog Status dialog box appears and provides the option of stopping the cataloging process.

- If there is no catalog information, the entire tape is scanned to determine all the backup sets and then scanned again slowly to determine the contents of each backup set.
- If there is partial information on the backup sets, that information is accessed quickly and then the entire tape is scanned slowly to determine the contents of each backup set.

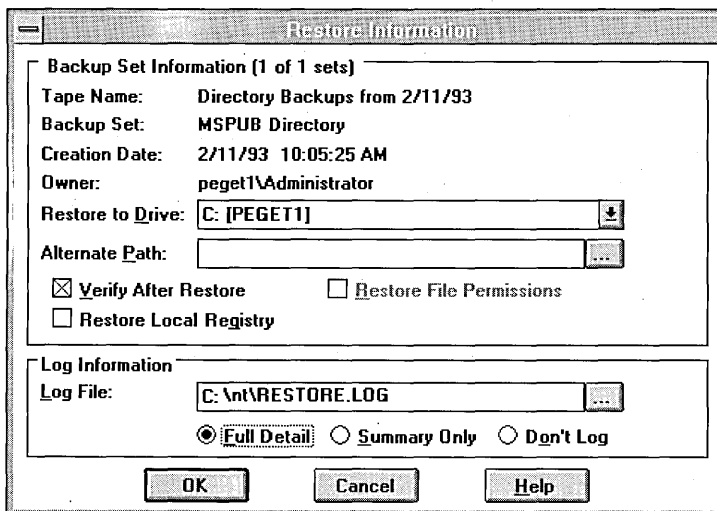
Setting the Restore Options

After selecting one or more tapes, backup sets, or files to restore, choose the Restore command from the Operations menu to open the Restore Information dialog box. The first section provides information about the backup set(s) on the loaded tape and tells you how many other tapes are in that family set. For each backup set, you must specify the drive to which you want the information restored.

You can also specify an alternate directory path to place a backup set's files into a different directory instead of into the original one on the default drive. This might be done to compare them to the files on the disk. You can use the Browse button at the end of the Alternate Path box to help you find the correct path name.

If you want to verify the contents of the files restored onto disk against the files on tape and then log any exceptions, select the Verify After Restore check box. When you select the Restore File Permissions check box, the system restores the permissions information along with the file. Otherwise, the files inherit the permissions information of the directory into which they are restored. When you want to restore the Registry files, select the Restore Local Registry check box. However, you will need to restart the computer for the restored information to take effect.

When you restore files that were backed up from an NTFS volume to an NTFS volume, you can restore the original file-access permissions as well. You should do so only if you are restoring files to the computer from which they were originally backed up and want the original file-access controls to be in effect. Do not restore file permissions if you are using the backup tape to transfer files to another computer or if you are restoring files to a computer that has not been completely restored following the corruption of the operating system. Because file permissions include the unique identifier of the computer on which the files are stored, they are valid only on the original computer.



Setting the Log Options

In the bottom section of the Restore Information dialog box, you can choose not to log information or you can choose to create a log that contains either a summary of major operations or full details on all operations. If you choose to create a log, you can type the name of the text file into which the information on completed tape operations will be logged. You can also use the Browse button at the end of the Log File box to help you locate the correct filename for the log.

The following are descriptions of the three logging options.

Choose	To
Full Detail	Log all operations information including the names of all the files and directories that are restored.
Summary Only	Log only the major operations such as loading a tape, starting the restore process, and failing to create a file.
Don't Log	Log no information.

When you are done, choose the OK button to display the Restore Status dialog box and start the restore process.

Checking the Restore Status

The Restore Status dialog box contains an active status area; the names of the drive, directory, and files that are being restored; and a Summary section showing a log of major operations. You can also choose to stop the restore operation. If a file being restored already exists on disk and is newer than the one on the tape, the Confirm File Replace dialog box will prompt you to confirm whether or not to restore the file from the tape. If the restore operation reaches the end of a tape before finishing the restoration of a backup set or file, the Insert New Tape dialog box will prompt you to insert a new tape.

▷ **To display the Restore Status dialog box and start restoring**

- In the Restore Information dialog box, choose the OK button.

The status area at the top of the box shows the same types of information as in the Backup Status dialog box.

If you need to stop a restore job before it is completed, choose the Abort button. The current file will be completed if less than 1 MB remains. Otherwise, a message asks whether to continue or stop now. The Summary section then gives the final operation details and shows whether or not the operation completed successfully.

Maintaining Tapes



The Windows NT Backup program provides three commands under the Operations menu to help you maintain your backup tapes. The Erase Tape command causes the whole tape to be erased. A warning message in the Erase Tape dialog box advises you that all the information on the tape will be destroyed. It also gives you the name of the tape and when it was created.

You can do either a Quick Erase, during which the tape header is simply rewritten, or a Secure Erase, during which the entire tape is overwritten. The secure-erase method may take several hours to complete, depending on the drive technology and tape length. You should categorize the information on the backup tapes by which method of erasing to use, and then create and maintain a list for easy reference.



The Retension Tape command eliminates loose spots on the tape by fast forwarding to the end of the tape and then rewinding. This procedure winds the tape evenly so it will run more smoothly past the tape drive heads.

To reduce tape slippage, manufacturers of tape backup drives recommend that you retension .25-inch tape once every 20 uses. 4 mm and 8 mm tapes do not require retensioning, and so the command is unavailable. How much time it takes to forward and rewind the media depends on the device technology. See the manufacturer's documentation for specific retensioning requirements.

The Format Tape command formats an unformatted mini-cartridge tape. This type of tape is treated like a floppy disk and must be formatted before it can be used. If you do not have a mini-cartridge drive installed and activated, this command is unavailable.

Event Viewer



In Windows NT, an event is any significant occurrence in the system or in an application that requires users to be notified. For some critical events such as a full server or an interrupted power supply, you may see a message on screen. For many other events that do not require immediate attention, Windows NT adds information to an event log file to provide information without disturbing your usual work. This event logging service starts automatically each time you start Windows NT.

You can use Event Viewer to view and manage event logs for your system. You can also save event logs to view later or to generate reports about your system. This chapter describes how to use Event Viewer, with the following topics:

- An overview of Event Viewer
- Viewing event logs
- Setting options for logging events
- Viewing specific logged events
- Using archived log files

Overview

Event Viewer is the tool you can use to monitor various kinds of events in your system, which are recorded in event logs. Windows NT records events in three kinds of logs:

- The system log records events logged by the Windows NT system components. For example, the failure of a driver or other system component to load during startup is recorded in the system log.
- The application log records events logged by applications. For example, a database program might record a file error in the application log.
- The security log records security events. This helps track changes to the security system and identify any possible breaches to security. For example, attempts to log on to the system may be recorded in the security log, depending on the Audit settings in User Manager.

To control the types of security events that are audited, choose the Audit command from the Policies menu in User Manager. For more information, see “Managing the Audit Policy” in Chapter 13, “User Manager.”

To control the auditing of file and directory access, choose the Auditing command from the Security menu in File Manager. For more information, see “Auditing Files and Directories” in Chapter 4, “File Manager.”

After you select a log for display in Event Viewer, you can view, sort, filter, and search for details about events. You can also archive logs in various file formats.






Event Viewer displays events from a single log. Each line in the log shows information about one event, including date, time, source, event type, category, Event ID, user account, and computer name.

Event Viewer - System Log on \SCOTTIE						
Log	View	Options	Help			
Date	Time	Source	Category	Event	User	Computer
4/2/93	11:54:53 AM	Service Control Manager	None	7001	N/A	SCOTTIE
4/2/93	11:54:53 AM	Service Control Manager	None	7002	N/A	SCOTTIE
4/2/93	11:54:53 AM	NetDDE	None	13	N/A	SCOTTIE
4/2/93	11:54:53 AM	Service Control Manager	None	7002	N/A	SCOTTIE
4/2/93	11:54:53 AM	NetDDE	None	204	N/A	SCOTTIE
4/2/93	11:54:51 AM	Service Control Manager	None	7002	N/A	SCOTTIE
4/2/93	11:54:51 AM	Service Control Manager	None	7002	N/A	SCOTTIE
4/2/93	11:54:51 AM	Service Control Manager	None	7000	N/A	SCOTTIE
4/2/93	11:54:51 AM	Elnkii	None	5003	N/A	SCOTTIE
4/2/93	11:54:51 AM	EventLog	None	6005	N/A	SCOTTIE
4/2/93	11:53:41 AM	EventLog	None	6006	N/A	SCOTTIE
4/2/93	11:19:41 AM	EventLog	None	6005	N/A	SCOTTIE

The terms in the following table describe items in the Event Viewer window.

Item	Meaning
Source	The software that logged the event, which can be either an application name, such as "SQL Server," or a component of the system or of a large application, such as a driver name. For example, "Elnkii" indicates the EtherLink II driver.
Category	A classification of the event by the event source. For example, the security categories include Logon and Logoff, Policy Change, Privilege Use, System Event, Object Access, Detailed Tracking, and Account Management.
Event	A unique number for each source to identify the event. The Event ID can also be used by product support representatives to track what event occurred in the system.
User	The user name for the user who was logged on and working when the event occurred. "N/A" indicates that the entry did not specify a user.
Computer	The computer name for the computer where the event occurred.

The icon on the left side of the Event Viewer screen describes the classification of the event by Windows NT such as Error, Warning, Information, Success Audit, and Failure Audit.

Icon	Event Type	Meaning
	Error	Significant problems, such as a loss of data or loss of functions. For example, an Error event might be logged if a service was not loaded during Windows NT startup.
	Warning	Events that are not necessarily significant but that indicate possible future problems. For example, a Warning event might be logged when disk space is low.
	Information	Infrequent significant events that describe successful operations of major server services. For example, when a database program loads successfully, it may log an Information event.
	Success Audit	Audited security access attempts that were successful. For example, a user's successful attempt to log on to the system might be logged as a Success Audit event.
	Failure Audit	Audited security access attempts that failed. For example, if a user tried to access a network drive and failed, the attempt might be logged as a Failure Audit event.

Starting and Quitting Event Viewer

You start and quit Event Viewer in the same way as any application in Program Manager.

▷ **To start Event Viewer**



- In the Administrative Tools group in Program Manager, choose the Event Viewer icon.

▷ **To quit Event Viewer**

- From the Log menu, choose Exit.

Viewing Event Logs

You determine the log and computer selected for viewing in Event Viewer, and you can refresh the view, as described in the sections that follow.

Selecting a Log for Event Viewing

By default, the system log on the local computer is displayed the first time you start Event Viewer. You can also view the security and application logs.

▷ **To select another log for viewing**

- From the Log menu, choose System, Security, or Application.

Event Viewer shows the events recorded in that log. The corresponding command name is checked on the Log menu, and the log name appears on the title bar.



To view the content of a security log, you must be logged on as a member of the Administrators group.

Selecting a Computer for Event Viewing

When you first start Event Viewer, the events for the local computer are displayed.

If you want to view events for another computer, choose Select Computer from the Log menu. If the computer you select is across a link with slow transmission rates, select the Low Speed Connection box. If this box is selected, Windows NT does not list all the computers in the default domain, thereby minimizing network traffic across the link. (If slow transmission rates are commonplace, choose Low Speed Connection from the Event Viewer Options menu.)

► **To select another computer in Event Viewer**

1. From the Log menu, choose Select Computer.
2. In the Computer box, type the computer name of the computer to view.
Or select a computer name in the Select Computer box.
3. Choose the OK button.

Refreshing the View

When you first open a log, Event Viewer displays the current information for that log. Unless you choose the Refresh command to refresh the view, this information is not updated. That is, any new events that occur while viewing the log are not added to the list, and overwritten entries are not removed from the list. The event listing is updated automatically only when you select a different log for viewing or when you start Event Viewer again.

► **To update the events currently shown in Event Viewer**

- From the View menu, choose Refresh. Or press F5.

If you are viewing an archived log, the Refresh command is not available because archived files are never updated.

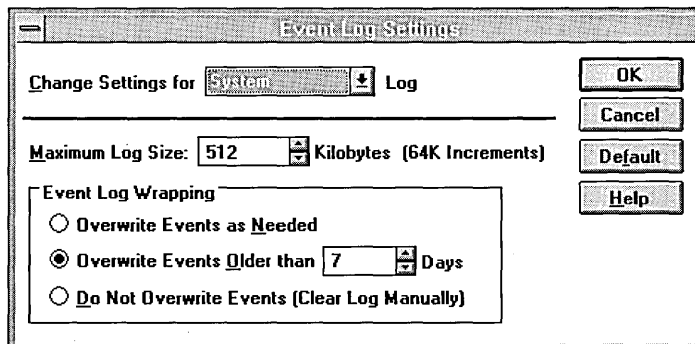
Setting Options for Logging Events

You can use the Log Settings command from the Log menu to define parameters for logging events in each kind of log, including the maximum size for the log and whether the events are overwritten or stored for a certain period of time.

For the security log, the administrator can also set auditing policies in User Manager that cause the system to halt when the security log is full.

► **To set event logging options**

1. From the Log menu, choose Log Settings.



2. In the Change Settings For box, select the kind of log for which you want to specify settings.
3. In the Maximum Log Size box, specify the size of the log in kilobytes.
For example, type **640** for a maximum log size of 640 kilobytes. The default setting is 512. The size must be an increment of 64K.
4. Select an Event Log Wrapping option to define how the events are retained in the log selected in the Change Settings For box. The options include the following.

Use	To
Overwrite Events As Needed	Have new events continue to be written when the log is full. Each new event will replace the oldest event in the log.
Overwrite Events Older Than [] days	Retain the log for the number of days you specify before overwriting events. The default setting for this option is seven days. This is the best choice if you want to archive log files weekly.
Do Not Overwrite Events	Clear the log manually rather than automatically. Select this option only if you cannot afford to miss an event—for example, for the security log at a site where security is extremely important.

5. If you want to restore all default settings, choose the Default button.
6. Choose the OK button.

Note When a log is full (no more events can be logged), you can free the log by clearing it. Reducing the amount of time you keep an event also frees the log if it allows the next record to be overwritten.

If you specify that events cannot be overwritten in a log, you must clear the log periodically—either when the log reaches a certain size or when a message notifies you that the log is full. Archived logs cannot be cleared.

► **To clear a log**

1. Switch to the log whose events you want to clear.
2. From the Log menu, choose Clear All Events.

A message asks if you want to archive the currently logged events. If you answer Yes, the Save As dialog box appears. For more information about this dialog box, see “Archiving a Log,” later in this chapter.

After you answer Yes or No, Event Viewer empties the current log. All new events are recorded in the log.

Viewing Specific Logged Events

After you select a log to view in Event Viewer, you can:

- Sort events from old to new or from new to old.
- Filter events so that only events with specific characteristics are displayed.
- Search for events based on specific characteristics or event descriptions.
- View descriptions and additional details that the event source might log.

These subjects are covered in detail in the following sections.

Sorting Events

The events displayed in Event Viewer are listed in sequence by date and time of occurrence. You can specify the order as newest events first or oldest first. The default listing order is from newest to oldest.

When a log is archived, the sort order affects the order in which event records are archived in a text format or comma-delimited text format file, but sort order does not affect the order of event records in a log archived in log file format. For more information, see “Using Archived Log Files,” later in this chapter. If the Save Settings On Exit command from the Options menu is checked when you quit, the current sort order is used the next time you start Event Viewer.

- ▶ **To specify sort order**
 - From the View menu, choose Newest First or Oldest First.
The command currently in effect is checked on the menu.

Filtering Events

When you first start Event Viewer, all events recorded in the selected log are displayed automatically. You can choose Filter Events from the View menu if you want to view only events with specified characteristics. Filtering has no effect on the event log whatsoever; all events are logged all the time, whether the filter is active or not. The filter affects only what is displayed, and you can see all the logged events any time you want by turning off the event filter.

Your choices for filtering are used throughout the current Event Viewer session, unless you decide to change them. If Save Settings On Exit from the Options menu is checked when you quit Event Viewer, your choices for filtering remain in effect the next time you start Event Viewer. When filtering is on, a check mark appears by the Filter command on the View menu and “(Filtered)” appears on the title bar.

► **To filter events**

1. From the View menu, choose Filter Events.

The screenshot shows the 'Filter' dialog box with the following settings:

- View From:** First Event, Events On: 9 /28 /92, 2:11:09 AM
- View Through:** Last Event, Events On: 9 /28 /92, 10:48:53 AM
- Types:**
 - Information
 - Warning
 - Error
 - Success Audit
 - Failure Audit
- Source:** (All)
- Category:** (All)
- User:**
- Computer:**
- Event ID:**

2. In the Filter dialog box, specify the characteristics that qualify an event for display in Event Viewer.

The following table describes the options in the Filter dialog box. Entries in the Filter dialog box are not case sensitive.

3. Choose the OK button to view the filtered events.

► **To return to the default criteria**

- In the Filter dialog box, choose the Clear button.

► **To turn off filtering of events**

- From the View menu, choose All Events.

The following table describes the options available in the Filter dialog box.

Use	To filter for
View From	Events after a specific date and time. By default, this is the date of the first event in the log file.
View Through	Events up to and including a specific date and time. By default, this is the date of the last event in the log file.
Information	Infrequent significant events that describe successful operations of major server services. For example, when a database program loads successfully, it may log an Information event.
Warning	Events that are not necessarily significant but that indicate possible future problems. For example, a Warning event might be logged when disk space is low.
Error	Significant problems, such as a loss of data or loss of functions. For example, an Error event might be logged if a service was not loaded during Windows NT startup.
Success Audit	Audited security access attempts that were successful. For example, a user's successful attempt to log on to the system might be logged as a Success Audit event.
Failure Audit	Audited security access attempts that failed. For example, if a user tried to access a network drive and failed, the attempt might be logged as a Failure Audit event.
Source	A source for logging events, such as an application, a system component, or a driver.
Category	A classification of events defined by the source. For example, the security event categories are Logon and Logoff, Policy Change, Privilege Use, System Event, Object Access, Detailed Tracking, and Account Management.
User	A specific user that matches an actual user name. This field is not case sensitive.
Computer	A specific computer that matches an actual computer name. This field is not case sensitive.
Event ID	A specific number that corresponds to an actual event.

Searching for Events

Searching for events can be useful when you are viewing large logs. You can search for each event that matches the type, source, or category that you want by choosing Find from the View menu. For example, you can search for all Warning events related to a specific application. Or search for all Error events from all sources.

Your choices in the Find dialog box are in effect throughout the current session. The default settings are restored the next time you start Event Viewer, if Save Settings On Exit is selected on the Event Viewer Options menu.

▷ **To search for specific kinds of events in a log**

1. From the View menu, choose Find.
2. In the Find dialog box, select any of the Types of events you want to find.
3. Specify any other Source, Category, Event ID, Computer, and User events you want to find, as described in “Filtering Events,” earlier in this chapter.
4. In the Description box, type text that matches any portion of an event record description.

Because you can search for any portion of an event record description, the complete description is not required.

5. To specify the direction of the search, select the Up or Down option button.
The search direction is independent of the sort order checked on the View menu.
6. Choose Find Next to begin the search.

▷ **To find the next matching event**

- Press F3 to continue searching without displaying the Find dialog box again.

▷ **To restore the default search criteria**

- In the Find dialog box, choose the Clear button.

Viewing Details About Events

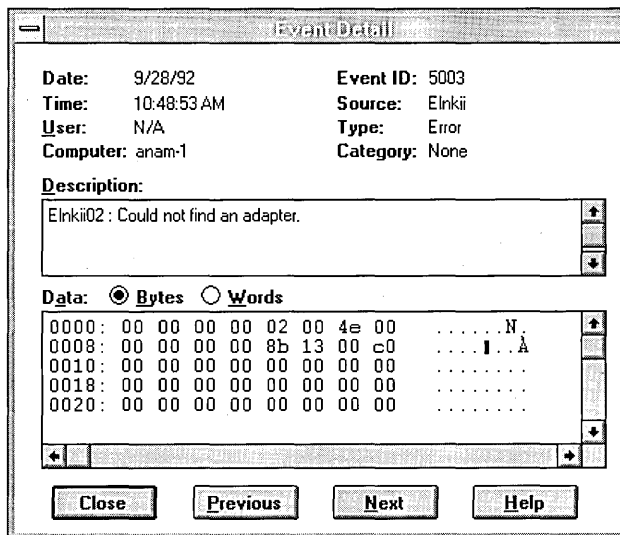
For many events, you can view more information than is displayed in Event Viewer by choosing Detail from the View menu.

The Event Detail dialog box shows a text description of the selected event and any available binary data for the selected event. This information is generated by the application that was the source of the event record. Because the data appears in hexadecimal format, its meaning can only be interpreted by a support technician familiar with the source application. Not all events generate such data.

The event data is saved if you archive a log in log file format, but is discarded if you archive it in text or comma-delimited text format. The event description is saved in all archived logs.

► **To view more details about an event**

1. In Event Viewer, double-click the event you want to view details about. Or select an event in the list, and then choose Detail from the View menu.



2. In the Description or Data box, use the scroll box to browse the information about the event.
3. To view details about other events in sort-order sequence, choose the Next or Previous button.
4. When you finish viewing details, choose the Close button to return to Event Viewer.

Using Archived Log Files

You can archive an event log in log file format so that you can later reopen it in Event Viewer. Or the log can be saved in text format or comma-delimited text format so that you can use the archived information in other applications.

These subjects are covered in more detail in the sections that follow:

- Saving a log as an archived file
- Viewing a log archived in log file format
- Using log files saved in text format or comma-delimited text format

For example, you might choose to archive security logs so that you can monitor security events over a period of time. Or you might archive application logs so that you can track the Warning and Error events that occur for specific applications.

When you archive a log file, the entire log is saved, regardless of any filtering options you specified in Event Viewer. If you changed the sort order in Event Viewer, the event records are saved exactly as displayed if you archive the log in a text or comma-delimited text file.

An archived log contains all events that were current when the file was saved, so the archived file might contain new events or might not contain events overwritten after you first displayed the log in Event Viewer.

Archiving a Log

When you archive an event log, you can save the log in one of three file formats:

- Log file format, which you should choose if you want to view the archived log again in Event Viewer.
- Text file format, for using the information in an application such as a word processor.
- Comma-delimited text file format, for using the information in an application such as a spreadsheet or a flat-file database.

▶ **To archive an event log**

1. From the Log menu, choose Save As.
2. In the File Name box, type a filename for the archived log file.
Event Viewer adds the .EVT filename extension for log files, or the .TXT extension for either kind of text format file.
3. In the Save File As Type box, select a file format option for saving the log information, and then choose the OK button.

Archiving a log has no effect on the current contents of the active log. To clear the original log, you must choose Clear All Events from the Log menu. To remove an archived log file, delete the file in the same way that you delete other kinds of files.

Viewing a Log Archived in Log File Format

You can view an archived file in Event Viewer only if the log was saved in log file format. You cannot choose the Refresh or Clear All Events commands to update the display or to clear an archived log. To remove an archived log file, you must delete the file in File Manager.

▶ **To display an archived log in Event Viewer**

1. From the Log menu, choose Open.
2. In the File Name list, select the filename of the log you want to view, and then choose the OK button.
3. In the Open File Type dialog box, select the kind of log you saved originally —System, Security, or Application. Then choose the OK button.

Note If you do not specify the correct log type, the Description displayed for the archived log in the Event Detail dialog box will not be correct.

Using Logs Archived in a Text Format

If you save an event log in text or comma-delimited text format, you can open that file in other applications. Those other applications can be used to filter, sort, and format the archived event records. Or you might combine event records from two or more archived text files to create reports.

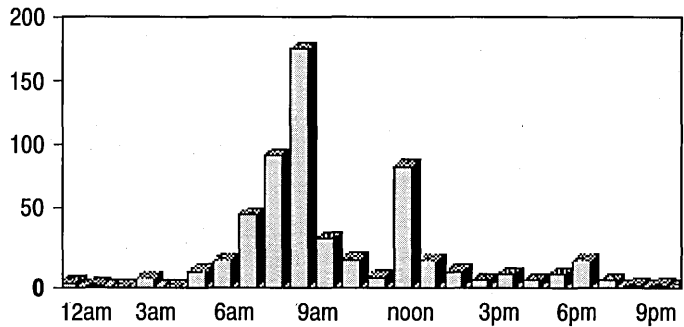
If an archived log is saved in text or comma-delimited text format, the binary data for each event record is discarded. The sequence of data in an event record saved in either text format is the following:

- | | | |
|----------------------|-------------|----------------|
| 1. Date ¹ | 4. Type | 7. User |
| 2. Time | 5. Category | 8. Computer |
| 3. Source | 6. Event | 9. Description |

¹ Depends on the sort order specified in the View menu.

For example, you might copy lines of text from an archived log to include as supporting information in an electronic mail message. As another example, you might archive a security log in comma-delimited format so you can place the information in a spreadsheet and produce a chart depicting the archived information.

Daily Average
for Successful
Logon Attempts



Logon Activity by Time of Day, Engineering Domain, December 1992

Disk Administrator



Disk Administrator is a graphical tool for managing disk resources. This tool encompasses and extends the functionality of character-based disk management programs such as MS-DOS Fdisk.

This chapter provides information on using Disk Administrator to set up and organize your hard disks to function more efficiently. The following main topics are included:

- Partitioning disks
- Creating and deleting volume sets
- Extending volumes and volume sets
- Creating and deleting stripe sets

Overview

Partitioning the internal hard disk on a new computer is done during initial setup when you load the Windows NT operating software. Making changes to that disk or partitioning an additional new hard disk is done using the Disk Administrator program. Disk Administrator is located in the Administrative Tools group in Program Manager.

The following list provides an overview of some of the things you can do with this graphical tool:

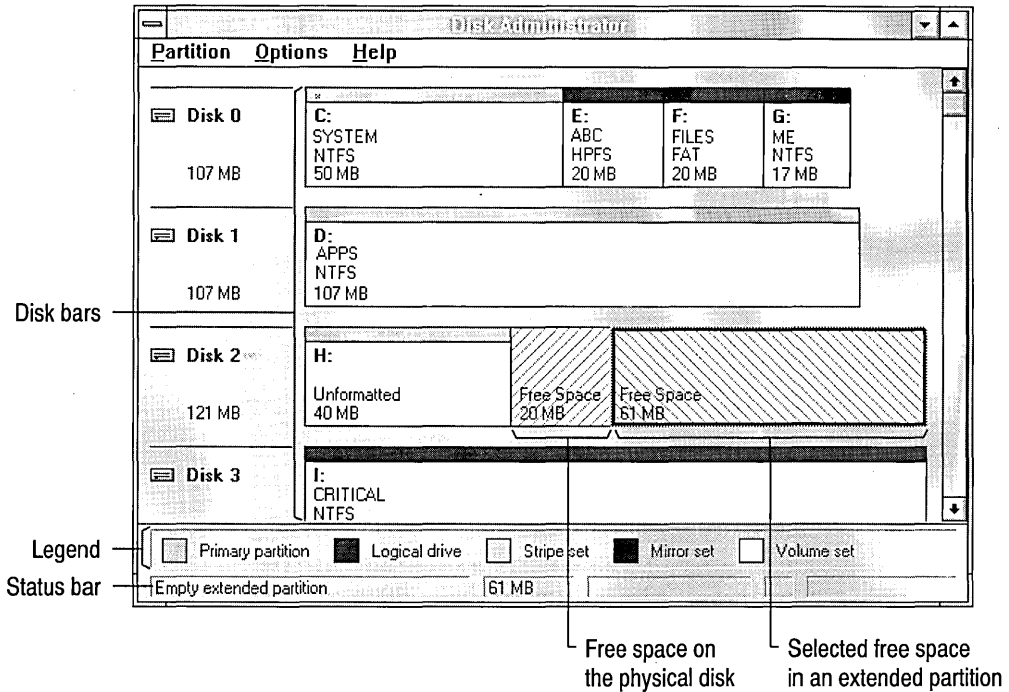
- Create and delete partitions on a hard disk and logical drives within an extended partition.
- Read status information about disks such as the partition sizes and the amount of unformatted free space that is available for creating additional partitions.
- Read status information about Windows NT volumes such as the drive-letter assignment, volume label, file system type, and size.
- Make and change drive-letter assignments.
- Create and delete volume sets.
- Extend volumes and volume sets.
- Create and delete stripe sets without parity.

Starting and Quitting Disk Administrator



You can only open Disk Administrator if you are logged on as a member of the Administrators group. Double-click the Disk Administrator icon in the Administrative Tools group to display a scrollable graphical representation of all the physical disks connected to your workstation along with their partitions. (You can also type **windisk** or **start windisk** at the command prompt.)

A status bar at the bottom of the window provides basic information on partitions. A color-coded legend on top of the status bar shows what the different partition colors and patterns represent. Both context-sensitive and standard Help are provided for all Disk Administrator commands.



To quit Disk Administrator, you can choose either Exit from the Partition menu or Close from the Control menu. If you have requested any significant changes to your disk partitions or drive-letter assignments, Disk Administrator displays a message to remind you about the irreversibility of certain changes, such as deleting a partition, and to ask whether or not you want to save those changes. Disk Administrator only performs updates to the disks after you agree to saving those changes and quit the program. If you decide not to save the changes, choose the No button and Disk Administrator will close without making any changes. If you decide not to quit and want to continue using Disk Administrator, choose the Cancel button.

If you make changes and commit to them upon quitting, Disk Administrator makes the requested changes and displays a message when the disks have been successfully updated. After you choose the OK button, another message advises you that changes have been made that require you to restart the computer. When you choose the OK button, Disk Administrator initiates a complete system shutdown, closes all open applications, and restarts the computer for you. Restarting makes the new volumes accessible. You can then format and label your volumes.

Organizing Your Screen

From the Options menu, you can choose whether or not to display the status bar and legend, customize the colors and patterns used in the legend and disk displays, and change how the disk regions are displayed. See online Help for detailed procedures.

When you select an area of free space, notice that Disk Administrator makes a distinction in the status bar between free space on the disk and free space in an extended partition. You can also see the distinction graphically in the way Disk Administrator uses forward slanting lines to fill free space on the disk and backward slanting lines to fill free space in an extended partition.

You can change the colors and patterns that are used on the screen to distinguish between the following items: primary partition, logical drive, stripe set, mirror set, and volume set.

Since you may have several disks with a wide range of capacities, you can change the relative display size of partitions. Disk regions are shown as being proportionate to each other within a single disk bar. You can choose either to display the regions on each disk based on their relative size, size all the regions equally, or let Disk Administrator decide how to size the regions. You can do this differently for each disk or choose the Reset All button to let Disk Administrator decide how to display all the disks connected to your system.

Note The total lengths of the bars used to represent disks are generally proportional to the size of the disk. However, the total length of a single disk bar is never less than 25 percent of the total length of the largest disk bar.

Managing Disks

Windows NT Disk Administrator provides a simple, graphical way for you to enhance your system's performance and to manage your disks by creating and deleting all the partitions you may need to run your system effectively.

If you use only the Windows NT operating system, you can create one partition that occupies your entire disk or as many as four partitions. If you want to use other operating systems on your hard disk (such as UNIX or MS-DOS) with file systems that are not recognized by Windows NT, you must create separate partitions for each non-Microsoft operating system. Notice, though, that MS-DOS and Windows NT can share the same partition when using the File Allocation Table (FAT) file system.

On an x86-based computer, the operating system starts from the active system partition on the first internal hard disk (that is, Disk 0). Computers using reduced instruction set computing (RISC) processors can have several system partitions that are configurable by the manufacturer's configuration program. Such partitions must be formatted for the FAT file system. Consult your hardware documentation for detailed information on setting up more than one system partition on a RISC-based computer.

When you partition a disk, you specify which portion of the disk a file system can use. When you format a partition, Windows NT prepares an existing partition with a drive letter to use a specific file system. After you partition a disk and save the changes, Disk Administrator restarts the computer for you to make those new volumes accessible. You must then go to the Windows NT command prompt and format each new partition. To do this, use the Format command and the appropriate switch for the file system that you will use on that partition. For more information on formatting partitions under Windows NT, see "Formatting and Labeling Partitions," later in this chapter, and online Help for the Format command.

Partitioning Disks

Disk management under Windows NT is very flexible. You can create up to four partitions in the free space on a physical hard disk, create multiple logical drives in the free space of an extended partition, and delete partitions. You can also add hard disks to your system configuration, recover disk configuration information, and assign specific drive letters to each primary partition or logical drive.

Setting Up a New Hard Disk

You can create any of the following in the free space on a hard disk:

- A single primary partition
- Additional partitions up to the maximum of four
- An extended partition with a number of logical drives that is limited only by the size of the partition
- Other types of Windows NT volumes, such as volume sets and stripe sets

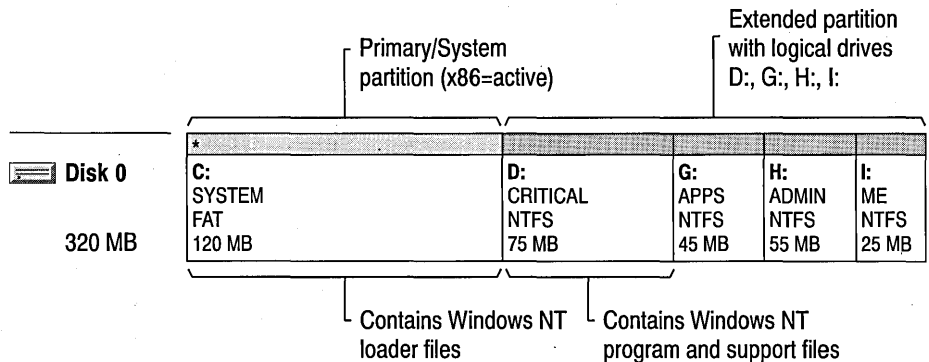
Free space is an unused and unformatted portion of a hard disk that can be partitioned or subpartitioned. Free space within an extended partition is available for the creation of logical drives. Free space that is not within an extended partition is available for the creation of a partition, with a maximum of four partitions allowed.

A *partition* is a portion of a physical disk that functions as though it were a physically separate unit. A *volume* is a partition or collection of partitions that have been formatted for use by a file system. A Windows NT volume can be assigned a drive letter and used to organize directories and files.

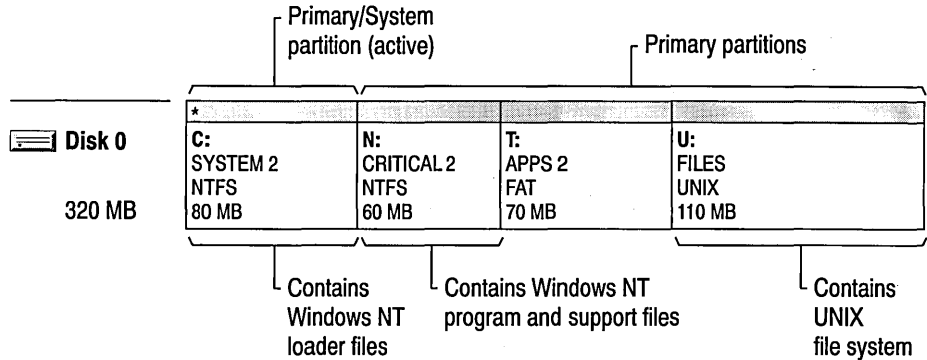
A partition is usually referred to as either a primary or an extended partition. A *primary partition* is a portion of a physical disk that can be marked for use by an operating system. There can be up to four primary partitions (or up to three, if there is an extended partition) per physical disk. A primary partition cannot be subpartitioned.

An *extended partition* is created from free space on a hard disk and can be subpartitioned into zero or more logical drives. The free space in an extended partition can also be used to create volume sets or other kinds of volumes for fault tolerance purposes. Only one of the four partitions allowed per physical disk can be an extended partition, and no primary partition needs to be present to create an extended partition. Free space in an extended partition is described as such in the status bar.

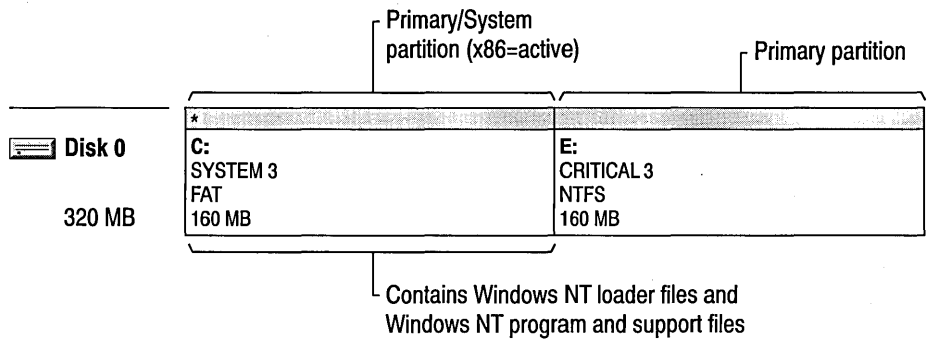
The following illustration shows examples of different disk-partitioning schemes on x86- and RISC-based computers and where certain files might be located.



x86- or RISC-based computers



x86-based computers



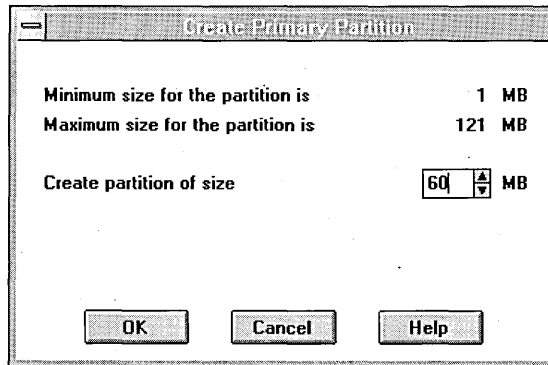
x86- and RISC-based computers

Creating Primary Partitions

When creating primary partitions, the system assigns space to a partition starting from the beginning of the space available. Therefore, in the beginning, there are no gaps between partitions. Gaps only happen when you delete a partition later on. For example, if you delete the second of three partitions and create a new smaller-sized second partition, that will leave a gap of free space between the second and third partitions.

► **To create a primary partition**

1. Select an area of free space on a disk.
2. From the Partition menu, choose Create.



Disk Administrator displays what the minimum and maximum sizes for the primary partition can be.

3. In the Create Primary Partition dialog box, type the size of the primary partition that you want to create.
4. Choose the OK button.

Creating an Extended Partition

One of the four partitions that you can create under Windows NT, if disk space allows, is an extended partition. You can use the free space in the extended partition to create multiple logical drives or use all or part of it when creating volume sets or other kinds of volumes for fault-tolerance purposes.

► **To create an extended partition**

1. Select an area of free space on a disk.
2. From the Partition menu, choose Create Extended.

Disk Administrator displays what the minimum and maximum sizes for the extended partition can be.

3. In the Create Extended Partition dialog box, type the size of the extended partition that you want to create.
4. Choose the OK button.

▷ **To create logical drives in an extended partition**

1. Select an area of free space in an extended partition.
2. From the Partition menu, choose Create.

Disk Administrator displays what the minimum and maximum sizes for the logical drive can be.

3. In the Create Logical Drive dialog box, type the size of the logical drive that you want to create.
4. Choose the OK button.

Formatting and Labeling Partitions

Before you can store files and directories on the partitions that you have created, you must restart your computer and then format each partition individually for use with the file system of the operating system with which you want to work. You can also assign descriptive volume labels at this time.

▷ **To format a partition and label the volume**

1. In the Program Manager window, choose the Command Prompt icon.
2. At the command prompt, type **format /?**

Help information is displayed, showing you the complete command syntax and the meaning of each switch. Be careful not to reformat a partition that already contains information. After typing the appropriate format command, you are asked to assign a volume label to the new volume.

▷ **To change or delete a volume label**

1. In the Program Manager window, choose the Command Prompt icon.
2. At the command prompt, type **label [drive:][label]**

If you do not add a volume label name, the system displays the current label, the volume serial number, and then asks for a new label. Pressing ENTER before supplying a label deletes the current label or leaves the volume without a label.

If you want to change the file system on an existing HPFS or FAT partition to the NTFS format, you can use the CONVERT.EXE utility from the command prompt.

If you want to change the file system on an existing NTFS partition, you must first back up all the information, reformat the partition, and then restore the files. However, if Windows NT is installed on the NTFS partition, you cannot reformat the partition from the command prompt nor delete it from within Disk Administrator. Instead, you must use the Setup program.

▶ **To reformat an NTFS partition containing Windows NT**

1. Back up the information on the partition.
2. Start the Windows NT installation procedure.
3. Choose Express or Custom Installation.
4. When Windows NT Setup asks you to select the partition on which you would like to install, select the NTFS partition and press P to delete the partition.
5. Either continue from here using the Setup program to recreate and format the partition, or quit the Setup program and use the MS-DOS **fdisk** and **format** commands to complete the process.

Marking Partitions as Active

The names commonly used for the partition(s) containing the startup and operating system files are the system and boot partitions, respectively.

The *system partition* for Windows NT is the volume that has the hardware-specific files needed to load Windows NT. On x86-based computers, it must be a primary partition that has been marked as active for startup purposes and must be located on the disk that the computer accesses when starting up the system. There can only be one active system partition at a time, which is denoted on the screen by an asterisk. If you want to use another operating system, you must first mark its system partition as active before restarting the computer.

Partitions on a RISC-based computer are not marked active. Instead, they are configured by a hardware configuration program supplied by the manufacturer. On RISC-based computers, the system partition must be formatted for the FAT file system. On either type of computer, the system partition can never be part of a stripe set or volume set.

The *boot partition* for Windows NT is the volume, formatted for either an NTFS, FAT, or HPFS file system, that has the Windows NT operating system and its support files. The boot partition can be (but does not have to be) the same as the system partition. It also cannot be part of a stripe set or volume set.

▶ **To mark a partition as active on an x86-based computer**

1. Select the primary partition that contains the startup files for the operating system that you want to activate.
2. From the Partition menu, choose Mark Active.
A message advises you that the partition has been marked active and that the operating system on that partition will be started after you restart your computer.
3. In the Disk Administrator message box, choose the OK button.

An asterisk appears in the color bar of the active partition.

Securing System Partitions

Since the system partition on a RISC-based computer must be formatted for the FAT file system, there is no way to secure information in individual directories and files on that partition. Therefore, the only way to secure the system partition is to allow access only to members of the Administrators group.

▷ **To secure the system partition on a RISC-based computer**

1. From the Partition menu, choose Secure System Partition.

A message asks you to confirm this request. When the command is in effect, a check mark appears next to the command in the Partition menu.

2. To activate security on the system partition, restart your computer.

▷ **To remove security from the system partition on a RISC-based computer**

1. From the Partition menu, choose Secure System Partition.

The check mark disappears, but security on the system partition will not actually be removed until you restart your computer.

2. Restart your computer.

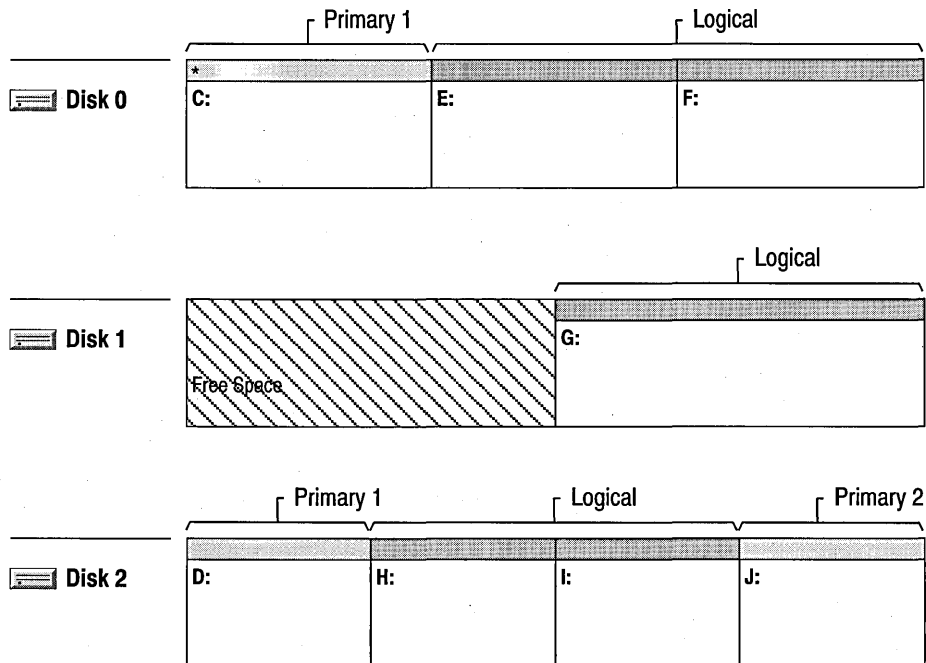
Assigning Drive Letters

You can create more than 24 volumes with Windows NT, but you will not be able to assign more than 24 drive letters for accessing these volumes. Drive letters A and B are reserved for floppy disk drives. However, if you do not have a physical B drive, you can use the letter B for a network drive.

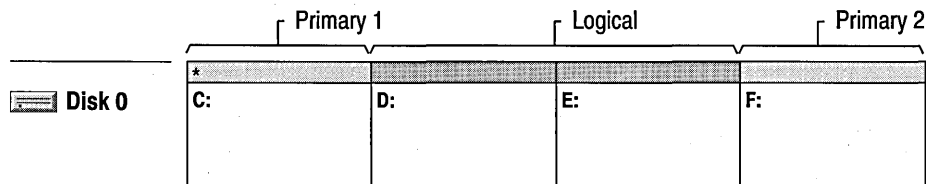
Windows NT allows the static assignment of drive letters. This means that a drive letter can be permanently assigned to a specific hard disk and partition/volume. When a new hard disk is added to an existing computer system, it will not affect statically assigned drive letters.

However, this static assignment of drive letters occurs only after Disk Administrator has been used on the workstation. Until then, drive letters are assigned by Windows NT in the same manner as by MS-DOS, which adheres to the following rule: first the primary partitions on each hard disk get letters assigned starting with the letter "C." Windows NT then continues assigning the next available drive letter to each of the logical drives in order on each hard disk, and then to the secondary primary partitions on each hard disk. The active system partition is typically the C drive.

The following is an example with three hard disks:



The following is an example with only one hard disk:



Note You should be careful when making drive-letter assignments because many MS-DOS and Windows programs make references to a specific drive letter. For example, the Path environment variable shows specific drive letters in conjunction with program names.

▷ **To assign a drive letter**

1. Select the partition or logical drive whose drive letter you want to assign.
2. From the Partition menu, choose Drive Letter.
3. In the Assign Drive Letter dialog box, select the appropriate option button.
If you decide to assign a drive letter, you can either accept the next letter available or select a different one.
4. Choose the OK button.

Deleting Partitions, Volumes, or Logical Drives

Before deleting partitions, volumes, or logical drives under Windows NT, you need to ensure that the information on them has been backed up onto another storage medium and verified, or is no longer needed.

Windows NT places certain restrictions on your freedom to delete. It will not let you delete the volume with the files needed to run Windows NT. Nor can you delete individual partitions that are part of a set without deleting the entire set. But, on a RISC-based computer, you can delete the system partition with the files needed to load Windows NT, so be very careful. Windows NT also requires that all the logical drives or other volumes in an extended partition be deleted before you can delete the extended partition.

However, remember that no changes actually happen until you agree to save them when you quit Disk Administrator.

▷ **To delete a partition, volume, or logical drive**

1. Select the partition, volume, or logical drive.
2. From the Partition menu, choose Delete.
A message advises you that all data will be lost and asks you to confirm your action.
3. In the Confirm message, choose the Yes button.
The partition, volume, or logical drive and any data are deleted, and the space becomes free again.

Adding Hard Disks

The maximum number of hard disks that you can add to a computer depends on your hardware configuration, such as how many SCSI adapters you have attached. After adding additional hard disks to your computer, restart your computer and then start Disk Administrator. Before the Disk Administrator window opens, a message advises you that Disk Administrator has noticed a change and will update the system configuration after you choose the OK button. However, drive letters are not changed by the system when you add new hard disks if they have already been statically assigned.

Recovering Disk Configuration Information

In addition to the Emergency Repair disk that you created during Setup, Disk Administrator provides options for saving and restoring the following currently defined disk configuration information: assigned drive letters, volume sets, stripe sets, stripe sets with parity, and mirror sets.

You can also search for disk configuration information among different installed versions of Windows NT and select a specific version to replace another. However, you should be careful to update this version's information every time you make a change to your disk's configuration. Make your changes first, quit Disk Administrator, restart your computer and Disk Administrator, and then save the configuration information and quit Disk Administrator.

► To save disk configuration information

1. From the Partition menu, choose Configuration.
2. From the Configuration menu, choose Save.

A message describes what will be saved and where you should save it. It also warns you that changes made during this session will not be included.

3. Insert a blank floppy disk, a floppy disk with a previous version of the configuration information, or the Emergency Repair disk.
4. Choose the OK button.

▶ **To restore disk configuration information**

1. From the Partition menu, choose Configuration.
2. From the Configuration menu, choose Restore.

A message warns you that this operation will overwrite your current disk configuration information with what was previously saved on the floppy disk. Also, any changes made during this session will be lost.

3. Insert the floppy disk containing the saved configuration information.
4. Choose the OK button.

▶ **To search for disk configuration information**

1. From the Partition menu, choose Configuration.
2. From the Configuration menu, choose Search.

A message warns you that this operation will overwrite your current disk configuration information with the information from a different installation of Windows NT. Also, any changes made during this session will be lost.

3. Choose the OK button.

Disk Administrator scans your disk for other Windows NT installations and then displays a list of the installations.

4. Select an installation.
5. Choose the OK button.

Deleting Mirror Sets

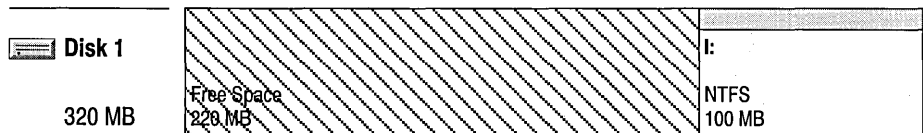
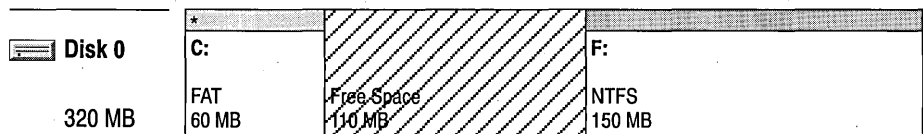
If you are using Windows NT on your computer and inherit several hard disks that were formerly used on a Windows NT Advanced Server computer, you may also inherit two volumes with duplicated, or mirrored, information. Establishing mirror sets and then breaking them, without deleting the information in the two volumes, is part of the fault-tolerance functionality provided with Windows NT Advanced Server.

However, Windows NT will not recognize such volumes unless you first saved the configuration information from the Windows NT Advanced Server computer to a floppy disk and then restored that information on the Windows NT computer. They will appear in the disk bar with the color bar for a primary partition or logical drive, and there will be no drive letter assigned. You may then choose either to assign them drive letters or to delete the volumes and regain the use of that disk space.

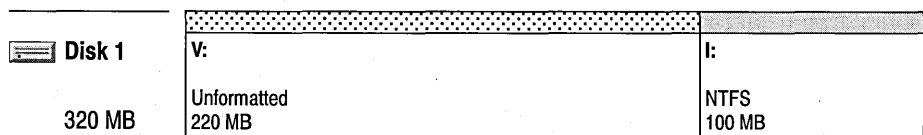
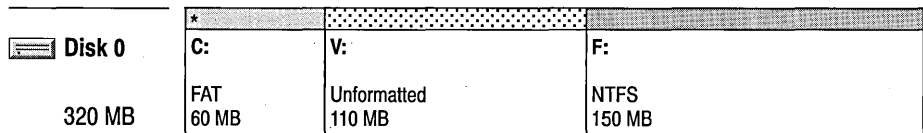
Creating and Deleting Volume Sets

Volume sets are a mechanism for more effectively using the total available free space on a disk. They are created, as shown in the following illustration, by combining various-sized areas of free space on from one to 32 disks into one large logical volume set that is treated like a single partition.

Note Operating systems, such as MS-DOS, that do not have volume-set functionality cannot recognize any volume sets that are created by Windows NT. Therefore, if you create a volume set on a dual-boot computer, those partitions become invisible to MS-DOS.



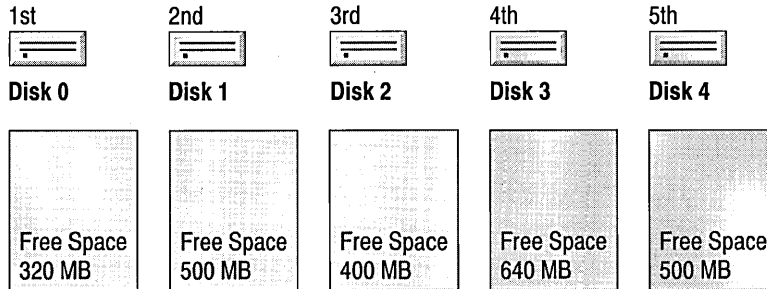
Results showing what the system sees:
Volume set (V:) created from free space
on 2 disks=330 MB



The areas of free space used to create volume sets can be of different sizes, as shown in the following illustration. Volume sets are organized in such a way that the free space on one disk gets filled up and then, starting at the beginning of the next disk, all that free space gets filled up. The process continues in the same way on each subsequent disk up to a maximum of 32.

This volume set is a combination of different-sized areas of free space on 5 hard disks for a total of 2360 MB.

Information is stored in the following order:



Deleting partitions to create free space that is then combined into one volume set also frees up drive letters for other uses, enables the creation of a large volume for file system use, and may improve system performance by better balancing data input and output (I/O) across the drives.

▷ To create a volume set

1. Select two or more areas of free space on from one to 32 hard disks by selecting the first area of free space, and then pressing CTRL and clicking each of the other areas.
2. From the Partition menu, choose Create Volume Set.

Disk Administrator displays the minimum and maximum sizes for the volume set.

3. In the Create Volume Set dialog box, type the size of the volume set that you want to create.
4. Choose the OK button.

If you choose to use less than the total available space, Disk Administrator divides the total size by the number of disks to create almost equal-sized unformatted partitions in each of the selected disks and assigns a single drive letter to the collection of partitions that make up the volume set.

When you no longer want to have a volume set, or you want to reorganize the data on your disks, or you have a problem with a faulty disk drive, you should first back up all the information on the volume set and then choose the Delete command. Deleting the volume set deletes all the information contained in the volume set.

▶ **To delete a volume set**

1. Select the volume set that you want to delete.
2. From the Partition menu, choose Delete.

A message advises you that all the data will be lost and asks you to confirm that you want to delete it.

3. In the Confirm message, choose the Yes button.

Extending Volumes and Volume Sets

Existing NTFS volumes and volume sets can also be extended by adding free space. Disk Administrator forces the system to restart after you quit and save your changes, and then formats the new area without affecting any existing files on the original volume or volume set.

▶ **To extend a volume or volume set**

1. Select an existing volume (that is not part of a stripe set or mirror set) or a volume set and one or more areas of free space.
2. From the Partition menu, choose Extend Volume Set.

Disk Administrator displays the minimum and maximum sizes for the volume set.

3. In the Create Extended Volume Set dialog box, type the size of the volume set that you want to create.
4. Choose the OK button.

Depending on the size that you specified, Disk Administrator determines how much of the free space to use.

Creating and Deleting Stripe Sets

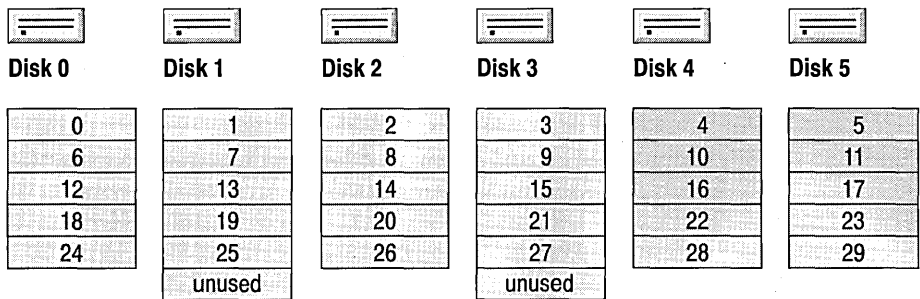
Stripe sets are created similarly to volume sets, but with more restrictions. Each member partition of the stripe set must be on a different disk up to a limit of 32 disks. Also, Disk Administrator will make all the partitions approximately the same size.

Note Operating systems, such as MS-DOS, that do not have stripe-set functionality cannot recognize any stripe sets that are created by Windows NT. Therefore, if you create a stripe set on a dual-boot computer, those partitions become invisible to MS-DOS.

Stripe sets are created by combining areas of free space on from two to 32 disks into one large logical volume. The partitions in stripe sets are all approximately the same size so that the data can be written in stripes across each partition. This enables I/O commands to be issued concurrently and increases throughput.

The following illustration shows a set of six hard disks and how the stripes are distributed across them.

Information is written across the 5 rows of each partition from stripe #0 to #29, leaving 2 areas of unused space.



▶ **To create a stripe set**

1. Select two or more areas of free space on from two to 32 hard disks by selecting the first area of free space on the first disk, and then pressing CTRL and clicking an additional area of free space on each of the other hard disks.
2. From the Partition menu, choose Create Stripe Set.
Disk Administrator displays the minimum and maximum sizes for the stripe set.
3. In the Create Stripe Set dialog box, type the size of the stripe set that you want to create.
4. Choose the OK button.
Disk Administrator divides the total size by the number of disks to create equal-sized unformatted partitions in each of the selected disks and assigns a single drive letter to the collection of partitions that make up the stripe set. If you choose a number that cannot be divided equally, Disk Administrator rounds to the closest higher or lower value.

When you no longer want a stripe set or you have a problem with a faulty disk drive, you should first back up all the information on the stripe set and then choose the Delete command. Deleting the stripe set deletes all the information there.

▶ **To delete a stripe set**

1. Select the stripe set that you want to delete.
2. From the Partition menu, choose Delete.
A message advises you that all the data will be lost and asks you to confirm that you want to delete it.
3. In the Confirm message, choose the Yes button.

Performance Monitor



Performance Monitor provides administrators and other users with a very capable monitoring tool to help with initial performance troubleshooting and capacity planning.

This chapter explains how to use the four windows in Performance Monitor to better understand how well your own computer or other computers on a network are performing. The following main topics are included:

- Monitoring performance
- Charting current activity
- Logging current activity
- Setting alerts on current activity
- Creating reports on current activity
- Working with existing log files

Overview

Performance Monitor is a graphical tool for measuring the performance of your own computer or other computers on a network. On each computer, you can view the behavior of objects such as processors, memory, cache, threads, and processes. Each of these objects has an associated set of counters that provide information on such things as device usage, queue lengths, and delays, as well as information used for throughput and internal congestion measurements.

It provides charting, alerting, and reporting capabilities that reflect current activity along with ongoing logging. You can also open log files at a later time for browsing and charting as if they were reflecting current activity. Performance Monitor is located in the Administrative Tools group in Program Manager.

The following list provides an overview of what you can do with this graphical tool to view the performance of objects:

- View data from any number of computers simultaneously.
- View and dynamically change charts reflecting current-activity counter values that are updated at a user-defined frequency.
- Export data from charts, logs, alert logs, and reports to spreadsheet or database programs for further manipulation and printing.
- Add system alerts that list an event in the Alert Log and, optionally, notify you by reverting to the Alert view or issuing a network alert.
- Run a predefined program every time, or just the first time, a counter value goes over or under a user-defined value.
- Create log files containing data about various objects from different computers.
- Append to one file selected sections of other existing log files to form a long-term archive.
- View current-activity reports or create reports from existing log files.
- Save individual chart, alert, log, or report settings, or the entire workspace setup, and reuse when needed.

Starting and Quitting Performance Monitor



You do not need any special privileges to open Performance Monitor. However, you do need to be logged on as a member of the Administrators group to use the **diskperf** command. This command turns on and off the counters for physical and logical disk activity on your own or another computer. The ability to control the activation of these counters is useful because disk counters can increase disk access time by approximately 1.5% on 386 processors. After restarting the computer, you can then use Performance Monitor to view disk performance data.

► **To activate the physical and logical disk counters**

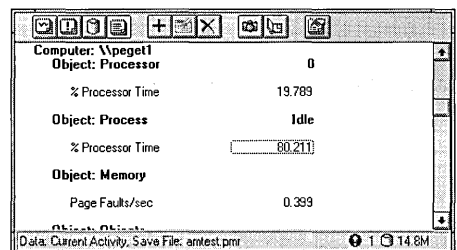
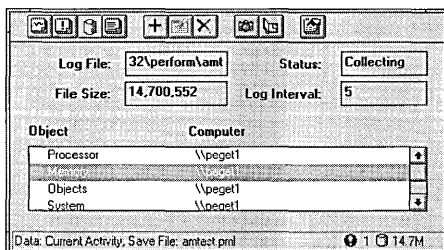
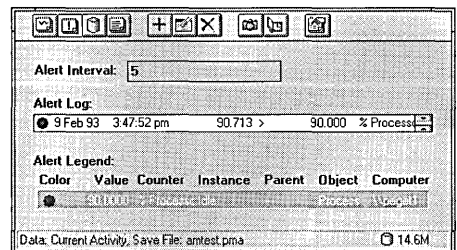
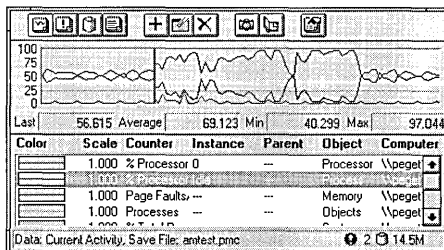
1. Log on as a member of the Administrators group.
2. At the command prompt, type **diskperf** to view help information on how to turn **diskperf** on and off and specify a remote computer's name.

It will also state whether or not the disk performance counters have been activated already on that computer.

3. Restart the computer to activate the disk performance counters.

Double-click the Performance Monitor icon in the Administrative Tools group to display the Performance Monitor window in the Chart view. (You can also type **perfmon** [*settings file*] at the command prompt. The previously saved settings file can consist of selections made within a single view or within all four views, which is known as a Workspace and is saved as a .PMW file. If you do not specify a settings file, Performance Monitor searches the current working directory for the default chart file _DEFAULT.PMC.)

Performance Monitor actually consists of four main windows, which you display by choosing to view Chart, Alert, Log, or Report. All four windows contain different information and have only the menu bar, status bar, and toolbar in common. Both context-sensitive and standard Help is provided for all the Performance Monitor commands.



The following most commonly used commands from the View, Edit, and Options menus are also available on the toolbar:

Chart	Add To	Bookmark
Alert	Edit	Options
Log	Delete From	
Report	Update Now	

An important menu item that is available in all four windows is the Data From command under the Options menu. You use this command to specify if you want to view current activity and work with current values or if you would rather manipulate an existing log file. The default value for displaying data is from current activity. Therefore, you will not need to change it until you want to examine an existing log file.

You can quit Performance Monitor by choosing either Exit from the File menu or Close from the Control menu. Be sure to save your individual chart, alert, log, or report settings, or the entire workspace, to a file before quitting, unless you are sure you will not need that exact combination of settings again.

▶ **To save settings in any view**

1. From the File menu, choose the corresponding Save Settings command.
If you have not already assigned a filename, the Performance Monitor-Save As dialog box appears.
2. Type a name in the File Name box.
3. Choose the OK button.
The assigned filename now appears in the status bar.

▶ **To change the name of a settings file**

1. From the File menu, choose the corresponding Save Settings As command.
2. In the Performance Monitor Save As dialog box, type a name in the File Name box or choose one from the list of existing filenames.
3. Choose the OK button.
The new filename now appears in the status bar.

▶ **To save related settings from all four windows**

1. From the File menu, choose Save Workspace.
2. In the Performance Monitor-Save Workspace As dialog box, type a name in the File Name box or choose one from the list of existing filenames.
3. Choose the OK button.

Organizing Your Screen

You can choose to view one of four windows: Chart, Alert, Log, or Report. The only consistent elements among the four windows are the display options: Menu and Title, Toolbar, Status Bar, and Always On Top. By showing or hiding any of these options, you can vary the amount of screen space available for display purposes. The Always On Top option ensures that Performance Monitor, even when no longer the active window, stays visible over any other window on your screen.

Performance Monitor also has a chart-highlighting feature that provides better visibility for a selected counter by changing the counter's on-screen color to white. While in chart-highlighting mode, you can change selections in the legend area and see the corresponding chart line change to white on the screen. To stop highlighting your selections, you must turn off the chart-highlighting mode.

▷ **To show or hide a display option**

- From the Options menu, choose the appropriate display option's command. When an option is in effect, a check mark appears next to the command on the Options menu.

▷ **To show or hide only the menu bar and title bar**

1. Double-click anywhere in the display area that does not contain text information.
2. Double-click again to reverse the action.

▷ **To move the window while the title bar is hidden**

- Click anywhere in the display area that does not contain text information and drag the mouse to move the window.

▷ **To turn the chart-highlighting mode on or off**

1. To turn the chart-highlighting mode on and change the color of the selected counter to white, press CTRL+H.
2. To stop highlighting selected counters, press CTRL+H again.

Monitoring Performance

Performance Monitor is a graphical tool that almost everybody can use to gain a better understanding of how efficiently their computer is functioning and what the problems might be if it is performing poorly. You can use it to find bottlenecks on a network, to help in capacity planning, to do configuration management, and to verify or predict problem areas in a program design.

You can create charts, set alerts, build log files, and format reports that enable you to monitor the current performance of selected counters and instances for objects on Windows NT such as the following. However, notice that the objects will be different when viewing computers with different operating systems.

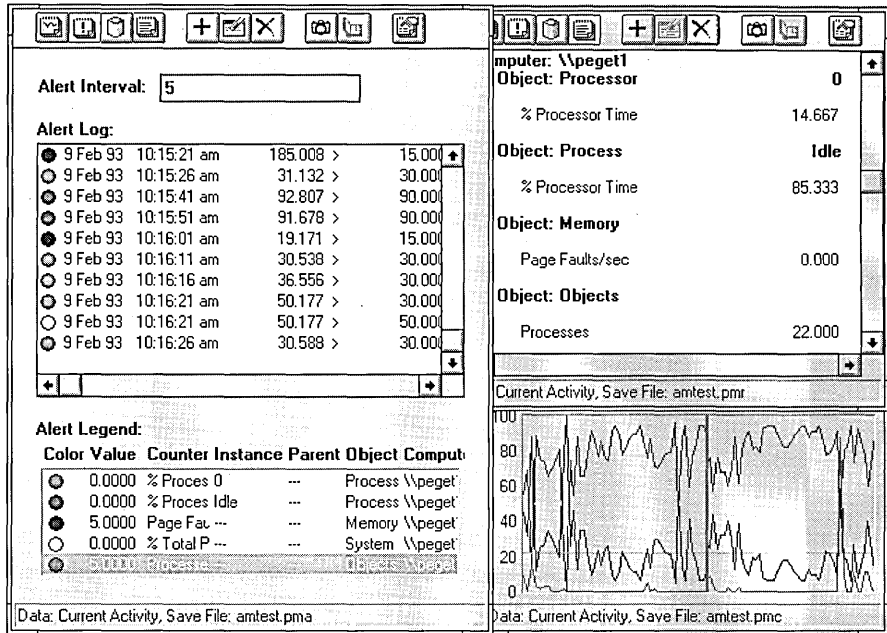
Cache	Paging File	Redirector
LogicalDisk	PhysicalDisk	Server
Memory	Process	System
Objects	Processor	Thread

Different scenarios may demand the use of different features in Performance Monitor. For example, a network administrator may routinely monitor network activity to watch for problems and may also need to report on any failure to provide guaranteed service levels. There may be workload discrepancies between servers, one server may be paging excessively because of insufficient memory, or a server disk may be almost saturated.

System throughput problems usually occur when the demand for resources exceeds the supply. The available resources, in this case, are the microprocessor(s), memory, hard disk(s), and networking hardware and software. Finding out how user applications interact with each of these resources is a logical first step when you start monitoring.

An important second step is to assess the overall load on each of these resources. How close to being saturated is a system processor? How many applications are waiting to use the disk drive? User applications are not the only programs demanding resource time; a number of operating-system processes also consume fixed amounts of each resource.

You can receive immediate feedback on how changes that you make affect the computer. You can also view information gathered over a period of time to see trends before and after the changes were made. And you can view all this in several different ways.



You can view information on current activity as well as from log files that you recorded earlier for viewing at a more convenient time. Current-activity data or selected data from log files can also be exported to a spreadsheet or database program and rearranged to fit your needs. Or, for a quick snapshot of the current activity, you can press ALT+PRINTSCREEN and then use the Paste command in Paintbrush to display a printable bitmap of the active window.

The same objects and counters are available for monitoring in all four views. When you select an object to monitor in Log view, all the counters for that object, or for each instance of that object, are monitored when you start collecting data in a log file. However, when you choose to view the results in one of the other three view windows, you can selectively add those counters and instances that are of interest to you.

Despite its wide applicability, Performance Monitor does not answer every performance-tuning question. It should be thought of as a broad tool that provides an overview of the computer's performance. And, generally, it will be the first tool used on any performance problem. Frequently, you will be able to use it to resolve the problem completely. In other cases, you will use it to indicate which specialized tool (such as a profiler, a working set monitor, a disk optimizer, or a LAN packet sniffer) to use next.

Understanding Objects, Counters, and Instances

When monitoring a system, you are really monitoring the behavior of its objects. In Windows NT, an object is a standard mechanism for identifying and using a system resource. Objects are created to represent individual processes, sections of shared memory, and physical devices. Performance Monitor groups counters by object type. A unique set of counters exists for the processor, memory, cache, hard disk, processes, and other object types that produce statistical information. Certain object types and their respective counters are present on all systems. However, other counters, such as transport-protocol counters, only appear if the computer is running the associated software.

Each object type can have several instances. For example, the Processor object type will have multiple instances if a system has multiple processors. The PhysicalDisk object type has two instances if a system has two disks. Some object types, such as Memory and Server, do not have instances. If an object type has multiple instances, each instance produces the same set of statistics (counter information).

Two object types, Process and Thread, have a particularly close relationship. A Windows NT process is created when a program runs. A process may be either an application (such as Microsoft Word or Corel® Draw), a service (such as Event Log or Computer Browser), or a subsystem (such as the print spooler or POSIX). In addition to an executable program, every process consists of a set of virtual memory addresses and at least one thread.

Threads are objects within processes that execute program instructions. They allow concurrent operations within a process and enable one process to execute different parts of its program on different processors simultaneously. Each thread running on a system shows up as an instance for the Thread object type and is identified by association with its parent process. For example, if Print Manager has two active threads, Performance Monitor identifies them as Thread object instances `Printman ==> 0` and `Printman ==> 1`.

Note Instances of the Process object type appear as numbers if they are internal system processes. Other types of processes are identified by the name of the executable file.

The following table provides a list of sample counters and why you would use them to resolve various problems.

Object: Counter	Description	Significance
Process:		
Working Set	The portion of physical memory allocated to a running application	This value may be larger than the minimum number of bytes actually needed by the process. Therefore, it will change slowly over time depending on the activity of the application.
Memory:		
Available Bytes	The size of the virtual memory that is currently available	If this number falls below a certain threshold, less free memory is available and Windows NT gradually begins to take memory away from the working sets of running applications to ensure that a certain amount of free memory exists.
Pages/sec	The number of pages that had to be read from or written to disk because they were not in physical memory	Check this counter's value if you suspect excessive paging, which would mean that memory demand is exceeding supply and therefore system performance is decreasing. If it is consistently greater than 5 for a single disk, you probably have a memory-caused bottleneck.
Page Faults/sec	The number of page faults in the processor	Data was not immediately available in the specified working set in memory.
Paging File:		
% Usage	The amount of the paging file that is in use	Check this counter's value to see if the size of PAGEFILE.SYS is appropriate. If it nears 100%, consider increasing the initial file size.
% Usage Peak	The peak usage of the system paging file	Check this counter's value to see if the size of PAGEFILE.SYS is appropriate. If it approaches the maximum paging-file setting, consider increasing the initial file size.
Processor:		
% Processor Time	The percentage of elapsed time that a processor is busy executing a non-idle thread	Check this counter's value to see how busy a processor is. Since each process thread requires a certain number of processor cycles when it runs, demand can exceed supply. If long processor queues develop, system response time can suffer.
Interrupts/sec	The rate of service requests from I/O devices	If this counter's value increases dramatically without a corresponding increase in system activity, it could indicate a hardware problem.

Object: Counter	Description	Significance
PhysicalDisk:		
% Disk Time	The percentage of time that a drive is active	If disk I/O is performing properly, there will be less strain on virtual memory, and programs will run faster. If this counter's value is high, check the Disk Queue Length counter. If both values are consistently high, move some files to an additional disk or server or consider upgrading the disk drive.
Disk Queue Length	The number of requests outstanding on the disk at the time the performance data is collected	The number of waiting I/O requests should be sustained at no more than 1.5 to 2 times the number of spindles making up the physical disk. Most disks have one spindle. However, Redundant Array of Inexpensive Disks (RAID) disks usually have more and yet appear as only one physical disk in Performance Monitor.
Avg. Disk sec/IO	The amount of time a disk takes to fulfill requests	If this counter's value is high, it may indicate that the disk controller is continually retrying the disk because of failures. For most disks, high average disk-transfer times correspond to values greater than 0.3 seconds. A missed disk revolution typically adds 16 ms to average disk-transfer time.
Avg. Disk Bytes/IO	The average number of bytes transferred to or from disk during read or write operations	If this counter's value is greater than 20K, the disk drive is generally performing well. Low values result if an application is accessing a disk inefficiently. Applications that access a disk at random also raise Avg. Disk sec/IO times because random transfers require increased seeking time.

Working with Information on Current Activity

Performance Monitor provides four different views for information on the current behavior of objects, counters, and instances. However, you can use the same approach to accessing and working with the information in all four windows: Chart, Alert, Log, or Report.

► **To work in any view with information on current activity**

1. From the view's File menu, choose either a new settings file or open an existing one.

You can open either a separate chart (.PMC), alert (.PMA), log (.PML), or report (.PMR) settings file, or a workspace (.PMW) file containing settings for all four windows.

2. From the view's Edit menu, choose the Add To command to select one or more computers to monitor and the appropriate objects, counters, or instances.

For details on how to select a computer in any view, see the following procedure.

To select multiple objects and counters, select the first item and then do one of the following:

- Press and hold down the SHIFT key and then select the last contiguous item.
 - Drag the mouse until you reach the last contiguous item.
 - Press and hold down the CTRL key and select each non-contiguous item.
3. Choose either the Add To or Edit command to make changes, if you want, to how selections are represented.
 4. From the view's File menu, choose to save selections in a new settings file or update the current one.
 5. From the view's Options menu, change any of the options provided with that view, such as specifying the time interval and update method, hiding and displaying items, changing the graphic format, starting and stopping logging, adding bookmarks, and specifying the notification method.
 6. Change to another window, or view, and repeat the process to gain a different perspective on the same information or to monitor some other aspect of the problem.
 7. If you have related information in all four windows, save the settings for the entire workspace.
 8. If you plan to open certain settings files regularly, use File Manager's File Associate command to associate the five Performance Monitor file-extension types with the Performance Monitor program. Then use Program Manager's File New command to create a new Personal Program Group into which you can put your settings files as new program items. Double-clicking on an item's icon will start Performance Monitor with that settings file already opened.

▷ **To select a different computer**

1. From the view's Edit menu, choose the Add To command.
2. In the Computer box, type the computer's name. Or click the gray button at the end of the box to display the Select Computer dialog box.

The names of the domains or workgroups to which you have access appear in the Select Computer box. The first time you use this, there may be some delay while Performance Monitor searches the accessible domains and workgroups for member computers.

3. Double-click the name of the appropriate domain controller or workgroup to display a list of the servers and workstations connected to it.
4. Select the name of the server or workstation that you want to monitor.
5. Choose the OK button.

Notice that the Add button is disabled while Performance Monitor searches for that computer. If the computer is found, the Add button is enabled again, and the boxes change to show the default settings of the new computer. If the computer is not found, a message appears and you revert back to your own computer's default settings.

Clearing the Display vs. Deleting Selections

You can also use the same approach in all four views to deleting either a full screen of information or a single selection.

▷ **To clear the values displayed on the screen**

- From the view's Edit menu, choose Clear Display.

▷ **To delete a selection**

1. Select the legend, log, or report item that you want to delete.



2. From the view's Edit menu, choose the Delete command. Or choose the Delete button on the toolbar.

Updating the Display

All four views have a command under the Options menu and a button on the toolbar that enable you to update manually the information on the screen. You can use the Update Now command or button between automatic data updates to get a current snapshot of the situation. Each view also has within its own Options dialog box an Update Time box for choosing the automatic updating frequency or for switching to only manual updates.

Notice that time-interval settings also affect the amount of memory and processor time used by Performance Monitor. Monitoring is generally not a large burden on processor time or memory unless you retrieve data very frequently from a large number of computers.

▷ **To update the screen display in any view**



- From the view's Options menu, choose Update Now. Or choose the Update Now button on the toolbar.

▷ **To change the updating method within each view**

1. In the appropriate view's Options dialog box, select either periodic or manual updating.
2. If you selected Periodic Update, type a number in the Interval box to determine the time, in seconds, between updates.
3. Choose the OK button.

Printing a Snapshot of the Window Display

You can use the PRINTSCREEN key to capture a graphical view of the current window at certain intervals or during peak periods to keep a record over time. You can then use the Paintbrush program in the Accessories group to clean up and print out a copy of the window display.

▷ **To print a snapshot of the current window**

1. Press ALT+PRINTSCREEN to copy a view of the active window. If Performance Monitor is maximized, press PRINTSCREEN to copy the whole desktop.
2. Start the Paintbrush program in the Accessories group.
3. From the Edit menu, choose Paste and then, if you want to save the bitmap to a file, choose Save As from the File menu.
4. From the File menu, choose Print.

Exporting Data

When you want to manipulate a snapshot of the current window's data in a spreadsheet or database program before printing it or when you want to change how the information is presented, use the view's Export command.

▷ **To export data to a spreadsheet or database program**

1. From the view's File menu, choose the Export command.
The Performance Monitor - Export As dialog box appears.
2. In the Column Delimiter box, choose either the Tab (*.TSV) or Comma (*.CSV) method for separating the data columns in the file.

3. Select or type a path name, with the appropriate extension for the column delimiter, for the file that you want to export.
If you want to select a file that is on another computer, choose the Network button to display and select from the Network Connections dialog box.
4. Choose the OK button.
5. Start the spreadsheet or database program.
6. Open your Performance Monitor file and work with it.

Working with Information from Log Files

Performance Monitor provides four different views of historical information on the behavior of objects, counters, and instances. As with information on current activity, you can use a similar approach to accessing and working with these existing log files in all four windows: Chart, Alert, Log, or Report.

► To work in any view with information from log files

1. From the view's Options menu, choose Data From to select an existing log file.
2. From the view's Edit menu, choose Time Window to change the starting and stopping times, if necessary.
3. Choose the appropriate Add To command to select one or more computers to monitor and the appropriate objects, counters, or instances.
Or you can open an existing settings file or workspace file with the Open command from the view's File menu.
For details on how to select a computer in any view, see the procedure given in the "Working with Information on Current Activity" section.
5. Choose either the Add To or Edit command to make changes, if appropriate, to how selections are represented.
6. From the view's File menu, choose to save selections in a new settings file or update the current one.
7. From the view's Options menu, change any options, if available, such as hiding and displaying items, changing the graphic format, starting and stopping relogging, specifying the logging interval, and adding bookmarks.
8. Change to another window, or view, and repeat the process to gain a different perspective on the same information or to study some other aspect of the problem.
9. If you have related information in all four windows, save the settings for the entire workspace.

Charting Current Activity

The ability to create customized charts to monitor the current performance of selected counters and instances is useful for doing tasks such as the following:

- Investigating why a computer or application is slow or inefficient
- Continuously monitoring systems to find intermittent performance bottlenecks
- Discovering why you need to increase capacity

For help understanding a selected counter, choose the Explain button in the Add To Chart dialog box to display the Counter Definition box.

▶ **To view the Chart window**



- From the View menu, choose Chart. Or choose the Chart button on the toolbar.

If you are switching from another view, the Chart window is blank unless you already created or opened a chart during that session or from the command prompt.

▶ **To open an existing chart settings file**

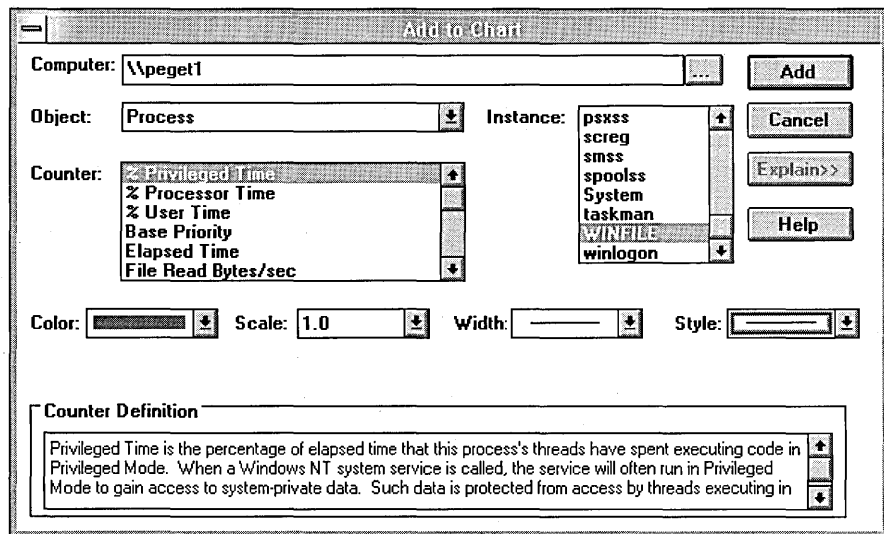
1. From the File menu, choose Open.
2. In the Performance Monitor - File Open dialog box, select or type the path name for the .PMC file containing the selections that you want to reuse.
To select a file that is on another computer, choose the Network button to display and select from the Network Connections dialog box.
3. Choose the OK button.

▶ **To create a new blank chart**

- From the File menu, choose New Chart.

Adding Chart Selections

Different problems require different settings. Creating charts to reflect these different requirements is a simple matter of selecting the computer to be monitored and adding the appropriate objects, counters, and instances. You can then save these selections under a filename for viewing whenever you want an update on their performance. To make the graphs more readable, vary the scale of the displayed information and the color, width, and style of the line for each counter as you add it to the chart. You can also modify these properties after you add a selection.



▶ To add selections to a chart



1. From the Edit menu, choose Add To Chart. Or choose the Add To Chart button on the toolbar.

The Add To Chart dialog box appears with the default settings and your workstation or server listed in the Computer box. To select a different computer, see the procedure given in the “Working with Information on Current Activity” section earlier in this chapter.

2. In the Object box, select an object to monitor from the list of those that are available on the chosen computer.

The Counter and Instance boxes change to display the items that are available for that object on the chosen computer.

3. In the Counter box, select one or more counters.

For a definition of the selected counter, choose the Explain button.

4. In the Instance box, select one or more instances if appropriate.

5. If you do not want the next available color to be assigned to a counter along with the default scale and the default line width and style, make your own selections now.

The scale factor is applied to all the currently selected counters. The factor displayed is multiplied times the counter value, and the product is charted. Notice, however, that the value bar continues to show the actual value, not the scaled value.

6. Choose the Add button.
7. Repeat the process for any additional objects or computers that you want to monitor.
8. When you finish adding selections, choose the Done button.

A list of your selections appears in the legend at the bottom of the window, and Performance Monitor displays the changing values of your selections on the chart. Notice that each displayed value is usually an average over the last two data reads, which are separated by the length of the time interval.

► **To save chart selections in a settings file**

1. From the File menu, choose Save Chart Settings As.
2. In the Performance Monitor - Save As dialog box, select or type a path name for the file that will contain the selections that you want to reuse.
3. Choose the OK button.

Changing Chart Selections

Creating a readable chart is important. Sometimes, you should change the scale at which you graph the counter information to display the activity more in the center of the chart, but the actual reported values are not changed. To make each counter's line stand out better, you might want to vary the color, style, and width used. You might also want to use the chart-highlighting mode on a selected counter.

► **To change how a selected counter is represented on the chart**

1. In the legend, select the counter that you want to change.
2. Double-click the selected counter. Or, from the Edit menu, choose Edit Chart Line. Or choose the Edit Chart Line button on the toolbar.



The same dialog box as the one used for Add To Chart appears, showing only the information for the counter that you selected in the legend.

3. Change any of the following options:

Select an option under	To
Color	Use colors to reflect your personal preferences.
Scale	Change the scale at which the information is displayed. The numbers shown in the value bar, however, are not scaled.
Width	Make the line thicker or thinner. Thick lines, however, cannot be styled.
Style	Use a different style with a thin line.

4. Choose the OK button.

The legend information area now displays the new selections.

- ▶ **To update chart selections that have been saved in a settings file**
 - From the File menu, choose Save Chart Settings.

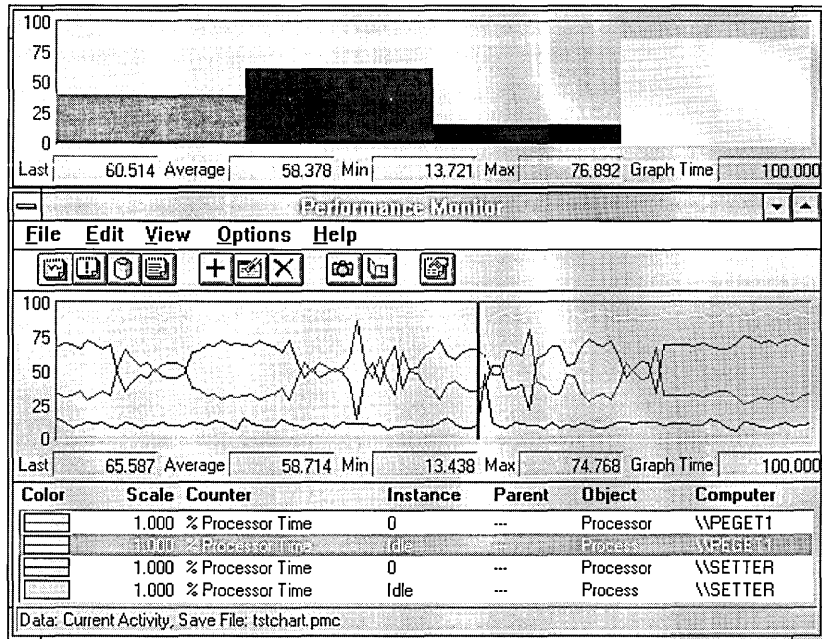
Changing the Chart Options

The Chart window shows a blank grid area and legend until you add information to it by selecting objects, counters, and instances to be monitored with the Add To Chart command from the Edit menu. Choosing the Chart command from the Options menu enables you to customize the charts that you create and change the method used for updating the chart values.

In the Chart Options dialog box, you can choose whether or not to display or hide horizontal and vertical grid lines, vertical labels, the value bar, and the legend and legend-information area.

You can also change the vertical maximum value of the displayed graph labels and the time interval used for graphing the information from the counters. The chosen graph-time interval is reflected in the value bar, which also displays the last, average, minimum, and maximum values for the data visible on the chart.

Finally, you can change from a graph format to a histogram bar-type representation (as shown in the following illustration) of the information that you are gathering. This is useful for better viewing the simultaneous behavior of many instances of the same object.



The Options menu also enables you to update manually the information on the screen. You can use the Update Now command between automatic data updates to get a current snapshot of the situation. In the Chart Options dialog box, use the Update Time box for choosing the automatic updating frequency or for switching to only manual updates.

► To change chart options



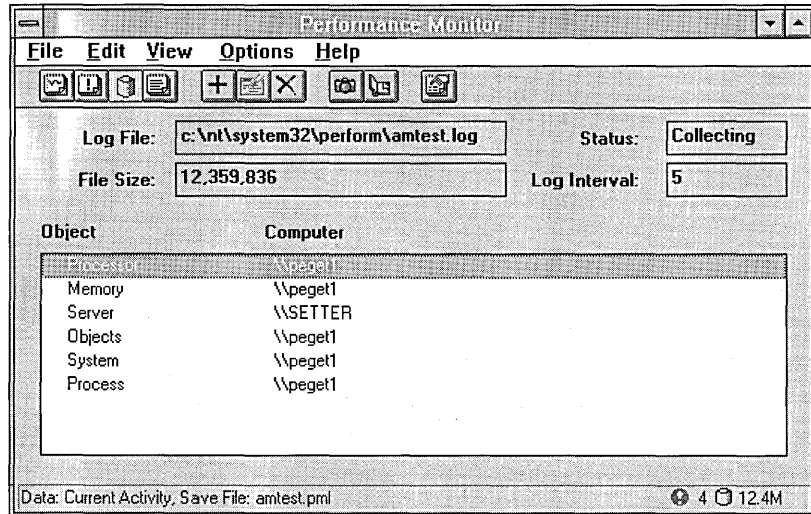
1. From the Options menu, choose Chart. Or choose the Options button on the toolbar.
2. In the Chart Options dialog box, select the options that you want to display.
3. In the Vertical Maximum box, type the maximum value to which the vertical axis should extend.
4. In the Update Time box, select either Manual Update or Periodic Update and then type a number in the Interval box to determine the time, in seconds, between updates of the charts.

The Graph Time value displayed in the value bar shows the time, in seconds, that it takes to create a complete chart across the window.

5. In the Gallery box, select how you want to display information in the chart.
6. Choose the OK button.

Logging Current Activity

Logging enables you to record information on the current activity of selected objects and computers for viewing later.



You can create a log file on the performance of counters and instances for objects on Windows NT. You can also collect data from multiple systems into a single log file. Log files contain detailed data for bottleneck detection or other detailed analysis. For capacity planning, you need to view trends over a longer period, which requires the ability to create a log file and to produce reports from that file.

► To view the Log window



- From the View menu, choose Log. Or choose the Log button on the toolbar.

If you are switching from another view, the Log window is blank unless you already created or opened a log file during that session or from the command prompt.

- ▷ **To open an existing log settings file**
 1. From the File menu, choose Open.
 2. In the Performance Monitor File Open dialog box, select or type the path name for the .PML file containing the selections that you want to reuse.

If you want to select a file that is on another computer, choose the Network button to display and select from the Network Connections dialog box.
 3. Choose the OK button.
- ▷ **To create a new blank log file**
 - From the File menu, choose New Log Settings.

Adding to a Log

You can create different logs to accumulate information on the behavior of selected objects on various computers to be studied later. You can then save these selections under a filename and reuse them when you want to create another log of the same type of information for comparison.

- ▷ **To add selections to a log**



1. From the Edit menu, choose Add To Log. Or choose the Add To Log button on the toolbar.

The Add To Log dialog box appears with the default settings and your workstation or server listed in the Computer box. To select a different computer, see the procedure given in the “Working with Information on Current Activity” section earlier in this chapter.
2. In the Objects box, select an object or set of objects to monitor from the list of those that are available on the chosen computer.
3. Choose the Add button.
4. Repeat the process for any additional computers that you want to monitor.
5. When you finish adding objects, choose the Done button.

A list of your selections appears in the display area.

- ▷ **To save log selections in a settings file**

1. From the File menu, choose Save Log Settings As.
2. In the Performance Monitor - Save As dialog box, select or type a path name for the file that will contain the selections that you want to reuse.
3. Choose the OK button.

Changing the Log Options

The Log window has a display area for listing the objects and their corresponding computers that you have selected with the Add To Log command from the Edit menu. Choosing the Log command from the Options menu enables you to fill in or change the information shown in the gray boxes in the Log window, to start or stop logging, and to change the method used for updating the log values.

The Log window displays a list of objects and computers along with the current file size and the following items that you can specify in the Log Options dialog box:

- Complete path and name of the log file.
- Log Interval in seconds, from 1 to 3600 seconds (1 hour).
- Status, either Collecting or Closed.

The Options menu also enables you to update manually the information on the screen. You can use the Update Now command between automatic data updates to get a current snapshot of the situation. In the Log Options dialog box, use the Update Time box to select either an automatic updating frequency or only manual updates.

► To change the log options



1. From the Options menu, choose Log. Or choose the Options button on the toolbar.
2. In the Log File box, type a name for the log file that you are creating.
If this is the name of an existing file, the new data will be appended to the old data. To replace the old data, you must first delete the file and then create a new one with the old name.
3. In the Update Time box, select either Manual Update or Periodic Update and then type a number in the Interval box, or open the list and select a number to determine the time, in seconds, between updates of the log.
4. If you do not want to start logging yet, choose the OK button.

► To start or stop logging

1. From the Options menu, choose Log.
2. To start logging, choose the Start Log button, which then changes to Stop Log.
If the Start Log button is not enabled, you must first type or select a log file name and add some objects to log.
After you start logging, a log symbol with the changing total file size appears on the right side of the status bar and remains there in all four views.
3. To stop logging, choose the Stop Log button.

Adding Bookmarks

Log files become more usable when you add bookmark comments at various points while logging. Bookmarks serve as reminders by describing the circumstances under which the file was created or by highlighting major points of interest. You can then refer to these bookmarks when you work with the log file later. The Bookmark command becomes available when you start logging.

► To add a bookmark



1. From the Options menu, choose Bookmark. Or choose the Bookmark button on the toolbar.
2. In the Bookmark Comment box, type a comment.
3. Choose the Add button.

Setting Alerts on Current Activity

Alerts enable you to continue working while Performance Monitor tracks events for you and notifies you in the way that you specify. In the Alert view, you can create an alert log that enables you to monitor the current performance of selected counters and instances for objects on Windows NT.

Alert Interval:

Alert Log:

9 Feb 93	10:32:58 am	31.090 >	30.000	% Processor Time, 0, (null), Processor, \\peget1
9 Feb 93	10:32:58 am	30.561 >	15.000	Page Faults/sec, (null), (null), Memory, \\peget1
9 Feb 93	10:33:15 am	30.385 >	30.000	% Processor Time, 0, (null), Processor, \\peget1
9 Feb 93	10:33:19 am	32.348 >	30.000	% Processor Time, 0, (null), Processor, \\peget1
9 Feb 93	10:33:53 am	90.104 >	90.000	% Processor Time, Idle, (null), Process, \\peget1
9 Feb 93	10:34:03 am	92.814 >	90.000	% Processor Time, Idle, (null), Process, \\peget1

Alert Legend:

Color	Value	Counter	Instance	Parent	Object	Computer
●	> 30.0000	% Processor Time	Idle	---	Processor	\\peget1
●	> 15.0000	Page Faults/sec	---	---	Memory	\\peget1
○	> 50.0000	% Total Processor Time	---	---	System	\\peget1
●	> 25.0000	Processes	---	---	Objects	\\peget1

Data: Current Activity, Save File: amtest.pma

With the alert log, you can monitor several counters at the same time. When a counter exceeds a given value, the date and time of the event are recorded in the Alert window. A total of one thousand events are recorded, after which the oldest event is discarded when the next new one is added. An event can also generate a network alert. When an event occurs, you can have a specified program run every time or just the first time that it occurs.

For help understanding what a selected counter shows, choose the Explain button in the Add To Alert dialog box to display the Counter Definition box.

▶ **To view the Alert window**



- From the View menu, choose Alert. Or choose the Alert button on the toolbar.

If you are switching from another view, the Alert Log area is blank unless you already created or opened an alert log file during that session or from the command prompt.

▶ **To open an existing alert log settings file**

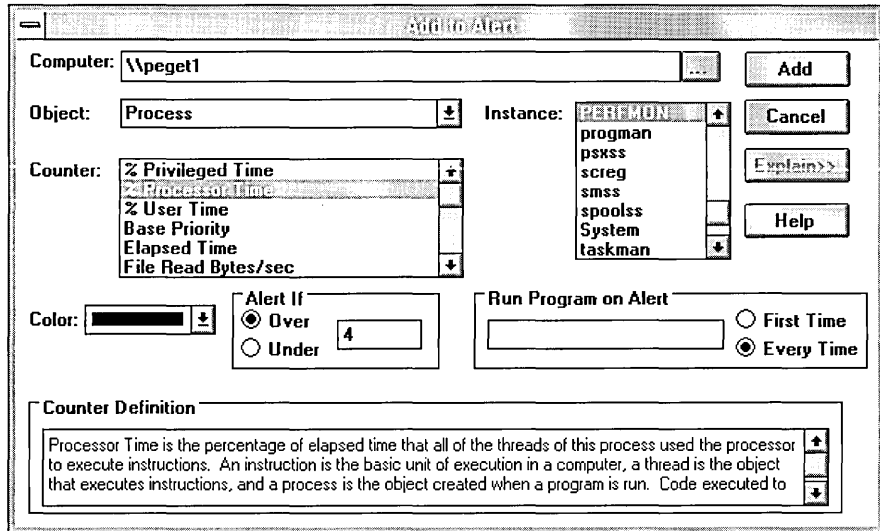
1. From the File menu, choose Open.
2. In the Performance Monitor - File Open dialog box, select or type the path name for the .PMA file containing the selections that you want to reuse.
If you want to select a file that is on another computer, choose the Network button to display and select from the Network Connections dialog box.
3. Choose the OK button.

▶ **To create a new blank alert log file**

- From the File menu, choose New Alert Settings.

Adding Alert Selections

You can create alert logs to warn yourself about problems in different situations. You can then save these selections under a filename and reuse them when you want to see if the problems have been fixed.



► To add selections to an alert log



1. From the Edit menu, choose Add To Alert. Or choose the Add To Alert button on the toolbar.

The Add To Alert dialog box appears with the default settings and your workstation or server listed in the Computer box. To select a different computer, see the procedure given in the “Working with Information on Current Activity” section earlier in this chapter.

2. In the Object box, select an object to monitor from the list of those that are available on the chosen computer.
The Counter and Instance boxes change to display the items that are available for that object on the chosen computer.
3. In the Counter box, select one or more counters.
For a definition of the selected counter, choose the Explain button.
4. In the Instance box, select one or more instances if appropriate.
5. If you do not want the next available color to be assigned to a counter, make your own selection now.
6. In the Alert If box, select either Over or Under and add a value that is appropriate for that counter.
7. In the Run Program On Alert box, select either First Time or Every Time and type the complete path name for the program or macro that you want to run whenever the specified alert occurs.

The Alert Log entry is passed to the program on the command line.

8. Choose the Add button.
9. Repeat the process for any additional objects or computers that you want to monitor.
10. When you finish adding selections, choose the Done button.

A list of your selections appears in the Alert Legend box at the bottom of the window, and Performance Monitor displays the resulting alerts in the Alert Log area. Notice that each alert value is usually an average over the last two data reads, which are separated by the length of the time interval.

When an alert occurs while you are not in the Alert view, an alert icon appears in the status bar showing the number of alerts that have occurred since you were last in the Alert view.

▶ **To save alert log selections in a settings file**

1. From the File menu, choose Save Alert Settings As.
2. In the Performance Monitor - Save As dialog box, select or type a path name for the file that will contain the selections that you want to reuse.
3. Choose the OK button.

Changing Alert Selections

After monitoring the alert log for a while, you may decide to change the Alert If criterion, what program to run and how often to run it, or the color used to display certain alerts.

▶ **To change how a selected counter is represented in the alert log**



1. Double-click the selected counter in the legend. Or, from the Edit menu, choose Edit Alert Entry. Or choose the Edit Alert Entry button on the toolbar.

The same dialog box as the one used for Add To Alert appears, showing only the information for the counter that you selected in the legend.

2. Change any of the following options:

Select an option under	To
Color	Use colors to reflect your personal preferences.
Alert If	Change the alert warning criterion.
Run Program On Alert	Change how often the program is run or change to a different program.

3. Choose the OK button.

The Alert Legend information area now displays the revised selections.

- ▷ To update alert log selections that have been saved in a settings file
 - From the File menu, choose Save Alert Settings.

Changing the Alert Options

The Alert window has a display area for an alert log reflecting current activity, an Alert Legend box showing the information that you selected for logging with the Add To Alert command from the Edit menu, and an Alert Interval box showing, in seconds, how often you want the system to be monitored.

The Options menu enables you to update manually the information on the screen. You can use the Update Now command between automatic data updates to get a current snapshot of the situation. In the Alert Options dialog box, use the Update Time box to select either an automatic updating frequency or only manual updates.

Choosing the Alert command from the Options menu enables you to specify not only the alert interval but also how you want to be notified when an alert occurs, which can be by either or both of the following two methods:

- Switching to the Alert view
- Sending a network alert message to yourself or someone else

▷ To change alert options



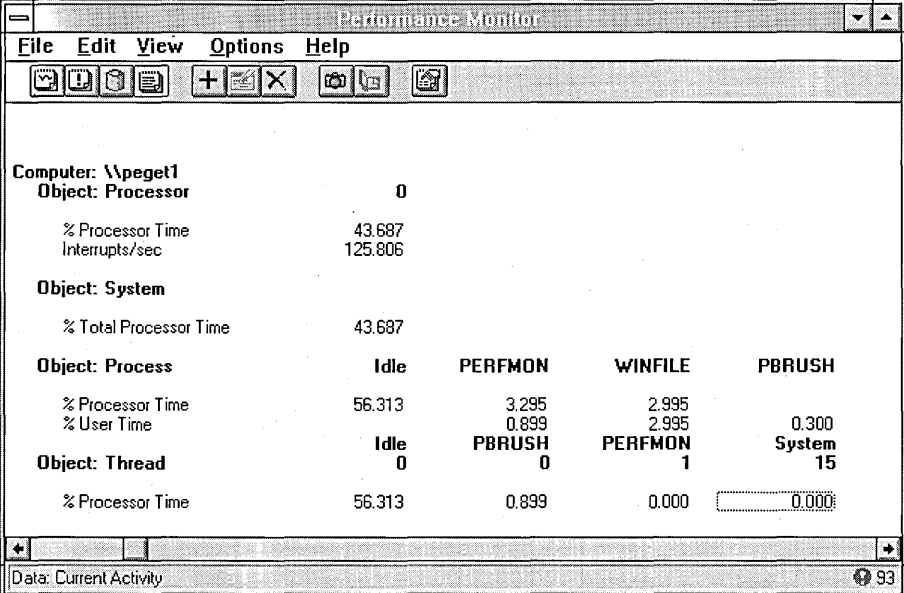
1. From the Options menu, choose Alert. Or choose the Options button on the toolbar.
2. In the Alert Options dialog box, select one or both of the notification options: Switch to Alert View or Send Network Message.
3. In the Network Alert box, type the computername, without backslashes (\\), of the recipient's computer or another predefined name on the recipient's computer in the Net Name box.

The Messenger service must already be started and the net name defined on the recipient's computer. To do so, at the command prompt, type **net start messenger /?** and **net name /?** to view Help information on how to use these commands.

4. In the Update Time box, select either Manual Update or Periodic Update and then type a number in the Interval box to determine the time, in seconds, between updates of the alert log.
5. Choose the OK button.

Creating Reports on Current Activity

The Report view provides a simple report format for displaying constantly changing values.



The screenshot shows the Performance Monitor window with a report for 'Current Activity'. The report is organized into sections for different objects: Processor, System, Process, and Thread. Each section lists various performance counters and their values. The Process section includes columns for specific processes: Idle, PERFMON, WINFILE, and PBRUSH. The Thread section includes columns for Thread ID, PBRUSH, PERFMON, and System ID.

Computer: \\\peget1	
Object: Processor	0
% Processor Time	43.687
Interrupts/sec	125.806
Object: System	
% Total Processor Time	43.687
Object: Process	Idle PERFMON WINFILE PBRUSH
% Processor Time	56.313 3.295 2.995
% User Time	0.899 2.995 0.300
Object: Thread	Idle PBRUSH PERFMON System
	0 0 1 15
% Processor Time	56.313 0.899 0.000 0.000

Data: Current Activity 93

With Performance Monitor, you can create reports showing current information on counter and instance values for selected objects. The information is presented in columns for each individual instance. You can adjust report intervals, print snapshots, and export data.

For help understanding a selected counter, choose the Explain button in the Add To Report dialog box to display the Counter Definition box.

► To view the Report window



- From the View menu, choose Report. Or choose the Report button on the toolbar.

If you are switching from another view, the Report window is blank unless you already created or opened a report file during that session or from the command prompt.

- ▷ **To open an existing report settings file**
 1. From the File menu, choose Open.
 2. In the Performance Monitor - File Open dialog box, select or type the path name for the .PMR file containing the selections that you want to reuse.

If you want to select a file that is on another computer, choose the Network button to display and select from the Network Connections dialog box.
 3. Choose the OK button.

- ▷ **To create a new blank report file**
 - From the File menu, choose New Report Settings.

Adding to a Report

Creating reports using current activity can help you to gain a better understanding of object behavior. You can create a report on all the counters for a given object and then watch them change under various loads. For example, certain counter values, such as Working Set, are relatively static, while others, such as % Processor Time, change constantly. At application startup, it is normal to see the % Processor Time value climb sharply, decrease, and then level off.

You can also create reports to reflect the same information that you are charting or to monitor other specific situations. You can then save these selections under a filename and reuse them when you need an update on the same information.

- ▷ **To add selections to a report**



1. From the Edit menu, choose Add To Report. Or choose the Add To Report button on the toolbar.

The Add To Report dialog box appears with the default settings and your workstation or server listed in the Computer box. To select a different computer, see the procedure given in the “Working with Information on Current Activity” section earlier in this chapter.

2. In the Object box, select an object to monitor from the list of those that are available on the chosen computer.

The Counter and Instance boxes change to display the items that are available for that object on the chosen computer.

3. In the Counter box, select one or more counters.

For a definition of the selected counter, choose the Explain button.

4. In the Instance box, select one or more instances if appropriate.
5. Choose the Add button.
6. Repeat the process for any additional objects or computers that you want to monitor.
7. When you finish adding selections, choose the Done button.

A list of your selections by computer and object appears in the report area, and Performance Monitor displays the changing values of your selections in the report. Notice that each displayed value is usually an average over the last two data reads, which are separated by the length of the time interval.

▶ **To save report selections in a settings file**

1. From the File menu, choose Save Report Settings As.
2. In the Performance Monitor - Save As dialog box, select or type a path name for the file that will contain the selections that you want to reuse.
3. Choose the OK button.

Changing the Report Option

The Report window shows a blank screen until you add information to it by selecting objects, counters, and instances to be monitored with the Add To Report command from the Edit menu. The Options menu enables you to update manually the information on the screen. You can use the Update Now command between automatic data updates to get a current snapshot of the situation. Choosing the Report command from the Options menu enables you to select either an automatic updating frequency or only manual updates.

▶ **To change the report updating method**



1. From the Options menu, choose Report. Or choose the Options button on the toolbar.
2. In the Update Time box, select either Manual Update or Periodic Update and then type a number in the Interval box, or open the list and select a number to determine the time, in seconds, between updates of the report.
3. Choose the OK button.

Working with Existing Log Files

Existing log files can provide a wealth of information for troubleshooting or planning. Whereas charting, setting alerts, and creating reports on current activity provide instant feedback, working with existing log files enables you to change the way you look at that feedback and gain a different perspective on the information.

You can examine the information much more thoroughly in a log file than you can while it is happening. You can move around in a log file (that is, change the start and stop times) by using the Time Window command from the view's Edit menu. The times selected will apply to all four views.

Changing the times is easiest to do in the Chart window. Add your selections to the chart first. You can then move the Input Log File Timeframe dialog box out of the way so you can see the gray vertical lines move on the chart as you move the ends of the slide bar. Set up a time window with this method that is appropriate for your needs and then set your alerts, create reports, or relog the data.

► To select an existing log file

1. From the Options menu, choose Data From.
2. In the Data Values Displayed From box, select Log File.
3. In the Log File box, type the log's filename. Or click the gray button at the end of the box to display the Open Input Log File dialog box from which you can select a file.

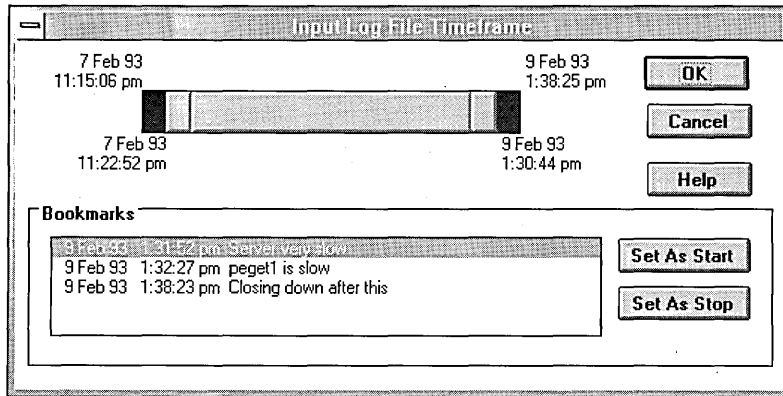
If you want to select a file that is on another computer, choose the Network button to display and select from the Network Connections dialog box.

4. Choose the OK button.

This also activates the Time Window command in the Edit menu.

► **To change the time window for the logged information**

1. From the Edit menu, choose Time Window.



2. In the Input Log File Timeframe dialog box, use one or a combination of both of the following methods to specify how much information you want to display.
 - To change the starting and stopping points to be used, drag the corresponding end of the time interval slide bar.

Notice that in charting, as you drag the ends of the slide bar, you are also moving two gray vertical lines on the chart.
 - To use bookmarks as starting or stopping points, select the appropriate bookmark and choose either the Set As Start button or the Set As Stop button.
3. Choose the OK button.

The screen display changes to reflect the selected time frame.

Charting Input Log Files

When you need a graphical view of a log file, you can open an existing one in Chart view to see how the values changed over a defined period of time. You can also change the time intervals displayed, choose which counters to chart, edit the chart, print a snapshot, and export the data to a spreadsheet or database program for further manipulation and printing.

▷ **To chart an input log file**

1. From the Options menu in the Chart view window, choose Data From.
2. Select a log file name from either your own computer or another one on the network.
3. From the Edit menu, choose any of the following commands:
 - Add To Chart, to choose which counters from which computers to chart.
 - Edit Chart Line, to change any of the selection settings.
 - Delete From Chart, to remove any counters that are not interesting or needed.
 - Time Window, to change the displayed starting and stopping points.
4. From the Options menu, choose Chart to hide or display any items, change the vertical maximum, or change from a graph format to a histogram.
5. From the File menu, choose any of the following commands:
 - Save Chart Settings As, to update changes made to the current chart settings file or to create a new file for these setting selections.
 - Export Chart, to export the data from the displayed chart to a spreadsheet or database program.

Setting Alerts on Input Log Files

You can take an existing log file and set alerts in the Alert Log to see where values exceeded or went below various alert values. All the counters for those objects that you chose to log will appear in the Add To Alert dialog box. You can now define your Alert Log by selecting only those computers and counters that you need.

▶ **To set alerts on an input log file**

1. From the Options menu in the Alert view window, choose Data From.
2. Select a log file name from either your own computer or another one on the network.
3. From the Edit menu, choose any of the following commands:
 - Add To Alert, to choose which counters from which computers to relog with alerts.
 - Edit Alert Entry, to change any of the selection settings.
 - Delete Alert, to remove any counters that are not interesting or needed.
 - Time Window, to change the displayed starting and stopping points.
4. From the Options menu, choose Alert to select the update-time interval.
5. From the File menu, choose any of the following commands:
 - Save Alert Settings As, to update changes made to the current alert settings file or to create a new file for these setting selections.
 - Export Alert, to export the data from the alert log to a spreadsheet or database program.

Relogging Input Log Files

By changing certain options when relogging, you can significantly condense large log files. You can relog with a longer time interval either all or only selected objects in an existing log file. You can also change the start and stop times and relog only the data within that time frame.

When you direct the output to an existing log file, that output is appended to the end of the file, thus creating a single, smaller archive file.

▷ To relog an input log file

1. From the Options menu in the Log view window, choose Data From.
2. Select a log file name from either your own computer or another one on the network.
3. From the Edit menu, choose any of the following commands:
 - Add To Log, to choose which objects from which computers to relog.
 - Delete From Log, to remove any objects that are not needed.
 - Time Window, to change the displayed starting and stopping points.
4. From the Options menu, choose Log to change the log file name, the logging interval, and to start relogging.

If you select an existing log file for output, the data will be appended. To enable the Relog File button, you must first provide a filename and select some objects to log.

5. From the File menu, choose any of the following commands:
 - Save Log Settings As, to update changes made to the current log settings file or to create a new file for these setting selections.
 - Export Log, to export the log setting to a spreadsheet or database program.

Reporting Based on Input Log Files

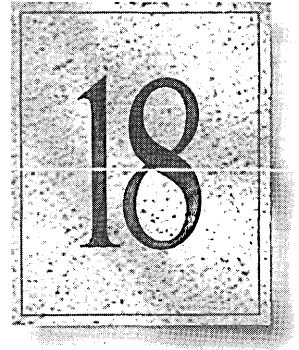
You can create simple reports from existing log files the same as you would with current activity values. However, here the values shown represent the counter values over the selected time frame.

▶ **To create a report from an input log file**

1. From the Options menu in the Report view window, choose Data From.
2. Select a log file name from either your own computer or another one on the network.
3. From the Edit menu, choose any of the following commands:
 - Add To Report, to choose which counters from which computers to display in the report.
 - Delete From Report, to remove any counters that are not interesting or needed.
 - Time Window, to change the displayed starting and stopping points.
4. From the File menu, choose any of the following commands:
 - Save Report Settings As, to update changes made to the current report settings file or to create a new file for these setting selections.
 - Export Report, to export the data from the report to a spreadsheet or database program.

CHAPTER 18

Troubleshooting



This chapter describes ways of troubleshooting various problems that can arise while installing, starting, and running Windows NT. The chapter discusses problems in these areas:

- Hardware compatibility
- Installation
- Starting Windows NT or an alternate operating system
- Logging on to Windows NT
- Performance
- Networking
- Starting services or subsystems
- Removing an NTFS partition

For additional information, check the Read Me icon in the Main program group.

Hardware Configuration Problems

The following sections discuss common hardware problems that can prevent Windows NT from installing, starting, or operating properly. See also “Network Problems,” later in this chapter.

SCSI Drives

Windows NT currently supports up to seven SCSI and two non-SCSI drives on a given single controller. If you have trouble with a SCSI drive, make sure the SCSI bus is set up properly (refer to your hardware documentation for specific details):

- The ends of the SCSI bus must have terminating resistor packs (also called “terminators”) installed. If you have only internal or only external SCSI devices, the ends of the bus are probably the SCSI adapter and the last device on the cable. If you have both internal and external SCSI devices, the adapter probably is in the middle of the bus and should not have terminators installed.
- If you disconnect a device that has terminators installed (such as an external CD-ROM drive), be sure to install terminators on whatever device then becomes the last one on the bus.
- One of the devices on the SCSI bus, usually the adapter, should be configured to provide termination power to the bus.

Make sure the SCSI ID of the CD-ROM drive is not 0 or 1. Some SCSI adapters reserve IDs 0 and 1 for hard drives. If your CD-ROM drive has an ID of 0 or 1, you may see an extra partition that does not exist. The SCSI ID is usually set by jumpers on the device.

If you have a SCSI hard disk drive that uses removable media, such as a cartridge drive, make sure that there is media mounted in the drive before running Setup. If no media is in the drive, errors may occur during Setup that prevent installation of Windows NT.

In some cases, adding or removing a SCSI adapter may prevent your system from starting correctly. For information on configuring SCSI adapters, check the Read Me item in the Main program group.

Network Adapter Cards

Devices cannot share interrupt request (IRQ) numbers, memory buffer addresses, or ROM addresses. Make sure there are no conflicts among network adapters or between the system board and adapters. Sometimes these are set with jumpers or switches on the hardware (refer to your hardware documentation for specific details), sometimes with software. If the network card can be configured through software, you can do so with Windows NT Setup. For more information, see “Network Adapter Card Settings,” later in this chapter.

Video Display Drivers and Adapter Cards

Note The information in this section is applicable to x86-based computers only.

If you choose a display mode in Setup that your hardware does not support, you will need to reinstall Windows NT. Unsupported video adapters should be set up as VGA in Windows NT Setup. If, after installation, you change your display type to one that is not compatible with your display adapter and monitor, you can recover the previous working configuration (the Last Known Good Configuration). For more information, see “Repairing Your System,” in Chapter 12, “System Maintenance with Windows NT Setup.”

In certain cases Setup may incorrectly identify your video card. If this happens, reinstall and select a VGA card during Setup.

Installing Windows NT

Make sure your disk has enough space to install Windows NT. For more information, see “System Requirements” in “Welcome.”

Remember that you cannot install Windows NT on a disk partition configured with any disk compression products.

Installing Using WINNT.EXE

The WINNT.EXE program must be run from MS-DOS on an x86-based computer. It cannot be run from Windows 3.1, OS/2, or Windows NT. To see usage information for WINNT.EXE, type **winnt /?** at the MS-DOS prompt.

When you install Windows NT using WINNT.EXE, Setup stores temporary files on your computer. Setup puts these files on the first available drive with enough space on it. It may choose a drive that is not supported by Windows NT Setup, such as a drive on a secondary IDE or ESDI controller or on an unsupported SCSI disk. If this happens, the following message appears: "Setup is unable to locate the hard drive partition prepared by the MS-DOS portion of Setup." In this case, run WINNT.EXE again and specify a supported drive using the /t parameter.

Starting Windows NT

Windows NT starts in the following sequence:

1. When Windows NT is installed, it alters the system's boot record to look for and run a program called NTLDR.
2. NTLDR runs NTDETECT.COM, which builds a list of the system's hardware components.
3. NTLDR reads BOOT.INI and builds a menu of the operating systems that you can start.

BOOT.INI is a system text file that has two sections: the first specifies the default operating system to start and a time-out value specifying how long to wait before starting automatically, and the second specifies the operating systems that you can start. For example, if your system is configured to run either Windows NT or MS-DOS, BOOT.INI typically looks like this:

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition(1)\winnt

[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\winnt="Windows NT"
c:\="MS-DOS"
```

You can edit the text displayed in quotes to customize the operating system choices, but you must first change the read-only attribute of the file. To do this, open File Manager. Choose By File Type in the View menu, and then select the Show Hidden/System Files box. Highlight the BOOT.INI file and select Properties from the File menu. Clear the Read Only Attribute box and edit the file using Notepad. Make the file read-only when you are done.

Alternatively, type **attrib -s -r c:\boot.ini** at the command prompt, and then edit the file.

4. You can select an operating system from the menu, or let the time count down to 0 to start the default operating system.

If you don't see the menu and the default operating system automatically starts, the time-out value has been set to 0.

5. The low-level components of Windows NT load, and then Windows NT initializes the drivers and starts the services in accordance with information stored in the Registry.
6. The high-level components of Windows NT load, and then the Welcome screen is displayed so you can log on.

Once Windows NT starts successfully, back up your configuration directory (\WINNT\SYSTEM32\CONFIG). As you change your configuration and accounts, maintain current backups. If you have to use the Emergency Repair disk that you made when you installed Windows NT to restore the system, the configuration may revert to what it was when the system was first installed. Rather than having to reconfigure the system and recreate all the accounts, you can just restore the configuration from your backup.

If Windows NT does not start, make sure that the statements in BOOT.INI (found in the root directory of your system partition) refer to the correct path for the \WINNT directory.

For x86-based systems, do not delete BOOT.INI, NTLDR, BOOTSECT.DOS, NTDETECT.COM, or NTBOOTDD.SYS (if Windows NT is installed on a SCSI disk) in the root directory of the system partition. For RISC systems, do not delete HAL.DLL or OSLOADER.EXE in \OS\NT. If these hidden system files are deleted, the system will not start. Use the Emergency Repair disk to recover these files.

If you made changes to a system that used to start Windows NT successfully and now doesn't start, you can return to your previous configuration and start Windows NT by doing the following:

1. If your system starts both Windows NT and another operating system, press the SPACEBAR immediately after selecting Windows NT from the Boot Loader menu. If your system starts directly into Windows NT, press the SPACEBAR when the words "OS Loader" appear.
A Configuration Recovery menu appears that lets you select one of the following choices:
 - Use Current Startup Configuration
 - Use Last Known Good Configuration
 - Restart Computer
2. The Last Known Good Configuration is the configuration that last successfully started Windows NT. Select it to start Windows NT as it was before you made the changes that prevented it from starting.

If Windows NT still won't start, use the Emergency Repair disk to recover the system. If the Emergency Repair disk doesn't recover the system, reinstall Windows NT. For instructions on using the Emergency Repair disk, see "Repairing Your System" in Chapter 12, "System Maintenance with Windows NT Setup."

Starting an Alternate Operating System

If the alternate operating system does not start, make sure that the statements in `BOOT.INI` (found in the root directory of your system partition) specify the correct path for that operating system.

The file `BOOTSECT.DOS` contains the boot record for the alternate operating system (whether or not the alternate is MS-DOS). The startup fails if the system cannot find `BOOTSECT.DOS` in the root directory of the system partition.

If you have OS/2 Boot Manager installed on your computer and want to continue to use it after Windows NT installation is complete, you need to reenale it. Start Disk Administrator from the Administrative Tools group in Program Manager. Select the OS/2 Boot Manager partition, then select Mark Active from the Partition menu. To return to booting Windows NT, use `FDISKPM` in OS/2 to make the Windows NT partition available.

Logging On

There are a variety of reasons why you may not be able to log on to Windows NT. An administrator can use Event Viewer in Administrative Tools to look at the audit trail of security events to determine why you were not able to log on, and can use User Manager to resolve problems with your account or password. The Audit policies for your account must include Failure for Logon and Logoff events in order for such problems to be displayed in the security log. When viewing the security log, the administrator should filter out all events except Failure Audit.

Some of the possible problems with logging on include the following:

- Passwords are case-sensitive and you used the wrong case. For example, if your password is "Test," you cannot use a password of "TEST" to log on. Check that the CAPS LOCK key is not on.
- You forgot your password. There is no way to determine your old password. An administrator can give you a new password.
- Your account or your password may be expired. An administrator can reenale it.

- You were required to enter a new password, and you may have entered one that is less than the minimum length set for the account. Also, there may be a restriction on your account concerning the reuse of an old password.
- You have reinstalled Windows NT but the domain administrator has not yet replaced your old computer account with a new one. Until your computer has a new account, you will be unable to log on to the domain.
- Your account may be disabled. An administrator can re-enable it.
- The workstation may be locked by a previous user. If that is the case, only that person or an administrator can unlock the workstation.
- You may be trying to log on at a time during which you are not allowed. An administrator can set times that you are permitted to log on.
- If you are logging on remotely from a workstation:
 - You may be allowed to log on only at certain computers.
 - You may be trying to log on to the wrong domain for your account.
 - The network may be down.

Performance Problems

If you experience performance problems while running Windows NT, make sure:

- The turbo function on your computer (if present) is active.
- The maximum system paging file size is adequate for your memory requirements. If its size approximates the maximum paging file size (set in the System option of Control Panel), consider increasing the maximum file size setting.

You can improve screen display rates by decreasing video resolution. If lower resolution is acceptable, use Windows NT Setup in the Main program group to decrease your resolution. Video response depends largely on computer architecture and your video adapter card.

Network Problems

Common network problems include hardware problems with the network itself, incompatible protocols running on different devices in the network, duplicate computer names, and interrupt request (IRQ) number conflicts. There may also be physical problems with the cabling and other hardware that prevents the network from operating properly.

If network problems persist, use Event Viewer from the Administrative Tools group to review the error log information generated during startup. Details in the system error log will reveal possible interrupt conflicts or other driver problems.

Duplicate Computer Names

Each computer on a network must have a unique name. If you specify a computer name that is the same as another computer on the network or the same as a workgroup or a domain, the network will not start when you run Windows NT.

Network Adapter Card Settings

If your network adapter card can accept more than one type of cable, make sure that the card is configured for the cable that you are plugging into it. Refer to the documentation that came with the card for details.

When you configure the network adapter card, you must select the correct interrupt request (IRQ) number, I/O port base address, and memory buffer address. On older network cards, you set jumpers or switches on the card for each of these items; with newer cards, you can program them with the driver software using only the I/O port address.

If you are not sure about which network card is installed in your computer or what its settings are, accept the defaults proposed by Windows NT Setup. After Setup is complete, you can use the Network option in Control Panel to install and configure network settings. For information about completing any options in the dialog boxes that appear during the network portion of Setup or when you run the Network option in Control Panel, use the Help button.

For the correct settings for your particular hardware, see the documentation for your network card and other devices such as SCSI adapters, or contact your hardware manufacturer.

You do not have to specify settings for built-in Ethernet capabilities on RISC-based computers from Acer, MIPS, and Olivetti®.

The default settings for network adapter cards in Windows NT are listed in the following table.

Card name	Default setting
3Com :	
EtherLink II, EtherLink II / TP, EtherLink II/ 16, or EtherLink II/ 16 TP	IRQ = 3 IoBaseAddress = 0x300 Transceiver = Internal MemoryMapped = Off
EtherLink® / MC	Not required
EtherLink 16/16 TP	IRQ = 3 IoBaseAddress = 0x300 Zero Wait State = Off

Card name	Default setting
DEC :	
EtherWORKS LC	IRQ = 5 MemoryAddress = 0xD0000 I/O Port Address = Primary
EtherWORKS Turbo or EtherWORKS Turbo / TP	IRQ = 5
IBM :	
Token Ring 16/4	I/O Port Address = Primary
Token Ring 16/4A	Not required
Novell :	
NE3200	Not required
NE2000	IRQ = 3 I/O Port Address = 0x300
Proteon :	
P1390	IRQ = 5 I/O Port Address = 0xa20 DMA Channel = 5 Cable Type = STP Card Speed = 16
P1990	Not required
SMC®/Western Digital™ :	
8003EP	IRQ = 3 MemoryBaseAddress = 0xD0000 I/O Port Address = 0x300
8013EWC or 8013WB	IRQ = 3 MemoryBaseAddress = 0xD0000 I/O Port Address = 0x300
8013EA	Not required
Ungermann-Bass® :	
Ethernet NIUps (MC) or Ethernet NIUps/EOTP (short MC)	Not required
Ethernet NIUpc (long) or Ethernet NIUpc/EOTP (short)	IRQ = 5 IoBaseAddress = 0x368 MemoryMappedAddress = 0xD8000

Network Adapter Card Interrupts

The interrupt (IRQ) that you assign to a network adapter card should be unique; that is, it should not be used by any other device in the system. The standard assignments for IRQs in x86-based computers include the following:

IRQ	Used for	IRQ	Used for
0	Timer	8	Clock
1	Keyboard	9	—
2	(cascade)	10	—
3	COM2/COM4	11	—
4	COM1/COM3	12	—
5	LPT2	13	Math coprocessor
6	Floppy controller	14	Hard drive
7	LPT1	15	Secondary disk controller

A network card should not be assigned an IRQ that is used by an active serial or parallel port, even if no device is currently attached to the port. Most newer x86-based computers let you disable the built-in serial or parallel ports. After you disable a port, you can assign its associated IRQ to another device, such as a network card.

For example, if you use only a network printer you can usually disable the built-in parallel printer ports for both LPT1 and LPT2. Network software does not use these interfaces when the underlying devices are redirected.

For information on disabling serial or parallel ports, see the documentation for your computer.

COM1 (IRQ 4) and COM2 (IRQ 3) are usually poor choices because most x86-based computers come with two active serial ports. For example, a typical computer with a mouse on COM1 and a modem on COM2 cannot use IRQ 3 or 4 for a network adapter card. IRQ 5 is often a safe choice, because x86-based computers usually do not have two parallel printer ports.

If you have two or more COM ports on your computer, you might find that a network adapter card (especially an EtherLink II card) will conflict with one port. Two common symptoms are that the workstation fails to start and that an error attributed to the network adapter card is logged in Event Viewer.

► **To change the interrupt of a network adapter card**

1. Choose the Network option in Control Panel.
2. Double-click the correct entry in the list of Adapter Cards.
3. In the Card Setup dialog box, change the interrupt number from 3, for example, to an available interrupt, such as 5 or 10.

Make sure that the interrupt you choose is not being used by another device.

Assigning I/O Port Base Addresses

Most devices have unique default I/O port base addresses. In the rare case that an I/O port appears to be in conflict, it can usually be moved to another setting without harm. The following table shows some common I/O port addresses:

I/O address	Used for	I/O address	Used for
3F8	COM1	300	—
3BC	—	2F8	COM2
378	LPT1	278	LPT2

Refer to the documentation for your network adapter card and other hardware devices to find what I/O addresses are required for your system.

Assigning Memory Buffer Addresses

No two devices can share memory buffers. Make sure that the network adapter card buffer address is not already used by another device, such as a SCSI adapter card or hard disk controller. Check the installation guide for your computer or peripherals to verify the setting of the memory buffer address.

Some SCSI and network adapters use conflicting memory addresses, such as an Adaptec™ or Future Domain SCSI adapter and a DEC EtherWORKS Turbo TP network adapter. This requires reconfiguring the hardware by changing jumpers.

You can use the Microsoft Diagnostics program (WINMSD.EXE) installed with Windows NT to check how memory buffers are being used.

Services or Subsystems Not Starting

If services or subsystems do not start properly, use the Services and Devices icons in Control Panel to check their status. You can try to start them with those icons. Check the system log in Event Viewer for entries relating to the problem.

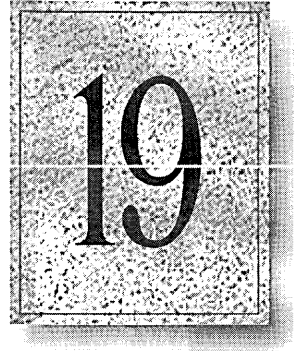
Removing an NTFS Partition

If Windows NT is not installed on an NTFS partition, you can use the **format** command from a Windows NT command prompt to reformat your NTFS partition to another file system.

If Windows NT is installed on an NTFS partition and you want to remove the partition, do the following:

1. Restart your system using Windows NT Setup. For example, with your computer turned off, insert Windows NT Setup Disk 1 in drive A and turn on your computer.
2. Follow instructions until the screen appears that asks whether you want to install Windows NT on a particular partition, or want to create or delete a partition. Highlight the NTFS partition and type **p** to delete it.
3. Either continue installing Windows NT or press **F3** to exit the Setup program.

Installing Windows NT



This chapter describes Windows NT Setup, the program you must use to install Windows NT on your computer. Setup copies the appropriate files to your computer's hard disk, and then configures the software you need to run applications and use the network with Windows NT.

Topics in this chapter include the following:

- Things you should know before running Setup
- How to start Setup on an x86-based and on a RISC-based computer
- Choosing Express or Custom Setup
- Using Setup to prepare your computer for Windows NT, including creating disk partitions and formatting the partition that will contain the Windows NT files
- How to create a sharepoint for network installations of Windows NT

To check disk space requirements for installing Windows NT, see “System Requirements” in the “Welcome” chapter. If you have problems installing Windows NT, see Chapter 18, “Troubleshooting.”

Things You Need to Know Before Running Setup

Note This software is protected by United States copyright law. Copying is permitted only in accordance with the license agreement.

Whatever kind of computer you have, you should know the following before you start installing Windows NT. If you do not know these items, ask your network administrator.

- If your computer will use a network, the name of your computer and the name for the workgroup or domain that this computer will join.
A computer name can be any name you invent as long as it is not the same as any other computer, workgroup, or domain name on the network. For more information on selecting a workgroup or domain name, see “Joining a Workgroup or Domain,” later in this chapter.
- If you have a printer connected directly to your computer, the printer model and port(s) used by the printer.
- The type of network adapter in your computer, the card’s interrupt request (IRQ) number, base I/O address, and other settings. Windows NT Setup suggests default values for these settings. See the documentation for your network adapter card to confirm these default settings.

You also need to set aside a high-density floppy disk of the correct size for disk drive A. This disk, which does not need to be formatted in advance, should be labeled Emergency Repair disk and set aside until Setup prompts you to insert it.

Note You may experience difficulty creating the Emergency Repair disk if your A drive is a 2.88 MB drive and you supply a disk formatted to 2.88 MB. If so, supply a disk formatted for 1.44 MB.

For information about using the Emergency Repair disk, see “Repairing Your System” in Chapter 12, “System Maintenance with Windows NT Setup.”

Unless you are installing Windows NT on a new computer, you are upgrading an existing system to use Windows NT. You can preserve your existing operating system and install Windows NT, provided you make certain decisions about partitioning and formatting your disk while running Setup. For information on maintaining your existing operating system, see “Preparing the Computer for Windows NT,” later in this chapter.

Upgrading from Windows NT to Windows NT Advanced Server requires reinstalling the operating system.

Starting Setup on an x86-Based Computer

How you start Windows NT Setup for an x86-based computer depends on the source media you are using to install Windows NT. The options include installing from floppy disks or installing from a compact disc drive.

Note If you have only a 5.25-inch floppy drive, and you cannot install Windows NT from a CD-ROM or network share, order 5.25-inch Setup disks using the fulfillment coupon at the back of this manual.

For an x86-based workstation, you can also install Windows NT over the network or from a CD-ROM device that is supported under MS-DOS but not under Windows NT. Check the hardware compatibility list in your Windows NT package to see whether your CD-ROM device is supported.

You cannot place Windows NT on a partition configured with any disk compression products.

▶ **To install Windows NT from floppy disks**

1. With your computer turned off, insert Windows NT Setup Disk #1 in drive A, and then turn on your computer.
(Two versions of Setup Disk #1 are provided: one for 5.25-inch A drives and one for 3.5-inch A drives.)
2. Follow the instructions on screen to complete Setup.

If you are using a CD-ROM to run Setup, make sure that your SCSI CD-ROM drive is not set to ID 0 or 1. For information, see your hardware documentation.

▶ **To install Windows NT from a SCSI CD-ROM drive**

1. Insert the floppy disk labeled "Setup Disk for CD-ROM Installation" in drive A, and then turn on your computer.
2. When Setup asks for the Windows NT compact disc, insert it in the CD-ROM drive.
3. Follow the instructions on screen to complete Setup.

You perform the following procedures from the local computer where you want to install Windows NT.

You can install Windows NT on multiple x86-based computers by first installing the Windows NT files in a shared directory on a network server, and then installing Windows NT on each workstation using WINNT.EXE.

You can also use this method to install Windows NT on x86-based computers with SCSI or CD-ROM devices that are supported under MS-DOS but are not supported by Windows NT. You cannot use this method to set up Windows NT on RISC-based computers.

▶ **To install Windows NT from the network or an unsupported CD-ROM device**

1. Use your existing MS-DOS–based network software to connect to the shared network directory that contains the WINNT.EXE program.

Or, if you have an unsupported local CD-ROM device, insert the Windows NT compact disc in the drive, and then, while running MS-DOS, change to the <cd..drive>:\I386 directory on the CD-ROM drive. For example, if the CD-ROM is drive E, change to the E:\I386 directory.

2. At the MS-DOS command prompt, type **winnt** and press ENTER.
3. When you are asked to confirm the Windows NT source directory, type the path for the directory where the WINNT.EXE program is stored (the same directory you specified in step 2).
4. When prompted, insert a blank formatted high-density floppy disk into drive A.

After the necessary files are transferred, a message asks you to press ENTER to restart the computer.

5. Follow the instructions on screen to complete Setup.

Make sure you keep the Setup and Emergency Repair disks WINNT.EXE creates during installation. If you have problems with your installation, you will need both of these disks to run the Repair program.

For complete details about setting up a network sharepoint to install Windows NT, see “Setting Up Windows NT Master Files on a Server,” later in this chapter.

Starting Setup on a RISC-Based Computer

RISC

Before you can run Windows NT Setup on an ARC-compliant RISC-based computer, you must first read the manufacturer-supplied instructions for starting programs from CD-ROM or disk. How you start Windows NT Setup depends on the type of RISC-based computer you are installing on. Once Windows NT Setup starts, you can follow the instructions on screen.

The following sample procedure for starting Windows NT Setup is typical of many (but not all) RISC-based computers.

1. Insert the Windows NT compact disc in the CD-ROM drive.
2. Restart your computer.
3. At the ARC screen, choose Run A Program from the menu.
4. At the prompt, type `cd:\mips\setupldr` and press ENTER.

For some systems, you might need to supply a full device name instead of typing `cd:`. See your hardware documentation for details.

5. Follow the instructions on screen.

These instructions assume that your hard disk has been initialized and at least partially partitioned. The *system partition*—the partition that has the hardware-specific files needed to load Windows NT—must be a FAT partition of at least 2 MB. On a RISC-based computer, the system partition is the disk partition that contains the hidden files OSLOADER.EXE and HAL.DLL in the subdirectory \OS\NT. If the system partition is large enough, it can also contain Windows NT, or you may choose to use a separate partition. If your hard disk does not include a system partition, refer to your manufacturer-supplied instructions for creating one.

Choosing Express vs. Custom Setup

Early in the Setup process you must choose to use Express or Custom Setup. Express Setup is the easiest way to install Windows NT and is recommended for most standard installations. Express Setup asks you the minimum number of questions and installs all optional Windows NT components. It automatically configures your mouse, display adapter, and other components.

Custom Setup is designed for experienced users who want or need more control over how Windows NT is installed on their computers. With Custom Setup, you can override default values or accept recommended settings for the following:

- The display adapter, mouse, keyboard, and keyboard layout
- The specific Windows NT components you want to install, and the existing applications you want to set up to run with Windows NT
- The virtual memory settings and local printer connections for your computer
- Any additional network adapters or other network components you want to install and configure during Windows NT Setup

If you want to make changes to your hardware after running Setup, use Control Panel or the Windows NT Setup icon in Program Manager to change the system configuration. For information, see Chapter 12, “System Maintenance with Windows NT Setup.”

Preparing the Computer for Windows NT

After you choose Express or Custom Setup, you must make some basic decisions to prepare your computer for Windows NT.

When you install Windows NT, the installation program checks to see whether a previous version of Windows is installed on the computer. If it is, you should install Windows NT in the same directory as the previous version of Windows. This allows Windows NT to configure the Windows environment based on the existing environment and to support all the features of currently installed Windows 3.1-based applications.

If you do not install into an existing Windows directory, Setup asks you to choose one of the following options:

- Install Windows NT on an existing partition.
- Create or delete disk partitions, and then select the partition that will contain the Windows NT system files.

After you choose the partition on which to install Windows NT, Setup asks whether you want to convert that partition to the Windows NT file system (NTFS) or keep the existing file system.

The choices you make may depend on whether you want to preserve an existing operating system and whether you want to take advantage of the security features available with NTFS. The rest of this section guides you through making these decisions.

Specifying the Disk Partitions

A partition can be any size from 1 MB to the entire hard disk. But the partition where you plan to store Windows NT files must be on a permanently attached hard disk and must have enough unused disk space (for more information, see the section called “System Requirements” in “Welcome”).

The system partition is the partition that has the hardware-specific files needed to load Windows NT. On an x86-based computer, the operating system starts from the active system partition on the first internal hard disk. This means that Windows NT looks for certain files in the root directory of the C drive (Disk 0) when you start your computer. This partition must be formatted with either the NTFS, FAT, or HPFS file system for Windows NT to start. It must be formatted with the FAT file system if you want to run both Windows NT and MS-DOS.

RISC

A RISC-based computer can have several system partitions that are configurable by the manufacturer’s configuration program, and each system partition must be formatted for the FAT file system. If you want to use NTFS, you need to create at least one FAT system partition of at least 2 MB plus a second partition large enough to contain all the files you want to protect with NTFS. For information about setting up more than one system partition on a RISC-based computer, see your hardware documentation.

Caution If your hard disk contains stripe sets, volume sets, or mirrors, these elements appear on the Setup screen as “Windows NT Fault Tolerance.” Be careful not to delete any of these elements. (For more information, see Chapter 16, “Disk Administrator.”) Also, do not delete partitions that contain data you want to keep.

The following are guidelines for making decisions about your hard disk partitions.

If you will use only the Windows NT operating system:

- On a new x86-based computer, make a single partition and format it with NTFS, as described in the following section.
- On an existing system that contains files you want to keep, maintain all existing partitions. You can place the Windows NT files on any partition with sufficient free space.

If you want to use another operating system such as MS-DOS in addition to Windows NT:

- Make sure the system partition (the C drive) is formatted with the appropriate file system. For example, if you already have MS-DOS installed and want to keep it, preserve the C partition and keep the file system as FAT. You can place the Windows NT files on any partition with sufficient free space.
- To use NTFS and have access to another operating system, you must have at least two disk partitions. Format the C drive with a file system that Windows NT and your other operating system can use, such as FAT. Format the other partition for NTFS. You can place the Windows NT files on any partition with sufficient free space.

Note If you are installing Windows NT on a computer currently configured to start either OS/2 or MS-DOS using the **boot** command, Windows NT Setup sets up your system so that you can run Windows NT or whichever of the two operating systems (MS-DOS or OS/2) you last started before running Windows NT Setup.

If you have OS/2 Boot Manager installed on your computer and want to continue to use it after Windows NT installation is complete, you need to re-enable it. Start Disk Administrator from the Administrative Tools group in Program Manager. Select the OS/2 Boot Manager partition, and then select Mark Active from the Partition menu.

Selecting a File System for the Windows NT Partition

Windows NT can use any one of three file systems: the Windows NT file system (NTFS), the file allocation table (FAT), or the high-performance file system (HPFS). You can set up Windows NT on a partition with an existing file system, or you can choose to use a new file system. You can format a partition for NTFS or FAT during Setup. Setup cannot format a partition for HPFS.

The following notes will help you choose how to format or convert the partition where the Windows NT files will be stored:

- For an unformatted partition, you can choose to format it with either the NTFS or FAT file system. Choose the FAT option if you want to access files on that partition when running MS-DOS or OS/2. Choose the NTFS option if you will use only Windows NT to access files on that partition.
- For an existing partition, you probably want to choose the default option, which is to keep the current file systems intact, preserving all existing files on that partition. You can convert FAT or HPFS partitions to NTFS after running Setup.
 - You can choose to convert an existing partition to NTFS so you can use Windows NT security. This preserves existing files, but only Windows NT has access to files on that partition.
 - You can choose to reformat an existing partition to either the NTFS or FAT file system, which erases all existing files on that partition. If you choose to reformat the partition as NTFS, only Windows NT will have access to files created on that partition.

Note The choices you make at this step are not final. After running Setup, you can change file systems on any partitions. However, to preserve data, you cannot convert an NTFS partition to any other file system without backing up all the files, reformatting the partition (which erases all files), and then restoring the files from the backup. You must also back up data before repartitioning a hard disk.

Also, if you choose to convert the file system on an existing partition to NTFS, the conversion does not take place until all of Setup is complete and you first start your computer with Windows NT. So if you quit Setup before it is finished running, the file system on that partition is not converted.

The following table summarizes the advantages and disadvantages of each of the three file systems that Windows NT can use.

Advantages	Disadvantages
<p>Windows NT file system (NTFS):</p> <p>Supports complete Windows NT security, so you can specify who is allowed various kinds of access to a file or directory.</p> <p>Keeps a log of activities to restore the disk in the event of power failure or other problems.</p> <p>Supports file and directory names of up to 256 characters, and supports extended file attributes. Automatically generates correct MS-DOS filenames so that files can be shared with MS-DOS users.</p> <p>Allows a program designed to run under other operating systems such as MS-DOS access to NTFS files when it runs under Windows NT.</p>	<p>Recognized only by Windows NT. When the computer is running another operating system (such as MS-DOS or OS/2), that operating system cannot access files on an NTFS partition.</p> <p>If drive C is formatted for NTFS, you cannot run MS-DOS from your hard disk. (But you can still run MS-DOS-based applications using Windows NT.)</p>
<p>File allocation table (FAT):</p> <p>Allows access to files when your computer is running another operating system, such as MS-DOS or OS/2.</p> <p>FAT is the most widely used file system for PCs.</p> <p>Enables you to share data on the partition with MS-DOS.</p>	<p>Files are not protected by the security features of Windows NT.</p> <p>Files are restricted to 8-character filenames with 3-character filename extensions.</p> <p>Cannot support extremely large files.</p> <p>Less robust than NTFS; for example, no automatic disk restore features.</p>
<p>High-performance file system (HPFS/HPFS386):</p> <p>Ensures file compatibility if you want to switch between Windows NT and OS/2 on your hard disk.</p> <p>Supports long filenames.</p> <p>Provides better error correction than does the FAT file system.</p>	<p>Has not been widely adopted.</p> <p>Files are not protected by the security features of Windows NT.</p> <p>MS-DOS and Windows 3.1-based applications cannot access files with long filenames or with long directory names in their paths.</p>

Selecting a Directory for Windows NT Files

Setup next proposes to install the Windows NT files in the \WINNT directory. You can accept the directory name that Setup suggests or type the directory name you prefer. We recommend that you accept the proposed directory.

If Setup detects a version of Windows NT in the directory where you choose to place the new Windows NT files, it asks if you want to choose another directory. If so, Setup automatically configures your computer so that you can run either version of Windows NT. If you install Windows NT into a directory which contains a previous installation of Windows NT, Setup overwrites the earlier version.

Configuring Windows NT

After Setup copies several basic files, you will see the Windows NT logo for the first time, and then all subsequent requests for information will appear in Windows NT dialog boxes. You can use standard Windows keyboard and mouse techniques for all actions during this part of Setup, as described in Chapter 2, "Windows NT Basics." You can also press F1 for context-sensitive Help at any time.

For either Express or Custom Setup, you must next supply the following information:

- A name that Windows NT will use to identify you for various operations. You must type in a response and verify your response for Setup to continue.
- A name that will identify your computer on the network. This name must be 15 characters or fewer and must not be the same as any other computer name, domain name, or workgroup name on the network. You can invent a computer name, or ask your network administrator if a specific name has been assigned for your computer. If you need to change the computer name after Setup is completed, choose the Network icon in Control Panel.
- The local language, or locale, that you want to use. This setting affects, for example, the format Windows NT uses to display the date, time and currency. If you want to change the language after Setup is complete, choose the International icon in Control Panel. For information, see Chapter 5, "Control Panel."

Setting Up a Local Printer

For both Express and Custom Setup, you can set up a printer that is connected directly to your computer.

If you don't have a printer connected to your computer, choose Cancel when the Printer Setup dialog box appears. After you install Windows NT, you can choose the Print Manager icon in Program Manager to set up network printers or change the printer configuration after completing Setup. For information about configuring and using printers, see Chapter 6, "Print Manager."

Setting Up a Network Adapter Card

For Express Setup, Windows NT Setup automatically checks for a network adapter card in your computer and installs the first one it recognizes. Some types of network cards may not be recognizable by Setup. If Express Setup cannot identify your adapter card, it asks if you want to install Microsoft Remote Access Service (for users connecting to a network over telephone lines). If you do not choose to install Remote Access Service, Setup displays the Network Adapter Setup dialog box and asks you to select from a list the name of the card you want to install.

Express Setup installs only one network adapter card. If you have additional adapter cards, you can install them after running Setup by choosing the Network icon in Control Panel.

Custom Setup uses the following steps to install a network adapter card:

1. Setup asks if you want it to detect the network card in your computer.
If you choose detection, Setup searches for a recognizable network adapter card (see step 2). If you reject detection, Setup displays the Network Adapter Setup dialog box and asks you to choose an adapter card name from a list.
2. If you choose detection, Setup looks for a network adapter card and stops at the first one it finds. It identifies the card and asks you to choose one of three options:
 - You can accept the identified network card, in which case Setup installs it for you (see step 3).
 - You can select Find Next, which causes Setup to search for another network adapter card.
 - You can choose Do Not Detect, which causes Setup to discontinue detection and display the Network Adapter Setup dialog.

If Custom Setup cannot identify an adapter card to install, or if you do not choose any of the detected cards, Setup informs you that there are no more network cards and asks you to choose Detect to try again or Continue. If you choose Continue, you have the option of installing Microsoft Remote Access Service or of manually selecting an adapter card.

3. If you accept the card that Setup detects, Setup installs and configures it and then displays a dialog box with the adapter card settings. We recommend that you accept these settings unless you are absolutely sure they are incorrect, in which case you can change them and then choose OK.
4. If Setup cannot completely validate adapter card settings or if potential hardware conflicts exist, Setup warns you and allows you to change the settings.

After Custom Setup installs your adapter card and other system software, the Network Settings dialog box appears so that you can install additional network cards and software.

Both Express and Custom Setup detect only one network adapter card.

If Setup cannot detect your network adapter card, or if you choose to bypass detection with Custom Setup, Setup allows you to select a specific network adapter card to install.

Configuring the Network Adapter Card

After Setup installs a network adapter card, it may display an Adapter Card Setup dialog box, so you can select the correct interrupt request (IRQ) number, I/O base port address, memory buffer address, and other settings. For many adapter cards, the settings are configured automatically so you don't have to identify settings.

If you are an experienced user and know that you need to change adapter card settings, see the documentation for your network adapter card or ask your network administrator for the correct values.

For Custom Setup, the Network Settings dialog box appears so that you can install additional network cards and supporting software. If you choose to install additional network components, you might be asked to insert additional disks supplied by the component manufacturer. For information about completing the options in the Network Settings dialog box, choose the Help button.

Joining a Workgroup or Domain

After you enter choices for the network configuration settings, Setup copies a large set of files and attempts to start the network. Then Setup displays the Domain Settings dialog box.

- If Setup successfully started the network, you can specify whether this computer is a member of a workgroup or a Windows NT Advanced Server domain.
- If the network did not start, you can accept or change the Workgroup entry in this dialog box, and then choose OK to continue Setup.

In Windows NT, a *workgroup* is a collection of computers that appears, for convenience, under the same workgroup name when you browse network resources. Any computer can join any single workgroup.

Belonging to a common workgroup is a way for coworkers to quickly find each other's computers on the network. When you browse the network, the names of all the computers in your workgroup appear first in the browsing directory.

You can join an existing workgroup, or create a new one simply by typing in another name. Windows NT Setup will accept any workgroup name you choose, including the default WORKGROUP.

A *domain* is a collection of computers defined by the administrator of a Windows NT Advanced Server network. A domain provides the same convenience for network browsing and also provides access to the centralized user accounts and group accounts maintained by the domain administrator.

Unlike a workgroup, a domain must already exist for you to join it. Joining a domain also requires that the domain administrator add an account for your computer to the domain.

If you do not know the precise domain name for your computer and you want to finish running Setup without this information, you can select the Workgroup option and then type any workgroup name. After running Setup, you can choose the Network option in Control Panel to join a domain or to change the workgroup name.

Note If you are reinstalling Windows NT on a computer that belongs to a domain, you must ask your network administrator to delete your computer account and create a new one. Otherwise, you will not be able to log on to the domain after the second installation.

Setting Up a Local Account

For both Express and Custom Setup, you are asked to provide a unique name for setting up a local user account if your computer is not a member of a Windows NT Advanced Server domain. This information is used for identification every time you log on to Windows NT. You can choose to cancel this dialog box and then set up a local account later using User Manager.

If you set up a local account, this account automatically becomes a member of the Administrators group. For information on setting up groups, see Chapter 13, "User Manager."

► **To set up a local account**

1. In the User Name box, type a unique name of 20 or fewer characters that does not include spaces.

This name is used to identify your user account whenever you log on to Windows NT. For example, if your name is Annie Pearson, you might want to choose "anniep" or some other derivative of your full name. This name should be unique on the network so as to avoid addressing conflicts.

2. In the Password box, type a unique name of 14 or fewer characters that does not include spaces, and then retype the password in the Confirm Password box.

For security, neither the original nor the confirmation you type appear in the dialog box.

If you do not want a password for this user account, leave the Password and Confirm Password boxes blank.

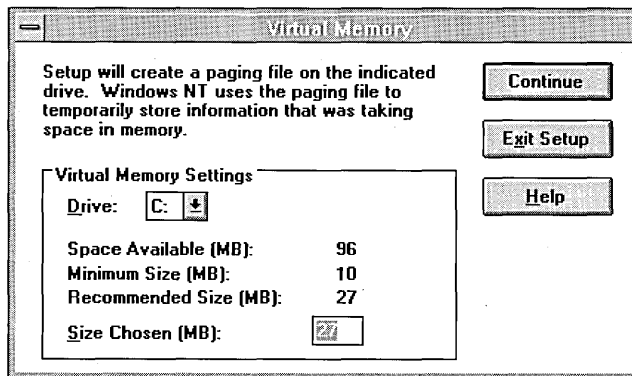
Note Passwords are case-sensitive. This means that Windows NT identifies "mypassword" and "MyPassWord" as different passwords.

3. Choose the Continue button.

Setting Up Virtual Memory

Windows NT creates a special file on your hard disk called a paging file. The paging file makes it seem like your computer has more memory to run programs, because Windows NT can temporarily swap the contents of memory used by one program to the hard disk so that another program can use that memory.

For Express Setup, all virtual-memory settings are configured automatically. For Custom Setup, you can change the size of the virtual-memory paging file or the drive where the file is stored. We recommend that you accept the proposed settings unless you are an experienced Windows NT user. If you want to change the location or size of this file or create other paging files after Setup is complete, choose the System icon in Control Panel. For more information, see “Defining Options for the Operating System” in Chapter 5, “Control Panel.”



Setting Up Applications to Run from Program Manager

The easiest way to run programs in Windows NT is to choose program-item icons in Program Manager. The easiest way to create the program-item icons is to have Windows NT Setup create them for you.

If you are installing Windows NT in a directory containing a version of MS-DOS-based Windows, Setup automatically installs all of your existing Windows groups, and you do not have to make choices during this part of Setup.

Completing Setup and Starting Windows NT

► **To complete Setup and start Windows NT**

1. When Setup is finished running and the message asks you to restart your computer, remove any disks from the floppy disk drives and choose the Reboot button.
2. When the boot loader menu appears, press ENTER.
3. When the Welcome logon message appears, press CTRL+ALT+DEL to log on.



4. In the Welcome dialog box, type and confirm your password, and then choose the OK button.

Passwords are case-sensitive, which means that Windows NT identifies “mypassword” and “MyPassWord” as two different entries.

Caution For an x86-based computer, the following files are copied to the root directory on the C drive: BOOT.INI, BOOTSECT.DOS (if another operating system is on your computer), NTLDR, and NTDETECT.COM. Also, the NTBOOTDD.SYS file is copied if you install Windows NT onto a SCSI disk. These files should never be deleted because your system will not start without them.

For a RISC-based computer, HAL.DLL and OSLOADER.EXE are copied to the \OS\NT directory on your system partition. These files should never be deleted.

Note that these files are all read-only, hidden system files.

Migrating Windows 3.1 Settings

If you installed Windows NT into an existing Windows 3.1 directory (including Windows for Workgroups), you have the opportunity to migrate a portion of your Windows 3.1 settings when you first log on as a new user (this option is not available for the Administrator user name). If you choose to preserve Windows 3.1 system and program settings, Windows NT migrates:

- Settings for your Windows-based applications.
- All program groups that do not already exist in Windows NT. For example, a program group named "Spreadsheets" would migrate while the Main program group would not. All new program groups migrate as icons.
- File associations.
- Information used for object linking and embedding.
- Desktop configuration settings, with the exception of screen savers.

The location of each program group icon, and the location of each group window when the icon is opened remains the same, except if Windows NT and Windows 3.1 display resolutions differ.

Setting Up Windows NT Master Files on a Server

This section is written for the administrator responsible for installing Windows NT on multiple computers. This section assumes that you have already installed Windows NT on a single computer and are familiar with Windows NT commands and procedures.

You can install Windows NT on multiple x86-based computers by first installing the Windows NT files in a shared directory on a network server, and then installing Windows NT on each workstation using WINNT.EXE.

You can also use this method to install Windows NT on x86-based computers with SCSI or CD-ROM devices that are supported under MS-DOS but are not supported by Windows NT. You cannot use this method to set up Windows NT on RISC-based computers.

Important Every Windows NT user must have a Windows NT license, which is obtained by buying a retail package or a Microsoft License Pack. For more information on restrictions, see your Windows NT license agreement.

To use WINNT.EXE, you must first install the Windows NT master files in a shared directory on the network. You can set up the sharepoint using any type of network, such as Microsoft LAN Manager 2.1, Novell NetWare, Banyan VINES, or others. The directory containing the Windows NT files must be accessible from MS-DOS to all users who will be using WINNT.EXE.

Note If the majority of users do not have CD-ROM drives, it is best to create Windows NT setup shares using floppy disks rather than the CD-ROM. To restore corrupt files using the Emergency Repair disk created by WINNT.EXE, users need the Setup disks or CD-ROM used to install the original Windows NT network share. If you create setup shares using floppy disks, users who installed using WINNT.EXE will be able to restore corrupt files without attaching a CD-ROM drive.

Before you can install the master Windows NT files on a network:

- You must already be running Windows NT on the computer from which you are installing the master files.
- The network must be operational.
- You must have read-write permission to the network directory where you want to install the Windows NT files, and other users must have read access to that directory. For more information, see your network software documentation.

Important Do not use the MS-DOS or OS/2 **copy** command, the MS-DOS **xcopy** command, or the Copy command in File Manager to install Windows NT files on a network server. You must use the Windows NT **setup** command.

▷ **To install the master Windows NT files on a network server**

1. From either a workstation or a server, log on to Windows NT and connect to the drive where you want to install the Windows NT master files.
2. Create the directory on the network drive that will contain the Windows NT master files.
3. In Program Manager, choose the Command Prompt icon to open a Windows NT command prompt window.
4. At the command prompt, type **setup -n -i initial.inf -s source -d destination** and press ENTER.

The switches **-n**, **-i**, **-s**, and **-d** must always appear in this order.

The switches for the **setup** command are described in the following table.

Setup command switch	Meaning
-n	Specifies that the files are copied to a network sharepoint
-i filename	Specifies the .INF file to be used from the Windows NT Setup working directory
-s source	Indicates the drive and directory that contains the original Windows NT Setup disks
-d destination	Indicates the network drive and directory where you want to copy the Windows NT master files

For example, type:

```
setup -n -i initial.inf -s f:\i386 -d x:\ntadmin
```

to install the Windows NT files from CD-ROM drive F to network drive X, which contains the directory \NTADMIN.

Or type:

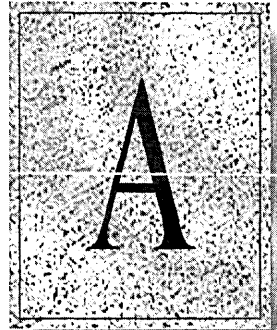
```
setup -n -i initial.inf -s a:\ -d x:\ntadmin
```

to install Windows NT files from your floppy drive A to network drive X. Setup will prompt you to insert a disk for CD-ROM or floppy disk installation, depending on the original setup media.

5. In the Group Information dialog box, type the workgroup name and the name of your company, and then choose the Continue button.
Each name can be no longer than 31 characters.
6. In the next Setup screen, verify the information, and then choose the Continue button.

A P P E N D I X A

Network Protocols



Network protocols can be compared to spoken language. A network protocol is a set of rules that allows computers on a network to communicate with each other. Two computers must use the same network protocol (speak the same language) to communicate.

This appendix provides a brief overview of network protocols and installation and configuration information for the four Windows NT protocols and two TCP/IP-based network services:

- NetBEUI
- Data link control (DLC)
- NWLink IPX/SPX compatible transport
- TCP/IP protocol
 - Simple Network Management Protocol (SNMP) service
 - FTP Server service

Overview

Choosing the protocol or protocols to use in a network requires evaluating several elements of the network, such as the number and types of computers in the network, special hardware or software in use in the network, and compatibility and integration into existing networks. If you are going to set up a local area network and do not have an experienced network administrator, it is suggested you have an understanding of all the complex elements of a local area network before attempting to install one.

If you are establishing a small, isolated network, you should probably use NetBEUI, the Windows NT protocol automatically installed on all computers.

If you are in a large network, the network administrator will have determined the network protocol to use based on network components and your company's requirements.

Protocols communicate through other layers of software that control the flow of information. How network protocols and other layers of network software work together is determined by network bindings. Windows NT automatically binds network protocols to all appropriate layers. For more information about installing network software and configuring network bindings, see "Installing Network Software" in Chapter 5, "Control Panel."

NetBEUI

The NetBIOS extended user interface (NetBEUI) is a small, efficient, and fast protocol optimized for very high performance in smaller LANs or LAN segments; for these environments, NetBEUI is the fastest protocol shipped with Windows NT. NetBEUI is self-configuring and self-tuning.

NetBEUI is installed and bound to a network adapter card automatically when Windows NT is installed. You cannot prevent NetBEUI from installing on a Windows NT computer. If you will not use the NetBEUI protocol, you can remove the protocol to save system resources using the Network option in Control Panel. For information about removing or reinstalling the NetBEUI protocol, see "Installing Network Software" in Chapter 5, "Control Panel."

DLC

The data link control (DLC) protocol is used primarily to access IBM® mainframe computers or printers attached directly to the network (instead of to a port on a print server). This protocol isn't used for general networking on Windows NT.

To connect to and communicate with a mainframe computer, the DLC protocol must be installed and running. You use a terminal emulator, such as the 3270 Emulator in the Accessories Group, to access a mainframe computer.

To print to printers attached directly to the network, the DLC protocol must be installed and running on the print server for the printer. Computers sending print jobs to a printer using DLC do not need the DLC protocol—only the print server requires DLC.

Install DLC using the Network option in Control Panel. For more information about installing the DLC protocol, see “Installing Network Software” in Chapter 5, “Control Panel.”

NWLink

The NetWare Link (NWLink) protocol is an implementation of the IPX, SPX, and NetBIOS protocols used in Novell NetWare networks.

This section first provides background material on basic concepts and the information you need before installing Microsoft NWLink. The section then describes how to install and configure NWLink.

This section assumes you are familiar with Novell networks and the IPX/SPX protocol. You should be familiar with implementing the IPX/SPX protocol before installing the NWLink protocol.

What Is NWLink?

NWLink provides communication between a Windows NT computer and either another Windows NT computer or a NetWare workstation. Two networking Application Programming Interfaces (APIs) are supported to allow this:

- Windows Sockets
- NetBIOS

The Windows Sockets interface is ideal to support existing NetWare applications written to comply with the NetWare IPX/SPX Sockets interface. The Windows NT computer acts as an application server responding to the IPX or SPX packets sent to or received from MS-DOS, Windows, or OS/2 NetWare workstations.

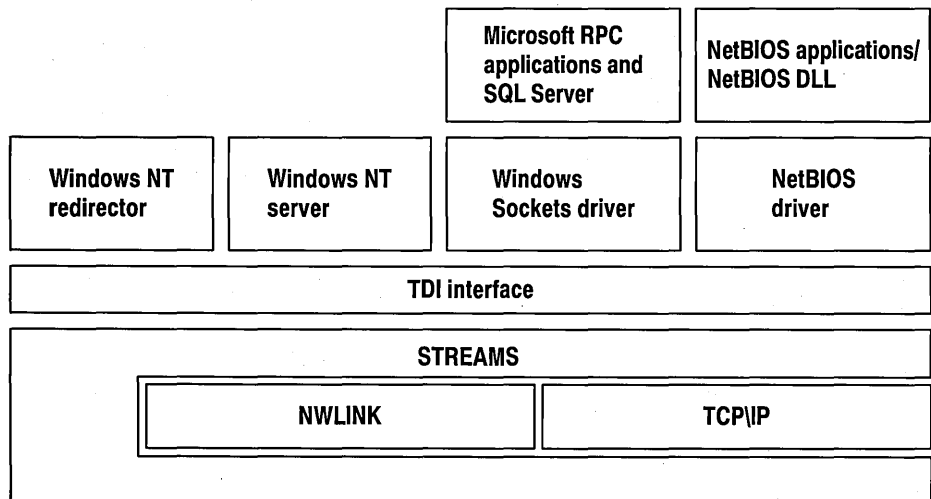
For example, SQL Server running on Windows NT takes advantage of the Windows Sockets interface to SPX to allow existing NetWare SQL Server clients to communicate with the server that is listening to requests via the Windows Sockets interface.

The NetBIOS support can be used to send and receive Novell NetBIOS packets between a NetWare workstation running Novell NetBIOS and a Windows NT computer, or between two Windows NT computers. You will see a significant performance gain where all computers are Windows NT computers because of Microsoft enhancements to the Novell NetBIOS protocol.

The Microsoft-enhanced Novell NetBIOS protocol not only conforms to the standard single request/reply implementation, but also automatically takes advantage of the knowledge that it is conversing with another computer that understands the enhancements. The enhancements improve efficiency by allowing the sender to send multiple NetBIOS packets before receiving an acknowledgment (a sliding window) as well as supporting the piggybacking of NetBIOS acknowledgments. NetBIOS acknowledgments are sent by the receiver after receiving the last packet of a NetBIOS message. In the common scenario in which the sender and receiver are participating in two way traffic, allowing piggybacking of acknowledgments saves network bandwidth, as well as processing time on the computers, since a separate acknowledgment frame need not be processed and sent.

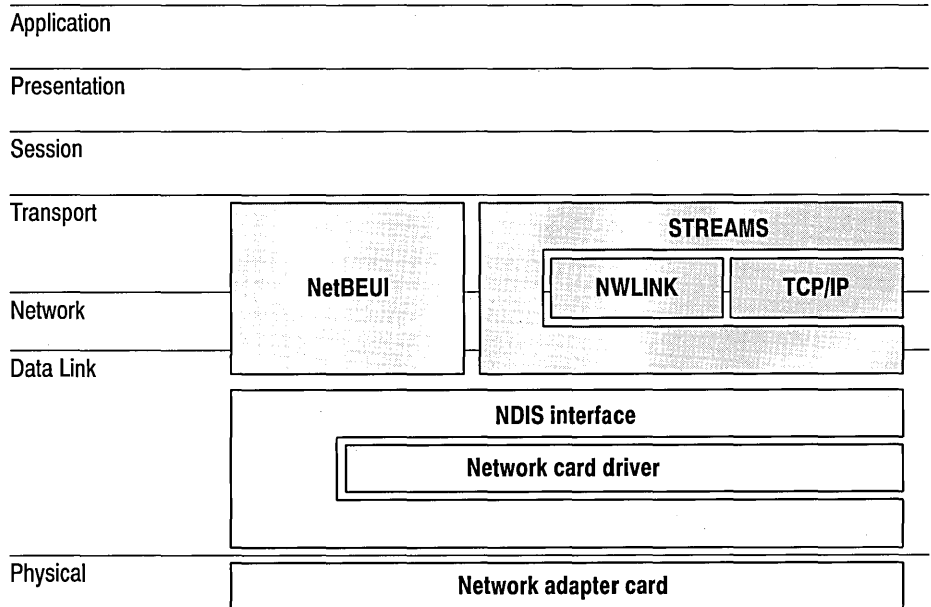
The implementation on Windows NT separates the Novell NetBIOS component from the IPX/SPX component. NWLink refers to IPX/SPX, and NWNBLink refers to the Microsoft-enhanced implementation of Novell NetBIOS.

As shown in the following illustration, NWLink supports a wide variety of application interfaces.



How Does NWLink Work?

Similar to the Windows NT TCP/IP implementation, NWLink is a STREAMS based protocol. STREAMS is a protocol interface and environment originally developed for UNIX systems that standardizes communication with adjacent software layers. Because the STREAMS environment supports the transport driver interface (TDI) at the top, and the network driver interface specification (NDIS) on the bottom, NWLink can seamlessly coexist with other protocols on the same network adapter as shown in the following illustration.



Installing and Configuring NWLink

The NWLink protocol is not installed as part of Windows NT when Express Setup is run. This section assumes that Windows NT has already been successfully installed on your system.

Installing NWLink



You must be a member of the Administrators group to install and configure NWLink.

► **To install NWLink on a computer with Windows NT**

1. Choose the Network option in Control Panel.
2. In the Network Settings dialog box, choose the Add Software button.
3. In the Network Software Installation dialog box, select NWLink IPX/SPX Compatible Transport in the Network Software box, and then choose the Continue button.
4. The Windows NT Setup dialog box prompts you for the full path to the Windows NT distribution files. Provide the appropriate location, and then choose the Continue button.
NWLink software is copied to your computer, and the Network Settings dialog box reappears. Choose the OK button. The NWLink Configuration dialog box appears.
5. Continue with the configuration procedure as described in the next section.
NWLink must be configured in order to operate.

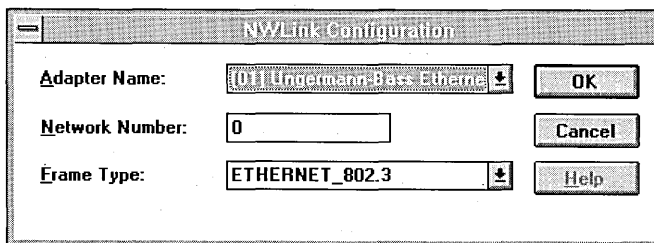
Configuring NWLink

After the NWLink protocol software is installed on your computer, you can configure it with a network number and frame type to work with your network. Typically, the defaults will not need to be changed. Additional advanced configuration parameters are documented in the Windows NT Resource Kit.

► **To configure or reconfigure the NWLink protocol**

1. The Configuration dialog box appears automatically after the NWLink software is installed on your computer.

If you are reconfiguring NWLink, choose the Network option in Control Panel. In the Installed Network Software box, select NWLink Protocol, and then choose the Configure button.



2. Select the adapter to which NWLink will be bound, its network number, and the frame type to use. Descriptions for each field follow.

Item	Description
Adapter Name	Lists available network adapter cards.
Network Number	Specifies the IPX network number to assign to this binding. To have Windows NT determine the correct network number for the computer, select 0 (the default option). To enter a specific number, enter the four byte hex value (for example, fe3dba9d). The network administrator should provide the correct value for this parameter.
Frame Type	Specifies the frame format for NWLink packets. Supported topologies include Ethernet, Token Ring, ArcNet®, and FDDI. Supported frame types include Ethernet II, Ethernet 802.3, 802.2, SNAP, and ArcNet. The default frame type is Ethernet 802.3. This is commonly referred to as raw 802.3 in NetWare networks. If the adapter is a Token Ring or FDDI adapter, specifying either Ethernet II or Ethernet 802.3 will use the 802.2 frame format. It is important to ensure that both stations communicating in a conversation are using the same frame format.

3. Choose the OK button to return to the Network Settings dialog box. Choose the OK button again.

Microsoft NWLink has been configured.

A message informs you that you must restart the computer so that the change you made will take effect. You can choose the Yes button to restart the computer.

If you choose the No button, you can continue to work, but your changes to NWLink will not take effect until the computer is restarted.

Configuring NWLink for Token Ring Networks with Ipxroute

Ipxroute manages the source routing variables of NWLink on a token ring network. It is installed with the NWLink protocol.

Ipxroute parameters are equivalent to the parameters in the ROUTE.EXE utility supplied by Novell. Complete syntax is described below and in the online Command Reference.

Iproute Syntax

iproute board=*n* [clear] [def] [gbr] [mbr] [remove=*xxxxx*]

board=*n*

Specifies the network adapter card for which to query or set parameters.

clear

Clears the source routing table.

def

Sends packets to the ALL ROUTES broadcast. If a packet is transmitted to a unique MAC address that is not in the source routing table, the default is to send the packet to the SINGLE ROUTES broadcast.

gbr

Sends packets to the ALL ROUTES broadcast. If a packet is transmitted to the broadcast address (FFFFFFFFFFFF), the default is to send the packet to the SINGLE ROUTES broadcast.

mbr

Sends packets to the ALL ROUTES broadcast. If a packet is transmitted to a multicast address (C000xxxxxxx), the default is to send the packet to the SINGLE ROUTES broadcast.

remove=*xxxxx*

Removes the given node address from the source routing table.

TCP/IP

Transmission control protocol/internet protocol (TCP/IP) provides communication across interconnected networks, between computers with diverse hardware architectures and various operating systems. TCP/IP can be used with Windows NT alone to connect to other Microsoft networking products or to connect to non-Microsoft (for example, UNIX) hosts.

This section first provides background material on basic TCP/IP concepts and the information you need before installing Microsoft TCP/IP for Windows NT. The section then describes how to install TCP/IP and SNMP for Windows NT and configure the protocols on your computer.

What Is TCP/IP for Windows NT?

The TCP/IP protocol family is a standard set of networking protocols, or rules, that govern how data is passed between systems on a network. Microsoft TCP/IP for Windows NT enables enterprise networking and connectivity on your Windows NT-based computer. Adding TCP/IP to a Windows NT configuration offers the following advantages:

- A standard, routable, enterprise networking protocol. TCP/IP is viewed as the most complete and accepted networking protocol available. Virtually all modern operating systems offer TCP/IP support, and most large networks rely on TCP/IP for much of their network traffic.
- An architecture that facilitates connection to foreign systems. Because most operating systems offer TCP/IP, many standard utilities have been designed to access and transfer data between heterogeneous environments. Examples of such standards include file transfer protocol (FTP) and Telnet (terminal emulation protocol). Several standard connectivity utilities are included with Windows NT, such as the FTP Server service and Telnet driver. The Windows Sockets interface offers compatibility with many third-party foreign host connectivity products. Several applications vendors support this application programming interface (API) standard.
- A robust, cross-platform client-server framework. TCP/IP for Windows NT offers the Windows Sockets interface, which is ideal for developing client-server applications. A Windows Sockets application developed to be used with Microsoft TCP/IP will be able to run other vendors' Windows Sockets-compliant applications as well.

How Does TCP/IP Work?

The name TCP/IP is somewhat misleading because TCP (transmission control protocol) and IP (Internet protocol) are only two protocols in the family of Internet protocols. However, TCP/IP has been used in the industry to mean the family of common Internet protocols.

The following sections briefly explain how the TCP and IP protocols work. For a full explanation of the TCP/IP protocols, see Comer, D. *Internetworking with TCP/IP Volume I, Principles, Protocols, and Architecture*. Second edition. Englewood Cliffs, N.J.: Prentice Hall, 1991.

How TCP Works

TCP is a reliable, connection-oriented protocol. Connection-oriented implies that TCP first establishes a connection between the two systems that intend to exchange data. Since most networks are built on shared media (for example, several systems sharing the same cabling), it is necessary to break chunks of data into manageable pieces so that no two communicating systems monopolize the network. These pieces are called packets. When an application sends a message to TCP for transmission, TCP breaks the message into packets sized appropriately for the network, and sends them over the network.

Sequence Numbers, Checksum, and Port ID

Because a single message is often broken into many packets, TCP marks these packets with sequence numbers before sending them. The sequence numbers allow the receiving system to properly reassemble the packets. Being able to reassemble the original message is not enough—the accuracy of the data must also be verified. TCP does this by computing a checksum.

A checksum is a simple mathematical computation applied by the sender to the data contained in the TCP packet. The recipient then does the same calculation on the received data and compares the result with the checksum that the sender computed. If the results match, the recipient sends an acknowledgment (ACK) to verify the receipt of valid data. If the results do not match, the recipient discards the packet without acknowledging it. The sender must then retransmit the packet since no acknowledgment was received.

Finally, TCP uses port IDs to specify which application running on the system is sending or receiving the data.

TCP Headers

The port ID, checksum, and sequence number are inserted into the TCP packet in a special section called the header. The header is at the beginning of the packet containing this and other “control” information for TCP.

How IP Works

IP is the messenger protocol of TCP/IP. The IP protocol, much simpler than TCP, basically addresses and sends packets. IP relies on three pieces of information, which you provide, to receive and deliver packets successfully: the IP address, subnet mask, and default gateway.

IP Addresses

The IP address identifies your system on the TCP/IP network. IP addresses are 32-bit addresses that are globally unique on a network. They are generally represented in dotted decimal notation. Dotted decimal notation separates the four bytes of the address with periods. An IP address looks like this:

102.54.94.97

Although an IP address is a single value, it really contains two pieces of information:

- Your system's network ID
- Your system's host (or system) ID

Subnet Mask

The subnet mask, also represented in dotted decimal notation, is used to extract these two values from your IP address. The value of the subnet mask is determined by setting the network ID bits of the IP address to 1's and the host ID bits to 0's. The result allows TCP/IP to determine the host and network IDs of the local workstation, as shown in the following table.

Understanding an IP Address

When the IP address is	102.54.94.97	(specified by the user)
And the subnet mask is	255.255.0.0	(specified by the user)
The network ID is	102.54	(IP address and subnet mask)
And the host ID is	94.97	(IP address and subnet mask)

Network and Host IDs

The network ID identifies a group of systems that are all located on the same logical network. In internetworks (networks formed by a collection of networks), there are as many unique network IDs as there are networks. TCP/IP networks are connected by routers (or gateways), which know the networks that are connected in the internet. The host ID identifies your system within a particular network ID.

Default Gateway

The default gateway is needed only for systems that are part of an internet. When IP gets ready to send a packet on the wire, it inserts the local (source) IP address and destination address of the packet in the IP header, and verifies that the network ID of the destination matches the source. If they match, the packet is sent directly to the destination system on the local network. If the network IDs do not match, the packet is forwarded to the default gateway for delivery. Since the default gateway knows the network IDs of the networks in the internet, it forwards the packet to other gateways until the packet is eventually delivered to a gateway connected to the specified destination. This process is known as routing.

Example

This example shows how TCP/IP might deliver a message, using an analogy with the U.S. postal system to describe how these protocols work.

Steve (source host ID) in Seattle (source network ID) wants to send a two-page letter (message) to Dana (destination host ID) in Dartmouth (destination network ID). There is a limit to the length of the message that can be sent in a single letter (maximum transmission unit, or MTU) to a single page.

First, Steve establishes the connection by writing a short note to Dana saying he is going to mail her a two-page letter. Steve then puts the letter in an envelope (IP packet) and addresses it to Dana in Dartmouth (destination IP address).

Steve's mail carrier (Steve's default gateway) picks up the letter, doesn't know where Dartmouth is, and forwards it to the Seattle post office (gateway). From Seattle, the message goes (routes) to the Dartmouth post office (Dana's default gateway). The Dartmouth mail carrier delivers it to Dana.

Dana writes back (ACKs) to Steve saying she is ready and waiting for his letter. She addresses the envelope, using the return address from the envelope (IP packet), to Steve in Seattle. Dana's mail carrier then carries her reply to the Dartmouth post office, and it travels to Steve.

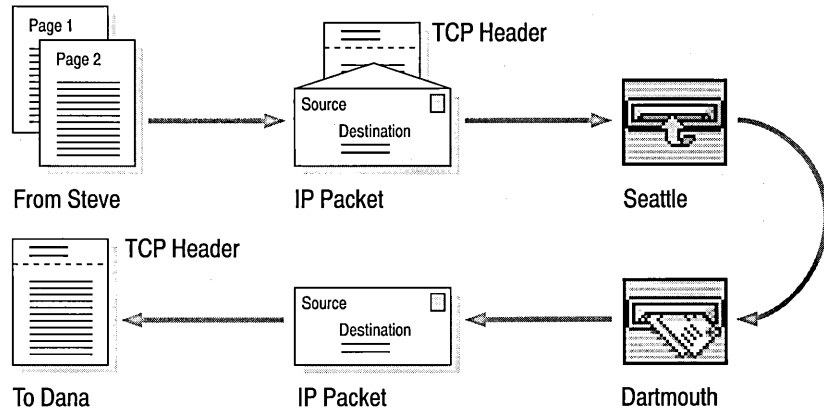
Steve realizes that his letter (message) is too long to fit in a single envelope (IP packet), tears off the first page (TCP packet) and writes "1 of 2" in the margin (TCP header), puts it into the envelope addressed to Dana (IP packet), and mails it.

The first page is successfully routed to Dana, who opens the envelope and reads the contents. But the letter is incomplete, so Dana mails a quick note (ACK) to Steve saying she received the first page of the message, but hasn't seen any since.

Steve reads Dana's letter and immediately takes the second page (TCP packet), writes "2 of 2" in the margin (TCP header), puts it in an envelope addressed to Dana (IP packet), and mails it.

The second note is also successfully routed to Dana, so she replies (ACKs) with one final note saying she received it.

The following figure shows how one page of Steve's message traveled.



Installing and Configuring Microsoft TCP/IP and SNMP

The TCP/IP protocol family is not installed as part of Windows NT when Express Setup is run. This section assumes that Windows NT has already been successfully installed on your system.



You must be logged on as a member of the Administrators group to install and configure TCP/IP and SNMP. Also, SNMP must be installed to monitor TCP/IP network components using Performance Monitor.

Before Installing Microsoft TCP/IP

You need to know the following information before you install Microsoft TCP/IP on your computer:

- Default gateway
- IP address
- Subnet mask
- Whether to enable Domain Name Service (DNS), and if so, the IP addresses of the DNS servers on your network
- LMHOSTS file for your network (if necessary)

Installing TCP/IP



You must be a member of the Administrators group to install and configure TCP/IP.

► To install Microsoft TCP/IP on a Windows NT computer

1. Choose the Network option in Control Panel.
The Network Settings dialog box appears.
2. Choose the Add Software button.
The Add Network Software dialog box appears.
3. Select TCP/IP Protocol in the Network Software box, and then choose the Continue button.
4. The Windows NT Setup dialog box prompts you for the full path to the Windows NT distribution files. Provide the appropriate location, and then choose the Continue button.
All necessary files are copied.
5. Continue with the configuration procedure as described in the next section.
TCP/IP must be configured in order to operate.

Configuring TCP/IP

After the Microsoft TCP/IP protocol software is installed on your computer, you must configure it with valid addressing information for TCP/IP to operate.

► To configure or reconfigure the TCP/IP protocol

1. The Configuration dialog box appears automatically after the TCP/IP software is installed on your computer and you have chosen the OK button in the Network Settings dialog box.
If you are reconfiguring TCP/IP, choose the Network option in Control Panel. In the Installed Network Software box, select TCP/IP Protocol, and then choose the Configure button.

The TCP/IP Configuration dialog box displays the following configuration options.

Item	Description
Default Gateway	Specifies the IP address of the default gateway used to forward packets to other networks or subnets. This parameter is required only for nodes on internetworks. If this parameter is not provided, IP functionality will be limited to the local subnet unless a route is specified with the route command. The network administrator should provide the correct value for this parameter.
IP Address	Specifies the IP address for your local computer, or if more than one network card is installed in the computer, the network adapter card listed in the Adapter box. Duplicate IP addresses on a network might cause some systems on the network to stop working or function unpredictably. The network administrator should provide the correct value for this parameter.
Subnet Mask	Specifies the subnet mask associated with the adapter to which TCP/IP is bound. Each interface used by TCP/IP must have a subnet mask configured. This allows the computer to separate the IP address into host and network IDs. The network administrator should provide the correct value for this parameter.

Item	Description
Windows Networking Adapter	Lists available network adapter cards. If your computer has multiple network interfaces, Windows Networking must be configured to use only one.
Scope ID	Specifies the NetBIOS scope parameter for the NetBIOS over TCP/IP (NBT) module. To be able to communicate, all computers on a NetBIOS network must have the same scope ID. The network administrator should provide the correct value for this parameter, but you can usually leave this value blank.

2. The values for Default Gateway, IP Address, and Subnet Mask must be configured.
3. If necessary, select a TCP/IP adapter, and provide a Scope ID in the Windows Networking On TCP/IP (NetBIOS) box.
4. A computer joining an existing Advanced Server domain on a different subnet may choose to import an LMHOSTS file containing the IP Address and NetBIOS name of that domain's controller. To import this file, choose the Import LMHOSTS button and provide the location in the dialog box that appears.

The network administrator should determine if an LMHOSTS file should be imported.

5. To enable the Domain Name Service (DNS), choose the Connectivity button. Continue with the configuration procedure as described in the next section.

If you do not want to use DNS and rely on the HOSTS file for name resolution, choose the OK button to return to the Network Settings dialog box. Choose the OK button again.

Microsoft TCP/IP has been configured. You must restart the computer for the configuration to take effect.

Note The \WINNT\SYSTEM32\DRIVERS\ETC directory will contain several files. You may need to replace the installed files with files from the network administrator.

Configuring TCP/IP to Use DNS

Although TCP/IP uses IP addresses to identify and reach computers, users typically prefer using names. The Domain Name service (DNS) is a naming service generally used in the UNIX networking community to provide standard naming conventions for IP workstations.

Microsoft Windows networking provides a dynamic naming system of its own using NBT; however, TCP/IP applications, such as **ftp** and **telnet**, can use DNS in addition to the HOSTS file. This allows the user to use names instead of IP addresses when connecting to foreign hosts.

You must configure how your computer will use DNS and the HOSTS file. TCP/IP must be installed and configured to set up the DNS connectivity options.

► To configure or reconfigure TCP/IP DNS connectivity

1. Choose the Network option in Control Panel. In the Installed Adapter Cards box, select the adapter card whose TCP/IP NetBIOS protocol you want to configure. In the Installed Network Software box, select TCP/IP Protocol and choose the Configure button.
2. In the TCP/IP Configuration dialog box, choose the Connectivity button.

The screenshot shows the "TCP/IP Connectivity Configuration" dialog box. At the top, there are two text boxes: "Host Name:" containing "grizzly" and "TCP Domain Name:" containing "bruins.com". Below these is a section titled "Name Resolution Search Order" with four radio buttons: "DNS Only", "Hosts File First, Then DNS", "DNS First, Then Hosts File" (which is selected), and "Hosts File Only". The next section is "Domain Name Service (DNS) Search Order", featuring an input field with "0 .0 .0 .0", "Add >" and "< Remove" buttons, and a list box containing "102.54.0.1", "102.54.0.4", and "102.54.0.2". To the right of the list box are "Order" buttons (up and down arrows). The final section is "Domain Search Order", with an empty input field, "Add >" and "< Remove" buttons, and a list box containing "bruins.com". To the right of this list box are "Order" buttons (up and down arrows). At the bottom of the dialog are "OK", "Cancel", and "Help" buttons.

The TCP/IP Connectivity Configuration dialog box displays the following options.

Item	Description
Host Name	Specifies the host name for this computer. The host name is used to identify the local computer by name for authentication by some utilities. Other TCP/IP-based utilities and applications can use this value to learn the name of the local computer. This value defaults to the Windows NT computer name, and it can be altered without affecting the computer name's value. The Host name is optional.
TCP Domain Name	Identifies your group in the DNS hierarchical naming convention, with descending levels of detail. The fully qualified domain name (FQDN) for the computer is the host name, a period, and the domain name; for example, rhino.microsoft.com , where rhino is the host name and microsoft.com is the domain name. During DNS queries, the local domain name is appended to short names. The TCP Domain Name is optional. The DNS domain is not the same as a Windows NT or LAN Manager domain.
Name Resolution Search Order	Determines when to use DNS host name resolution. The domain name resolver (DNR) software is loaded at startup and is used to resolve host names, in conjunction with the locally maintained HOSTS file. This option allows you to specify the order and method to use when resolving names.
Domain Name Service (DNS) Search Order	Determines the order of servers that will provide name resolution.
Domain Search Order	Determines the domains in which to search for host name resolution.

3. Enter a the Host Name (usually your computer name) and TCP Domain Name (usually an organization name, a period, and an extension that indicates the type of organization).
4. Select how you want your computer to search for name resolution in the Name Resolution Search Order dialog box.
5. Enter the IP address of a server that will provide name resolution. Choose the Add button to move the IP address to the list on the right.

You can add up to three IP addresses. The servers at the IP addresses are queried in the order listed. To change the order of the IP addresses, select an IP address to move, and use the up and down arrow buttons. To remove an IP address, select it and choose the Remove button.

6. Type the names of the domains in which to search for host name resolution.
You can add up to six domain names. To change the search order of the domains, select a domain to move, and use the up and down arrow buttons. To remove a domain name, select it and choose the Remove button.
7. When you are done setting connectivity values, choose the OK button.
The Microsoft TCP/IP-Connectivity Configuration dialog box closes, and the TCP/IP Configuration dialog box appears.
8. Choose the OK button. The Microsoft TCP/IP Configuration dialog box closes, and the Network Settings dialog box returns.
9. To complete TCP/IP Installation and Configuration, choose the OK button. DNS resolution has been configured.
A message informs you that you must restart the computer so that the change you made will take effect.
If you reconfigured only DNS, the new configuration will take effect immediately, without restarting.
If you have configured the default gateway, IP address, subnet mask, or scope ID, you must restart the computer for those changes to take effect. You can choose the Yes button to restart the computer.

Troubleshooting IP Connections

If you have trouble installing Microsoft TCP/IP on your computer, follow the suggestions in the error messages. You can also use the **ping** utility, as described below.

ping

The **ping** utility can isolate network hardware problems and incompatible configurations by allowing you to verify a physical connection to a remote computer.

Use the **ping** utility to test both the host name and the IP address of the host. If the pinged IP address responds but the host name does not, you have a name resolution problem. In this case, be sure that the host name you are querying is in either the local HOSTS file or in the DNS database.

Before Installing the SNMP Service

You need to know the following information before you install the SNMP service on your computer:

- Community names in your network
- Trap destination for each community

Installing the SNMP Service



You must be a member of the Administrators group to install and configure SNMP.

▶ To install the SNMP service on a Windows NT computer

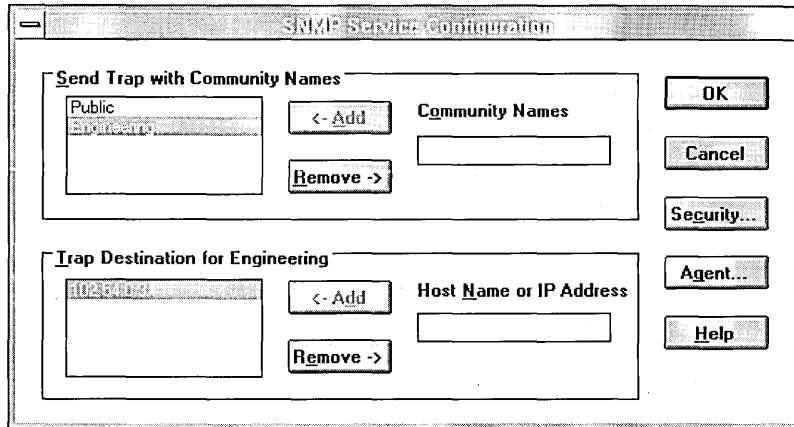
1. Choose the Network option in Control Panel.
2. In the Network Settings dialog box, choose the Add Software button.
The Add Network Software dialog box appears.
3. Select SNMP Service in the Network Software box and choose the Continue button.
4. The Windows NT Setup dialog box prompts you for the full path to the Windows NT distribution files. Provide the appropriate location, and then choose the Continue button.
The SNMP service software is copied to your computer. The SNMP Service Configuration dialog box appears.
5. Continue with the configuration procedure, as described in the next section, "Configuring SNMP." You can press the ESC key and configure SNMP later, but SNMP must be configured to operate.

Configuring SNMP

After the SNMP service software is installed on your computer, you must configure it with valid information for SNMP to operate.

▶ To configure or reconfigure the SNMP service

1. The Configuration dialog box appears automatically after the SNMP software is installed on your computer.
If you are reconfiguring SNMP, choose the Network option in Control Panel. In the Installed Network Software box, select SNMP Protocol, and then choose the Configure button.



The SNMP Service Configuration dialog box displays the following options.

Item	Description
Send Trap With Community Names	A community is a group of hosts to which a server running the SNMP service belongs. You can specify one or more communities to send traps to. The community name is placed in the SNMP packet when the trap is sent. Typically, all hosts belong to Public, which is the standard name for the common community of all hosts. An entry in the list can be deleted by selecting it and choosing the Remove button.
Trap Destinations For <i>selected community</i>	Trap destinations are the names or IP addresses of hosts to which you want the SNMP service to send traps with the selected community name. An entry in the list can be deleted by selecting it and choosing the Remove button.

2. Enter the community names you want your computer to send traps to in the Community Names box. Choose the Add button after typing each name to move the name to the list on the left.

For each community you send traps to, you can specify specific hosts in that community to send the traps to. After you have added the community, and while it is still highlighted, type the hosts in the Host Name Or IP Address box. Choose the Add button to move the host name or IP address to the box on the left.

- To enable additional security for the SNMP service, choose the Security button. Continue with the configuration procedure, as described in the next section, “Configuring SNMP Security.”

To specify Agent information (comments about the user, location, and services), choose the Agent button. Continue with the configuration procedure, as described in “Configuring SNMP Agent Information,” later in this appendix.

If you do not want to use SNMP security or specify Agent information, choose the OK button. The Network Settings dialog box reappears. Choose the OK button. The Microsoft SNMP service has been configured and is ready to start. It is not necessary to restart the computer.

Configuring SNMP Security

SNMP security allows you to specify the communities and host your computer will accept requests from and to specify whether to send an authentication trap when an unauthorized community or host requests information.

► To configure or reconfigure SNMP security

- Choose the Network option in Control Panel. In the Installed Network Software box, select SNMP Service and choose the Configure button. The SNMP Service Configuration dialog box appears.
- Choose the Security button.

The screenshot shows the "SNMP Security Configuration" dialog box. It features a title bar and a main area with several sections. At the top, there is a checked checkbox labeled "Send Authentication Trap". Below this is a section titled "Accepted Community Names" which includes a list box containing "public" and "private", "Add" and "Remove" buttons, and a text field for "Community Name". Underneath is a radio button for "Accept SNMP Packets from Any Host" which is unselected. The next section is "Only Accept SNMP Packets from These Hosts:" which is selected, containing a list box with "102.54.0.5", "Add" and "Remove" buttons, and a text field for "Host or IP Address:". On the right side of the dialog, there are three buttons: "OK", "Cancel", and "Help".

The SNMP Security Configuration dialog box displays the following options.

Item	Description
Send Authentication Trap	When the SNMP service receives a request for information that does not contain the correct community name and doesn't match an accepted host name for the service, the SNMP service can send a trap to the trap destination(s), indicating that the request failed authentication. This check box specifies whether or not this authentication trap is sent.
Accepted Community Names	A host must belong to a community that appears on this list for the SNMP service to accept requests from that host. Typically, all hosts belong to Public, which is the standard name for the common community of all hosts. An entry in the list can be deleted by selecting it and choosing the Remove button.
Accept SNMP Packets From Any Host	If this option is selected, no SNMP packets are rejected on the basis of source host ID, and the list of hosts under Only Accept SNMP Packets From These Hosts has no effect.
Only Accept SNMP Packets From These Hosts	If this option is selected, SNMP packets will be accepted only from the hosts listed. An entry in the list can be deleted by selecting it and choosing the Remove button.

3. Enter the community names you will accept requests from in the Community Name box. Choose the Add button after typing each name to move it to the list on the left.
4. To accept SNMP packets from any host, select that option. Otherwise, select the Only Accept SNMP Packets From These Hosts option. Then type the host names or IP addresses of the hosts you will accept requests from in the Host Or IP Address box. Choose the Add button to move the host name or IP address to the box on the left.
5. To send a trap for failed authentications, select the Send Authentication Trap box.
6. Choose the OK button.

The SNMP Service Configuration dialog box reappears.

To specify Agent information (comments about the user, location, and services) choose the Agent button. Continue with the configuration procedure as described in the next section.

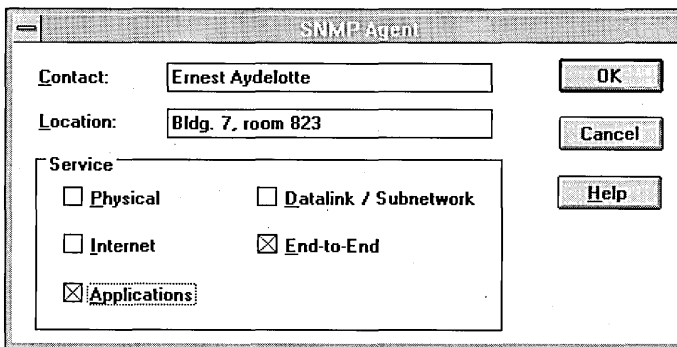
If you do not want to specify Agent information, choose the OK button to return to the Network Settings dialog box. Choose the OK button again. The Microsoft SNMP service and SNMP security have been configured and are ready to start.

Configuring SNMP Agent Information

SNMP agent information allows you to include comments about the user and physical location of the computer and indicate the types of service to report. The types of service that can be reported are based on the computer's configuration.

► **To configure or reconfigure SNMP agent information**

1. Choose the Network option in Control Panel. In the Installed Network Software box, select SNMP Service and choose the Configure button.
2. In the SNMP Service Configuration dialog box, choose the Agent button.



The screenshot shows the 'SNMP Agent' dialog box. It has a title bar with the text 'SNMP Agent'. Inside the dialog, there are three main sections: 'Contact', 'Location', and 'Service'. The 'Contact' section has a text box containing 'Ernest Aydelotte' and an 'OK' button to its right. The 'Location' section has a text box containing 'Bldg. 7, room 823' and a 'Cancel' button to its right. The 'Service' section is enclosed in a box and contains five checkboxes: 'Physical' (unchecked), 'Datalink / Subnetwork' (unchecked), 'Internet' (unchecked), 'End-to-End' (checked), and 'Applications' (checked). To the right of the 'Service' box are 'Help' and 'OK' buttons.

3. Enter the computer user's name in the Contact box and a physical location in the Location box.

The comments will be used as text and cannot include embedded control characters.

4. Select the services to report in the Service box.

This option specifies which TCP/IP services are enabled. SNMP must have this information to manage the enabled services. End-To-End and Applications should be selected for all Windows NT installations. If you have installed additional TCP/IP services, such as a bridge or router, you should consult RFC 1213 for additional information.

5. Choose the OK button to return to the SNMP Agent dialog box.

The SNMP Service Configuration dialog box appears.

6. Choose the OK button to close the SNMP Service Configuration dialog box and return to the Network Settings dialog box.
7. To complete SNMP Service Installation and Configuration, choose the OK button.

SNMP is ready to operate after installation and configuration without restarting.

Using the Microsoft FTP Server Service

The Microsoft FTP Server service allows a Windows NT computer to transfer files to and from remote computers that support the FTP and TCP/IP protocols. The FTP Server service supports all Windows NT FTP client commands. Non-Microsoft versions of FTP clients may contain commands that are not supported.

The FTP Server service is implemented as a multithreaded Win32 service compliant with the requirements defined in Request For Comments (RFCs) 959 and 1123. RFCs are the official working documents of the Internet Engineering Task Force (IETF).

The FTP Server is integrated with the Windows NT security model. Users connecting to the FTP Server service are authenticated based on their Windows NT user accounts and receive access based on their user profile. For this reason, it is recommended that the FTP Server service be installed on a NTFS partition so the files made available via FTP can be secured.

Caution The FTP Server protocol relies on the ability to pass user passwords over the network without data encryption. A user with physical access to the network could examine user passwords during the FTP validation process.

The following section describes how to install, configure, and administer the Microsoft FTP Server service. It assumes that you have successfully installed TCP/IP and any necessary devices and device drivers.

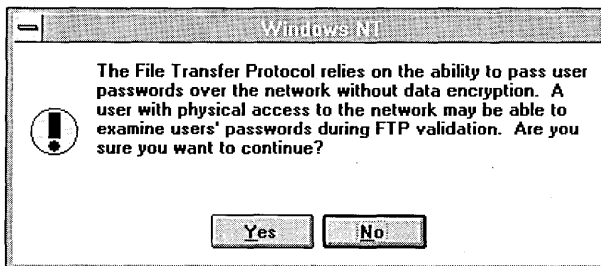
Installing the FTP Server Service



The FTP Server service is not installed automatically because of the security risks mentioned above. You must be a member of the Administrators group to install and configure the FTP Server service.

▶ **To install the FTP Server service**

1. Choose the Network option in Control Panel.
2. In the Network Settings dialog box, choose the Add Software button.
The Add Network Software dialog box appears.
3. Select FTP Server in the Network Software box, and then choose the Continue button. A warning message prompts you to confirm that you are familiar with FTP Security.



4. Choose the Yes button to continue with FTP Server installation.
The Windows NT Setup dialog box prompts you for the full path to the Windows NT distribution files. Provide the appropriate location, and choose the Continue button.
5. After the necessary files are copied to your computer, the FTP Service dialog box appears.
6. Continue with the configuration procedure as described in the next section.
The FTP Server service must be configured in order to operate.

Configuring the FTP Server Service

After the FTP Server service software is installed on your computer, you must configure it to operate.

▶ **To configure or reconfigure the FTP Server service**

1. The FTP Service configuration dialog box appears automatically after the FTP Server service software is installed on your computer.
If you are reconfiguring the FTP Server service, choose the Network option in Control Panel. In the Installed Network Software box, select FTP Server, and then choose the Configure button.

The screenshot shows the 'FTP SERVICE' dialog box. At the top, there are two spinners: 'Maximum Connections' set to 20 and 'Idle Timeout (min)' set to 10. Below these is a text field for 'Home Directory' containing 'C:\users'. A section with a checked checkbox is titled 'Allow Anonymous Connections'. Inside this section, there is a 'Username' field with 'guest' and a 'Password' field with asterisks. Below this section is an unchecked checkbox labeled 'Allow Only Anonymous Connections'. At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

The FTP Service dialog box displays the following options.

Item	Description
Maximum Connections	Specifies the maximum number of FTP users who can connect to the system simultaneously. The default value is 20; the maximum is 50.
Idle Timeout	Specifies how many minutes an inactive user may remain connected to the FTP Service. The default value is 10 minutes; the maximum is 60 minutes. If the value is 0, users are never automatically disconnected.
Home Directory	Specifies the initial directory for users.
Allow Anonymous Connections	Enables users to connect to the FTP Server using the user name anonymous . A password is not necessary, but the user is prompted to enter his or her electronic mail address as the password. By default, anonymous connections are not allowed. Note that you cannot use a Windows NT user account with the name anonymous with the FTP Server. The anonymous user name is reserved in the FTP Server for the anonymous logon function. Users logging on with the username anonymous receive permissions based on the FTP Server configuration for anonymous logons.
Username	Specifies which local user account to use for FTP Server users who log on under anonymous . Access permissions for the anonymous FTP user will be the same as the specified local user account. The default is the standard guest system account.

Item	Description
Password	Specifies a password when connecting with anonymous as the user name. The default is the default Windows NT guest account password. If you will use the guest account for anonymous logons, and you have changed the default guest account password, you should enter the guest account password here.
Allow Only Anonymous Connections	Allows only the user name anonymous to be accepted. This option is useful if you do not want users to use their own user names and passwords because FTP passwords are unencrypted. However, all users will have the same access privilege. By default, this option is not enabled.

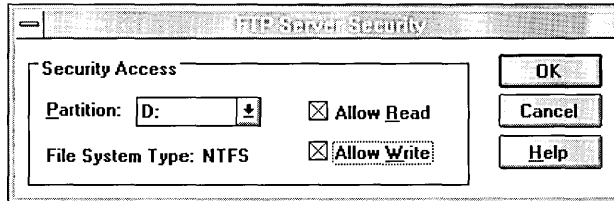
2. Default values are provided for Maximum Connections, Idle Timeout, and Home Directory. Accept the default values or change values for each field as necessary.
3. Choose the OK button to close the FTP Service configuration dialog box and return to the Network Settings dialog box.
4. To complete initial FTP Server service installation and configuration, choose the OK button.

A message informs you that you must restart the computer so that the change you made will take effect. It is not necessary to restart. If you are installing the FTP Server for the first time, you need only to exit Control Panel and restart Control Panel for the FTP Server icon to appear. If you are just reconfiguring the FTP Server service, you need only to restart the service for changes to take effect.

Note On initial installation you must also complete security configuration as described below for users to access volumes on your computer.

► **To configure FTP Server security**

1. After the FTP Server has been installed and you have restarted Control Panel, start the FTP Server option in Control Panel. Advanced Server users can also use the FTP menu in Server Manager. Choose the Security button.



2. Select the drive letter you want to set security on in the Partition box. Choose the Allow Read, the Allow Write, or both check boxes.
3. Choose the OK button when you are finished setting security access on partitions.

The changes take effect immediately. The FTP Server service is now ready to operate.

Administering the FTP Server Service

Once initial installation is complete, the FTP Server service is automatically started in the background as a service each time the computer is started. Remote computers are able to initiate an FTP session while the FTP Server service is running on your Windows NT computer. Both computers must be running the TCP/IP protocol.

Remote users can connect to the FTP Server using their account on the FTP Server, an account on the FTP Server's domain (Advanced Server only), or using the **anonymous** account if the FTP Server service is configured to allow anonymous logons.

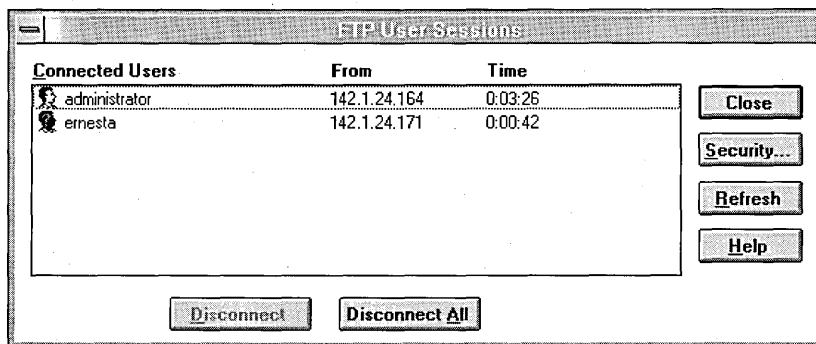
Use the Services option in Control Panel to start and stop the FTP Server service. For more information about using the Services option of Control Panel, see Chapter 5, "Control Panel." If selected, the FTP Server icon will offer to start the FTP Server service if it is not running. You can also start and stop the service at the command prompt using the commands **net start ftpsvc** or **net stop ftpsvc**.

Managing Users

Use the FTP Server option in Control Panel to manage users connected to the FTP Server and to set security for each volume on the FTP Server. For convenience on Advanced Server computers, the same dialog box can be reached from Server Manager using the FTP menu item.



You must be a member of the Administrators group to administer the FTP Server.



The Connected Users box displays connected users, their IP addresses, and how long they have been connected. Users who have logged on using the **anonymous** user name display the password used when they logged on as their user name. If the user name contained a mail host (for example, ernesta@trey_research.com) only the username (ernesta) appears. The anonymous user also has a question mark (?) over the user icon.

The FTP Server allows you to disconnect one or all users with the disconnect buttons. Users are not warned if you disconnect them.

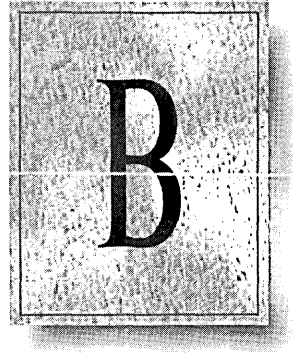
The FTP Server displays users as they connect, but does not update the display when users disconnect or their connect time elapses. The Refresh button allows you to update the display to show only users who are currently connected.

Choosing the Security button displays the FTP Service Security dialog box, allowing you to set Read and Write permissions for each partition on the FTP Server. You must set the permissions for each partition you want FTP users to have access to. If you do not set partition parameters, no users are able to access files. If the partition uses a secure file system, such as NTFS, file system restrictions are also in effect.

In addition to FTP Server partition security, if a user logs on using a Windows NT account, access permissions for that account are in effect.

A P P E N D I X B

Remote Access Service



This appendix helps you install and get started with the Remote Access Service. For details, see online Help.

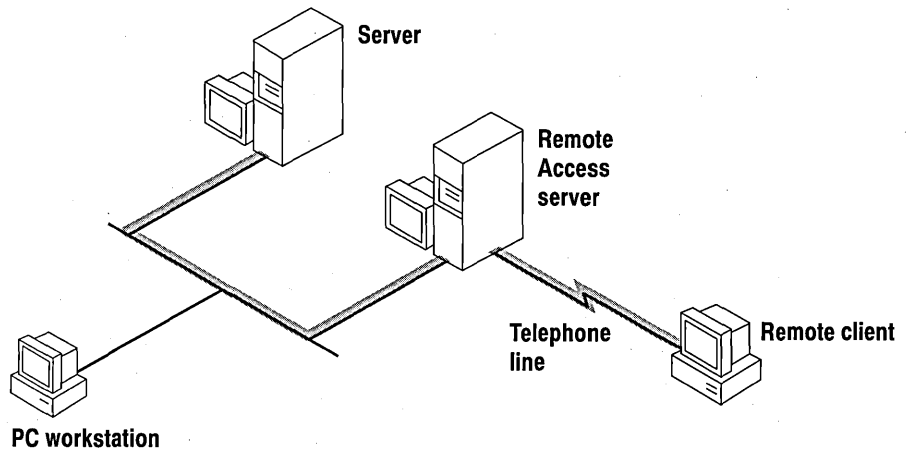
Overview and Planning

The Windows NT Remote Access Service contains two main components:

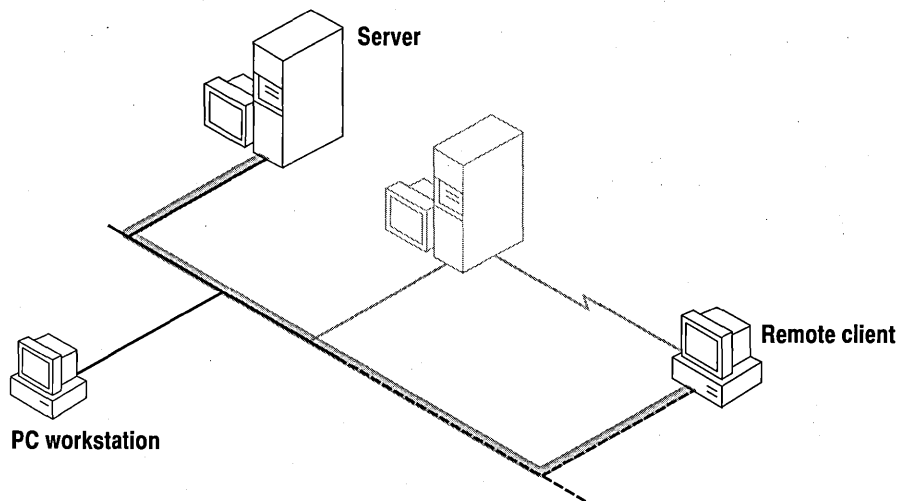
- The Remote Access server, a Windows NT workstation configured to accept incoming calls
- The Remote Access client, a Windows NT, MS-DOS, or Microsoft Windows computer that dials in to a server

Windows NT can act as both a server and a client.

A Remote Access client is a computer (or workstation) that is not directly connected to a network. The user calls a server and connects to the network through a telephone line, as shown in the following illustration.



Once connected, the telephone link is transparent. From the remote client, users can see and gain access to network resources on the LAN just as they do in the office from a computer physically connected to the LAN. In this way, the Remote Access Service acts as a *gateway* between the remote client and the network, as shown in the following illustration.

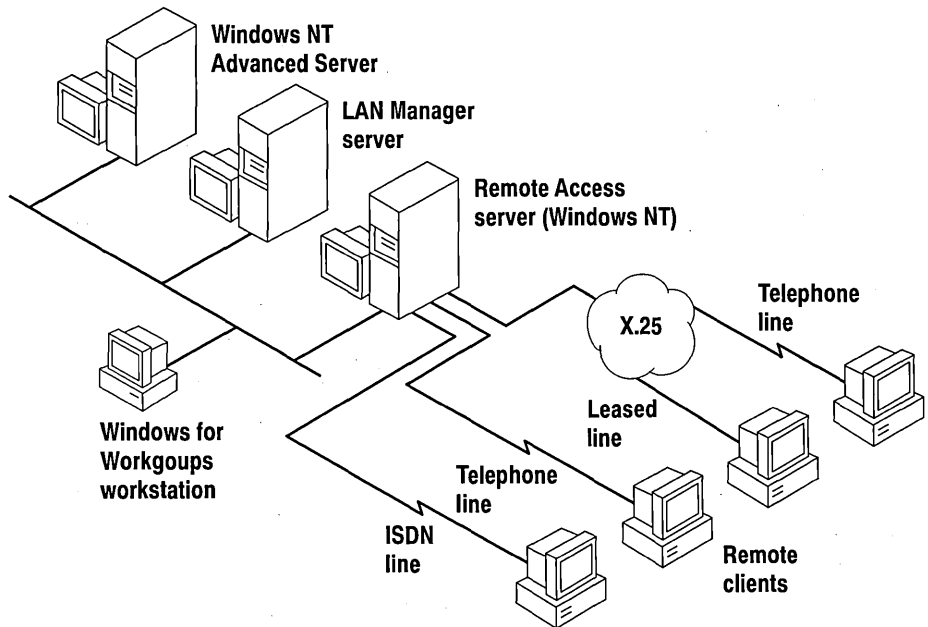


The Remote Access Service features the Remote Access Phone Book program for entering and maintaining the names and telephone numbers of remote networks. Clients can connect to and disconnect from these networks through the Phone Book. For information about using the Remote Access Phone Book, see the online Help.

The Remote Access Service also has a graphical Administrator's utility. Through the Administrator's utility, you can do the following:

- Start, stop, pause, or continue the Remote Access server
- Grant Remote Access permission to or revoke it from individual users
- Monitor Remote Access traffic and user accounts

The Administrator's utility allows you to monitor Remote Access servers and users from any computer on the network, including a remote one. With Windows NT Event Viewer, located in the Administrative Tools group, you can see events and errors audited by the Remote Access Service. For details about Event Viewer, see Chapter 15, "Event Viewer."



Overview of Windows NT Remote Access Service

Features

The Microsoft Windows NT Remote Access Service offers the following features:

- Transparent access to the network for telecommuters, mobile workers, and remote system administrators.
 - Support for named pipes, remote procedure calls (RPC), and the LAN Manager application programming interface (API).
 - Client access to resources on application servers such as SQL Server, SNA Server for Windows NT, and Lotus Notes®.
- Compatibility with workstations and servers running previous versions of the Remote Access Service.
- Support for public telephone, X.25, and integrated services digital network (ISDN) wide area networks.
- Support for data compression and error control on modems.
- Software compression.
- Security:
 - Integration with Windows NT security.
 - Encrypted authentication during connection.
 - Support for third-party security hosts that authenticate users.
 - Callback for either added security or user convenience.
 - Central administration of servers and users.
- Support for over 100 modems. See the Microsoft Windows NT Hardware Compatibility List.

Setting Up the Remote Access Service

First, install your wide area network adapters such as X.25 and ISDN adapters. (For information about installing adapter cards, see the hardware documentation.)

Note Make sure the I/O address and interrupt request (IRQ) level settings you choose for your adapter do not conflict with other peripherals on your computer.

▶ **To install a wide area network adapter**

1. In the Windows NT Control Panel, double-click the Network icon.
2. Choose the Add Software button.
3. From the list, choose Remote Access Service.
4. Choose the Continue button.
5. Follow the instructions on the screen.

If you need help, choose the Help button on any of the Remote Access Setup screens.

6. When the software is installed, restart the computer.

When you return to Windows NT, you will see the Remote Access Service group, which contains the Remote Access icon.

Allowing Others to Connect to Your Workstation

Without permission, users cannot dial in to your workstation, even if the Remote Access client software has been installed on their computers.

▶ **To grant Remote Access permission to users**

1. Start the Administrator's utility by double-clicking the Remote Access Admin icon in the Remote Access Service group.
2. From the Users menu, choose Permissions.

In the Remote Access Permissions dialog box, you can grant or revoke Remote Access permissions to either one user at a time or to all users at once. For more information on granting Remote Access permissions, choose the Help button.

For information about setting up your modem, see online help.

Note Microsoft recommends against granting dial-in permission to guest accounts.

X.25 Support

The Remote Access Service lets you access an X.25 network in two general ways:

- A client (for the Windows graphical environment or Windows NT system) can use asynchronous PADs.
- A server and client (for the Windows NT system only) can use direct connections.

X.25 Configurations

The Remote Access Service for X.25 networks offers two configurations for the client and two for the server:

Client/Server	Configuration
Client	Dial-up PAD
Client	External PAD
Client	Direct connection through X.25 smart card
Server	Direct connection through X.25 smart card
Server	External PAD

See the Windows NT Hardware Compatibility List for PADs that have been tested with the Remote Access Service.

Accessing X.25 Through Dial-up PADs

Operating between the client and the Remote Access server, an asynchronous PAD converts serially transmitted data into X.25 packets. When the PAD receives a packet from an X.25 network, it puts the packet out on a serial line, making communication possible between the client and the X.25 network.

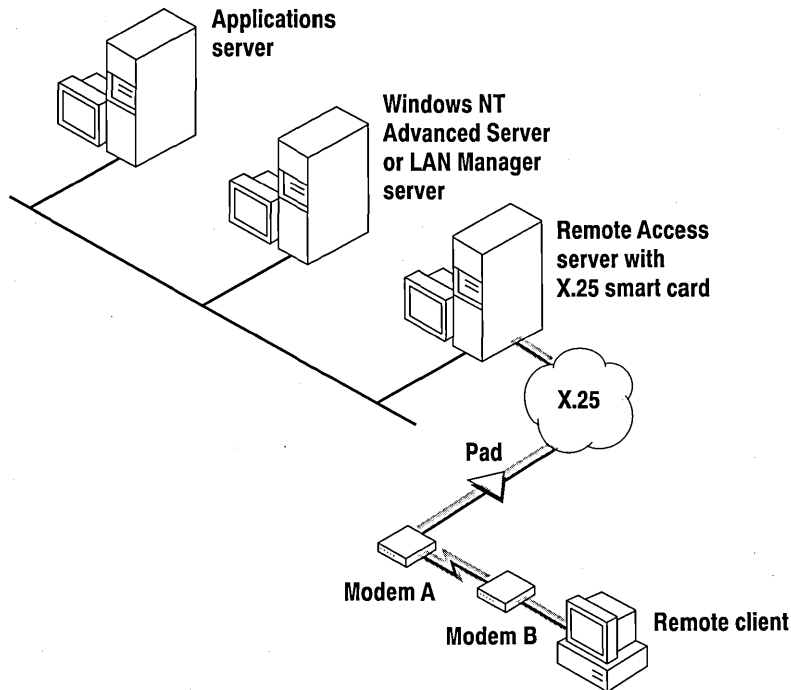
Remote Access clients can connect with Remote Access servers through dial-up PAD services supplied by X.25 carriers, such as Sprintnet and InfoNet. Once the client's modem (modem A in the following illustration) connects to the PAD's modem (modem B), the client software must converse with the dial-up PAD. When their conversation is successfully completed, a connection is established between client and server.

Note For best results, make sure the client modem is compatible with the PAD carrier's modem, or at least match the V. protocol supported by the carrier's modem.

The conversation (command/response scripts) for the PADs supported by an X.25 carrier is stored in the PAD.INF file. Remote Access software supplies one example. To customize for your PAD, see "PAD.INF Format," later in this chapter, and use the editing program you're familiar with.

Note For dial-up PADs, you must use the `COMMAND=` format, not the `COMMAND_INIT`, `COMMAND_DIAL`, and `COMMAND_LISTEN` format.

The following illustration shows how a client connects to the Remote Access server through a dial-up PAD and the X.25 network.



How Remote Access Connects to the Server Through a Dial-up PAD

Dial-up asynchronous PADs are a practical choice for Remote Access clients because they don't require an X.25 line plugged into the back of the workstation. Their only requirement is the telephone number of the PAD service for the carrier.

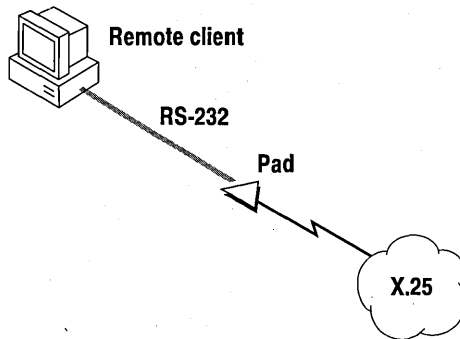
The following table compares connecting through dial-up PADs and connecting directly:

Dial-up PAD	Direct connection
Saves the expense of a dedicated leased line (direct connection).	Requires expensive leased line.
Allows connections from hotels, airports, homes—anywhere a phone line is available.	Requires users to dial in from a fixed location.
Requires two steps to connect.	Connects conveniently in one step.
Limits maximum communication speed to the modem's or the PAD's speed, whichever is slower.	Lets communication take place up to the speed of a leased line, 56 kilobits per second.
Allows less control in configuring PADs.	Offers greater reliability.

Client External PAD

In this configuration, the PAD is connected to the client workstation by an RS-232 cable attached to a serial port. In the PAD.INF file, create a section that contains a dialog script for connecting to a server. For examples, see the PAD.INF file.

Note The PAD.INF entry must have the `COMMAND_INIT`, `COMMAND_DIAL`, and `COMMAND_LISTEN` strings so that the PAD can be used for the client and server.

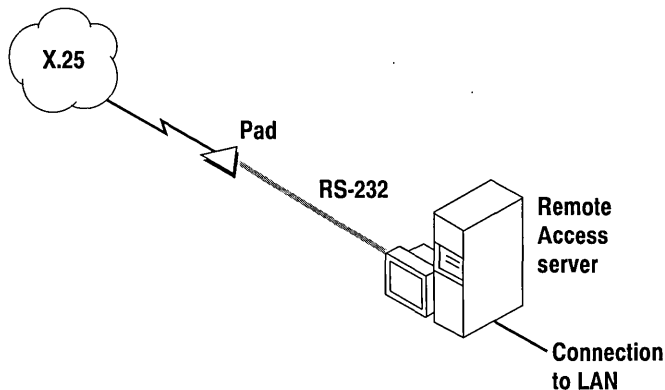


Client Connecting to the X.25 Network Through an External PAD

Server External PAD

Servers with external PADs must be configured to receive incoming calls. As with the client, in the PAD.INF file create a section that contains a dialog script for connecting to clients. For examples, see the PAD.INF file.

Note The PAD.INF entry must have the `COMMAND_INIT`, `COMMAND_DIAL`, and `COMMAND_LISTEN` strings so that the PAD can be used for the client and server.



Server Connecting to the X.25 Network Through an External PAD

PAD and Serial Configuration

To configure your PAD correctly, set the X.3 parameters as shown in the following table.

Parameter number	X.3 parameter	Value
1	PAD Recall	0
2	Echo	0
3	Data Fwd. Char	0
4	Idle Timer	1
5	Device Ctrl	0
6	PAD Service Signals	1
7	Break Signal	0
8	Discard Output	0
9	Padding after CR	0
10	Line Folding	0

Parameter number	X.3 parameter	Value
11	<i>Not Set</i>	
12	Flow Control	0
13	Linefeed Insertion	0
14	Padding after LF	0
15	Editing	0
16	Character Delete	0
17	Line Delete	0
18	Line Display	0
19	Editing PAD Srv Signals	0
20	Echo Mask	0
21	Parity Treatment	0
22	Page Wait	0

Caution Failure to set these values as shown prevents the Remote Access Service from functioning properly. For information on setting these values, see the instructions with your X.25 smart card.

Also, configure external and dial-up PADs to the following serial communication settings:

- 8 data bits
- 1 stop bit
- No parity serial communication

For dial-up PADs, make sure your vendor supports this configuration. The PADs are often already set to the correct configuration for connecting directly through an internal X.25 smart card. Do not change it.

Connecting to the X.25 Network Directly

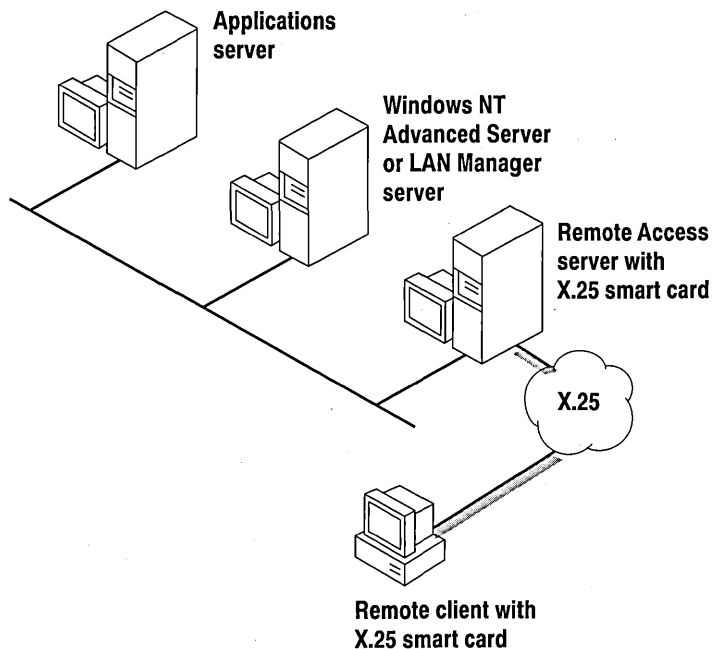
The Remote Access Service also supports connecting directly from the remote workstation to the X.25 network through a smart card. An *X.25 smart card* is a hardware card with a PAD embedded in it. To the personal computer, the X.25 virtual circuit looks like a communication port with an advanced modem connected to it.

To access the X.25 network through a direct connection, you need:

- A direct line connection to an X.25 network (clients only).
- A smart card.

Note The server side always requires an X.25 smart card, but the client side requires one only when connecting to the X.25 network directly.

The following illustration shows how the server and a Windows NT-based client (both equipped with smart cards) connect to the X.25 network directly.



Connecting to an X.25 Network Directly

Callback

The Remote Access server does not support callback on X.25 networks.

Setting Up the Remote Access Server for an X.25 Network

- ▶ **To set up the server to connect through an X.25 network**
 1. Install the X.25 smart card (according to the manufacturer's instructions).
A communications driver for the X.25 smart card supplied by the hardware manufacturer or a third party then emulates communication ports.
 2. Make sure your X.25 smart card is configured with the X.3-parameter values shown in the section "PAD and Serial Configuration," earlier in this chapter.
 3. Install the Remote Access Service through Windows NT Control Panel.
 4. From the list of devices on the Remote Access Setup screen, select an entry corresponding to the X.25 smart card.
 5. In setting up the Remote Access server, make sure that the ports selected are configured for dial in.

Note Make sure that the speed of the leased line can support all the serial communication (COM) ports at all speeds at which clients will dial in. For example, 4 clients connecting at 9600 bps (through dial-up PADs) will require a 38,400-bps (4 times 9600) leased line on the server end. If the leased line does not have adequate bandwidth, it can cause time-outs and degraded performance for connected clients.

Setting Up a Remote Access Client

This section tells you how to set up a Windows NT Remote Access client so that it can do the following:

- Connect to the X.25 network through PAD services
- Connect to the X.25 network directly

Connecting Through Dial-up PADs

In general, a client connects to an X.25 network in two steps:

1. Dial from the client's modem to a PAD (modem-to-modem).
2. Establish a connection over the X.25 network between the PAD and the server-side X.25 smart card.

Once you've established a connection, communicate as you would through any asynchronous connection. For a more complete description of connecting through dial-up PADs, see "Accessing X.25 Through Dial-up PADs," earlier in this chapter.

Configuring Client PADs

The client PAD, through which a remote workstation connects to the X.25 network, may have previously been set to X.3-parameter values that are incompatible with the Remote Access Service. Therefore, it is very important to configure the X.25 smart card on the Remote Access server so that it changes the client PAD's X.3 settings to the values shown in the section "PAD and Serial Configuration," earlier in this chapter as soon as a connection is established through X.29 commands. To configure an X.25 smart card to make these changes, see the configuration manual for your specific card.

Note If the X.25 smart card on the server end does not support commands for the X.29 language, the client PAD script must set the X.3 parameters locally. If you have problems, contact the support site for your X.25 smart card vendor.

Connecting Directly

To set up the client for connecting directly to the X.25 network, follow the same procedures as you did in setting up the Remote Access server. See "Setting Up the Remote Access Server for an X.25 Network," earlier in this chapter. Make sure the communication ports are selected as dial out.

Configuring Remote Access Software for X.25

Connecting to a server through an X.25 network is similar to connecting through a phone line. The only difference is that the phone book entry must specify an X.25 PAD type and an X.121 address.

- ▶ To add a phone book entry with X.25 or to add X.25 to an existing entry
 - See Remote Access online Help.

PAD.INF Format

Similar in format to MODEM.INF, PAD.INF contains the conversations between the client software and the PAD, whereas MODEM.INF contains script information used to talk to the modem. You can find PAD.INF in the \WINNT\SYSTEM32\RAS subdirectory.

The macros in the following list are *reserved words*, which you cannot define in PAD.INF to create a new entry. Reserved words are case insensitive.

- **x25address**
- **diagnostics**
- **userdata**
- **facilities**

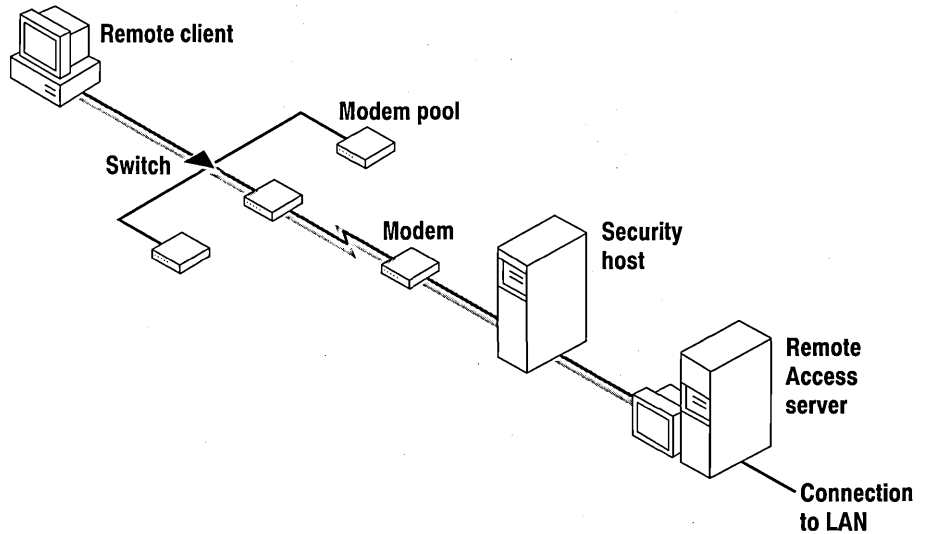
Caution Using reserved words as macro names in PAD.INF could result in unpredictable behavior of the Remote Access software.

In PAD.INF you can use the COMMAND_INIT, COMMAND_DIAL, and COMMAND_LISTEN family or the generic COMMAND= family. You cannot mix the two families within a single entry.

Support for Security Hosts and Switches

The Remote Access Service for Windows NT supports various kinds of *intermediary devices* (switches and hosts) between the Remote Access client and the Remote Access server. These devices include:

- Modem-pool switch
- Security host



Sample Configuration with Modem Pool and Security Host

Connecting Through Intermediary Devices

Before a client can connect to the Remote Access server through intermediary devices, it usually has one of two possible dialogs with each intermediary device:

Static

A dialog that's always the same and requires no input from the user.

Interactive

A dialog that always changes, requiring input from the user.

You must prepare the client to conduct the correct dialog with each intermediary.

With a configuration that requires both types of dialogs, preparation takes two general steps:

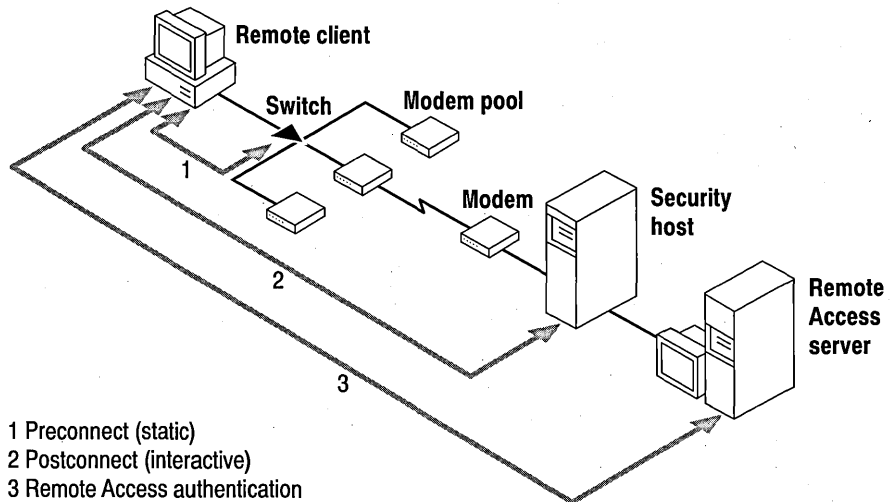
1. Write a script for the static dialog.
For details, see the following section, "Writing Scripts."
2. Activate terminal mode for the interactive dialogs.
For more information, see online Help.

If your configuration requires only one kind of dialog, perform only one of these steps. For example:

- If your clients connect through only one intermediary with a static dialog, such as an X.25 network, perform step 1 only.
- If your clients connect through a security host with an interactive dialog, perform step 2 only.

Writing Scripts

To write a script for static dialogs, such as the one between the client and modem pool in the following illustration, add the modem pool to the SWITCH.INF file.



Sample Dialogs Between Client and Intermediary Devices

This illustration shows two dialogs, preconnect (the modem-pool switch) and postconnect (the security host). Although preconnect and postconnect dialogs can be either *static* or *interactive*, the preconnect dialog is usually static and the postconnect interactive. Static dialogs require no interaction between the switch and the user. Interactive dialogs require input from the user onto a terminal screen.

With static dialogs, the user selects a user-written custom script from the Switch dialog box. With interactive dialogs, the user selects Terminal from the Switch dialog box. See online Help for accessing the Switch dialog box.

▷ **To write a script**

1. In the client's SWITCH.INF file, type the name of the device within brackets.
2. Add one or more commands followed by zero or more responses.

Note As with PAD.INF, responses in SWITCH.INF immediately follow their commands.

Here is a hypothetical entry from a sample SWITCH.INF file:

```
[Teleswitch]
COMMAND=<cr><cr>
OK=Ready<cr>
Error=Failure<cr>
```

To add an entry to your SWITCH.INF file, create a sequence of commands and responses that follows the order in the sample SWITCH.INF file.

The Remote Access Terminal feature lets the user communicate with intermediary devices that require an interactive dialog. For instructions about activating Terminal, see Remote Access online Help.

Security Hosts

A security host is a third-party authentication device that verifies whether a caller from a remote client is authorized to connect to the Remote Access server. This verification supplements security already supplied by the Remote Access Service and Windows NT Advanced Server.

For example, one kind of security system consists of two hardware devices, the security host and security card. The security host is installed between the Remote Access server and its modem. The security card is a small unit the size of a credit-card, resembling a pocket calculator without keys. The security card displays in its window a different access number every minute. This number is synchronized with the same number calculated in the security host every minute. When connecting, the remote user sends the number on the security card to the host. If the number is correct, the security host connects the remote user with the Remote Access server.

Another kind prompts the remote user to type in a username (which may or may not be the same as the Remote Access username) and a password (which differs from the Remote Access password).

Note When this manual was printed, only the Security Dynamics ACM/400 had been tested with the Windows NT Remote Access Service. Please consult the Microsoft Windows NT Hardware Compatibility List for other supported security hosts.

- ▶ **To make third-party security devices work with the Remote Access Service**
 1. If the Remote Access server's modem is different from the modem in the security host's section in MODEM.INF, the MODEM.INF file on the Remote Access server needs to be customized to link the security host to the server's modem.
 2. The remote user needs to activate Terminal mode to interact with the security host.

Customizing the Remote Access Server's MODEM.INF File

When you install a security host between the Remote Access server and its modem(s), the server's modem and the security host act together as a new type of modem. The MODEM.INF file is shipped with a template for each supported security host paired with a particular modem. For example, the ACM/400 is paired with an AT&T Comsphere 3820 modem.

To use the security host with a different modem, you will have to modify the MODEM.INF file.

- ▶ **To customize MODEM.INF**
 1. Make a backup copy of the MODEM.INF file.
 2. In the security host's section, replace all of the values for the **_on** and **_off** macros (such as **speaker_on=M1**) with the values from the section of the modem you'll be using.

For a list of these macro values, see the modem's documentation.
 3. In the security host's section, replace all **COMMAND_INIT=** lines with the **COMMAND_INIT=** lines from the section for the modem you'll be using.

The security host section must have the same number of **COMMAND_INIT** lines as the section for the modem you want to use.

Do not change any other line in the security host section.

Note LOOP= lines are not needed for all modems. However, if you are in doubt, leave them in.

After customizing the security host section in MODEM.INF, install the security host and modem on the Remote Access server through the Windows NT Advanced Server Network Control Panel.

▶ **To install a security device**

1. In the Windows NT Advanced Server Control Panel, choose the Network option.
2. In the Installed Network Software window, select Remote Access Service.
3. Choose the Configure button.
4. On the Remote Access Setup screen, select the security device connected between the Remote Access server and its modem, and choose the Continue button.
5. On the Network Setting screen, choose the OK button.

Activating Terminal Mode on the Client

Remote Access Terminal lets the remote user send the correct access number to the security device. If the number is correct, the user is connected to the Remote Access server.

▶ **To prepare the client for Terminal mode**

1. In the Remote Access Phone Book, select the entry you want to connect to.
2. Choose the Edit button.
3. Choose the Advanced button.
4. Choose the Switch button.
5. In the Post-connect Script box, select Terminal.
6. Choose the OK button.

▶ **To connect to the Remote Access server**

1. Select the entry you have just prepared for Terminal mode.
2. Choose the Dial button.

When prompted, type your username and password, and then choose the OK button.

3. When the Terminal screen appears, press ENTER. Type the access information required by your security host, for example, your personal identification number, followed by the number on the screen of the security card. Press ENTER again.
4. As soon as you get the indication that you have been authenticated, choose the Done button.

The indication varies from one security host to another. For example, you may get "OK," or the cursor may just drop to the next time.

Authentication on the Remote Access server begins.

ISDN Wide Area Network

Integrated services digital network (ISDN) offers a much faster communication speed than the telephone line. The phone line typically communicates at 9600 bits per second (bps), whereas ISDN communicates at speeds of 64 or 128 kilobits per second. Businesses that need this kind of speed usually have a large telecommuting work force or need to do extensive administrative tasks remotely such as installing software on off-site workstations.

Installation

An ISDN line comes with two B channels and one D channel. Each B channel transmits data at 64 kilobits per second. The D channel is for signaling, and it transmits data at 16 kilobits per second.

Install ISDN cards on the server and on each client. (For instructions, see the card's documentation.) Then configure each B channel to act as a port or to act together as a single port.

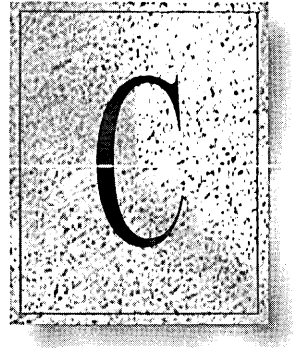
To configure the ISDN card to work with the Remote Access Service, see the Remote Access Service online Help.

If your business has a large number of people calling in to the Remote Access server, configure each channel to operate as a port. Clients will be able to get higher throughputs by requesting channel aggregation at connection time. This feature is a dynamic and more efficient way of allocating ISDN resources.

However, you can also statically assign a higher bandwidth by configuring both channels to act as a single port. With this configuration, line speed increases to 128 kilobits per second.

A P P E N D I X C

Limited Warranties



This appendix contains information about the warranties that cover Microsoft products. The country or region in which you acquired your Microsoft product determines which warranty applies to you. This appendix includes warranties for the following countries or regions:

- Australia, New Zealand, Papua New Guinea
- Canada (English)
- Canada (French)
- England, Scotland, Wales, Ireland
- USA or any other country

To determine the warranty coverage for your Microsoft product, turn to the warranty for the country or region in which you acquired the product.

If you acquired your Microsoft® product in AUSTRALIA, NEW ZEALAND, or PAPUA NEW GUINEA, the following limited warranty applies to you:

To the full extent permitted by the Commonwealth, State, Territory or other law or laws applicable to this Agreement, any conditions or warranties imposed by such legislation are hereby excluded. Insofar as liability under or pursuant to any legislation, whether of Commonwealth, State, Territory or other government, may not be excluded, such liability is limited to:

- (i) replacement of the SOFTWARE (and any accompanying hardware, if supplied by Microsoft); or,
- (ii) correction of defects in the SOFTWARE at the exclusive option of Microsoft.

You acknowledge that no promise, representation or warranty or undertaking has been made or given by Microsoft or any person or company on its behalf in relation to the profitability of or any other consequences or benefits to be obtained from the delivery or use of the SOFTWARE and any accompanying Microsoft supplied hardware, SOFTWARE manuals, and written materials. You have relied upon your own skill and judgment in deciding to acquire the SOFTWARE and any accompanying hardware, SOFTWARE manuals, and written materials for use by you. This Agreement constitutes the entire agreement and understanding between you and Microsoft in relation to the supply of SOFTWARE and any accompanying hardware, SOFTWARE manuals, and written materials from Microsoft.

Except as and to the extent that it is hereinbefore provided, under no circumstances shall Microsoft or any related company be liable for any loss, damage or injury (including without limitation any loss of profit, indirect, consequential or incidental loss, damage or injury) arising from the supply or use of the SOFTWARE and any accompanying hardware and written materials or any failure by Microsoft or any related company to perform any obligation or observe any terms of this Agreement.

This Agreement is governed by the laws of New South Wales, Australia.

Should you have any questions concerning this Agreement, or if you desire to contact Microsoft for any reason, please use the address information enclosed in this product to contact the Microsoft subsidiary serving your country or write: Microsoft Customer Sales and Service, One Microsoft Way, Redmond, Washington 98052-6399, USA.

If you acquired your Microsoft® product in CANADA, the following limited warranty applies to you:

LIMITED WARRANTY — Microsoft warrants that (a) the SOFTWARE will perform substantially in accordance with the accompanying Product Manual(s) for a period of 90 days from the date of receipt; and (b) any Microsoft supplied hardware accompanying the SOFTWARE will be free from defects in materials and workmanship under normal use and service for a period of one year from the date of receipt. Any implied warranties on the SOFTWARE and hardware are limited to 90 days and one (1) year, respectively.

CUSTOMER REMEDIES — Microsoft's entire liability and your exclusive remedy shall be, at Microsoft's option, either (a) return of the price paid or (b) repair or replacement of the SOFTWARE or hardware that does not meet Microsoft's Limited Warranty and which is returned to Microsoft with a copy of your receipt. This Limited Warranty is void if failure of the SOFTWARE or hardware has resulted from accident, abuse, or misapplication. Any replacement SOFTWARE will be warranted for the remainder of the original warranty period or 30 days, whichever is longer.

NO OTHER WARRANTIES — MICROSOFT DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SOFTWARE, THE ACCOMPANYING PRODUCT MANUAL(S) AND WRITTEN MATERIALS, AND ANY ACCOMPANYING HARDWARE. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES — IN NO EVENT SHALL MICROSOFT OR ITS SUPPLIERS BE LIABLE FOR ANY OTHER DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR INABILITY TO USE THIS MICROSOFT PRODUCT, EVEN IF MICROSOFT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN ANY CASE, MICROSOFT'S ENTIRE LIABILITY UNDER ANY PROVISION OF THIS AGREEMENT SHALL BE LIMITED TO THE AMOUNT ACTUALLY PAID BY YOU FOR THE SOFTWARE.

This Agreement is governed by the laws of the Province of Ontario, Canada. Each of the parties hereto irrevocably attorns to the jurisdiction of the courts of the Province of Ontario and further agrees to commence any litigation which may arise hereunder in the courts located in the Judicial District of York, Province of Ontario.

Should you have any questions concerning this Agreement, or if you desire to contact Microsoft for any reason, please use the address information enclosed in this product to contact the Microsoft subsidiary serving your country or write: Microsoft Customer Sales and Service, One Microsoft Way, Redmond, Washington 98052-6399, USA.

Si vous avez acquis votre produit Microsoft® au CANADA, la garantie limitée suivante vous concerne :

GARANTIE LIMITEE — Microsoft garantit que (a) la performance du LOGICIEL sera substantiellement en conformité avec le(s) manuel(s) de produits qui accompagne(nt) le LOGICIEL pour une période de quatre-vingt-dix (90) jours à compter de la date de réception ; et (b) tout matériel fourni par Microsoft accompagnant le LOGICIEL sera exempt de défaut de matière première ou de vice de fabrication dans des conditions normales d'utilisation et d'entretien pour une période d'un an à compter de la date de réception. Toute garantie implicite concernant le LOGICIEL et le matériel est limitée à quatre-vingt-dix (90) jours et un (1) an, respectivement.

RECOURS DU CLIENT — La seule obligation de Microsoft et votre recours exclusif seront, au choix de Microsoft, soit (a) le remboursement du prix payé ou (b) la réparation ou le remplacement du LOGICIEL ou du matériel qui n'est pas conforme à la Garantie Limitée de Microsoft et qui est retourné à Microsoft avec une copie de votre reçu. Cette Garantie Limitée est nulle si le défaut du LOGICIEL ou du matériel est causé par un accident, un traitement abusif ou une mauvaise application. Tout LOGICIEL de remplacement sera garanti pour le reste de la période de garantie initiale ou pour trente (30) jours, selon laquelle de ces deux périodes est la plus longue.

AUCUNE AUTRE GARANTIE — MICROSOFT DESAVOUE TOUTE AUTRE GARANTIE, EXPRESSE OU IMPLICITE, Y COMPRIS MAIS NE SE LIMITANT PAS AUX GARANTIES IMPLICITES DU CARACTERE ADEQUAT POUR LA COMMERCIALISATION OU UN USAGE PARTICULIER EN CE QUI CONCERNE LE LOGICIEL, LE(S) MANUEL(S) DE PRODUITS, LA DOCUMENTATION ECRITE ET TOUT MATERIEL QUI L'ACCOMPAGNENT. CETTE GARANTIE LIMITEE VOUS ACCORDE DES DROITS JURIDIQUES SPECIFIQUES.

PAS D'OBLIGATION POUR LES DOMMAGES INDIRECTS — MICROSOFT OU SES FOURNISSEURS N'AURONT D'OBLIGATION EN AUCUNE CIRCONSTANCE POUR TOUT AUTRE DOMMAGE QUEL QU'IL SOIT (Y COMPRIS, SANS LIMITATION, LES DOMMAGES ENTRAINES PAR LA PERTE DE BENEFICES, L'INTERRUPTION DES AFFAIRES, LA PERTE D'INFORMATION COMMERCIALE OU TOUTE AUTRE PERTE PECUNIAIRE) DECOULANT DE L'UTILISATION OU DE L'IMPOSSIBILITE D'UTILISATION DE CE PRODUIT MICROSOFT, ET CE, MEME SI MICROSOFT A ETE AVISE DE LA POSSIBILITE DE TELS DOMMAGES. EN TOUT CAS, LA SEULE OBLIGATION DE MICROSOFT EN VERTU DE TOUTE DISPOSITION DE CETTE CONVENTION SE LIMITERA AU MONTANT EN FAIT PAYE PAR VOUS POUR LE LOGICIEL.

La présente Convention est régie par les lois de la province d'Ontario, Canada. Chacune des parties à la présente reconnaît irrévocablement la compétence des tribunaux de la province d'Ontario et consent à instituer tout litige qui pourrait découler de la présente auprès des tribunaux situés dans le district judiciaire de York, province d'Ontario.

Au cas où vous auriez des questions concernant cette licence ou que vous désiriez vous mettre en rapport avec Microsoft pour quelque raison que ce soit, veuillez contacter la succursale Microsoft desservant votre pays, dont l'adresse est fournie dans ce produit, ou écrire à : Microsoft Customer Sales and Service, One Microsoft Way, Redmond, Washington 98052-6399, USA.

If you acquired your Microsoft® product in ENGLAND, SCOTLAND, WALES or IRELAND, the following limited warranty applies to you:

LIMITED WARRANTY — Microsoft warrants that (a) the SOFTWARE will perform substantially in accordance with the accompanying Product Manual(s) for a period of 90 days from the date of receipt; and (b) any Microsoft supplied hardware accompanying the SOFTWARE will be free from defects in materials and workmanship under normal use and service for a period of one year from the date of receipt. Any implied warranties on the SOFTWARE and hardware are limited to 90 days and one (1) year, respectively, or the shortest period permitted by applicable law, whichever is greater.

CUSTOMER REMEDIES — Microsoft's entire liability and your exclusive remedy shall be, at Microsoft's option, either (a) return of the price paid or (b) repair or replacement of the SOFTWARE or hardware that does not meet Microsoft's Limited Warranty and which is returned to Microsoft with a copy of your receipt. This Limited Warranty is void if failure of the SOFTWARE or hardware has resulted from accident, abuse, or misapplication. Any replacement SOFTWARE will be warranted for the remainder of the original warranty period or 30 days, whichever is longer.

NO OTHER WARRANTIES — TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, MICROSOFT DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SOFTWARE, THE ACCOMPANYING PRODUCT MANUAL(S) AND WRITTEN MATERIALS, AND ANY ACCOMPANYING HARDWARE. THE LIMITED WARRANTY CONTAINED HEREIN GIVES YOU SPECIFIC LEGAL RIGHTS.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES — TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, MICROSOFT AND ITS SUPPLIERS SHALL NOT BE LIABLE FOR ANY OTHER DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR INABILITY TO USE THIS MICROSOFT PRODUCT, EVEN IF MICROSOFT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN ANY CASE, MICROSOFT'S ENTIRE LIABILITY UNDER ANY PROVISION OF THIS AGREEMENT SHALL BE LIMITED TO THE AMOUNT ACTUALLY PAID BY YOU FOR THE SOFTWARE.

This Agreement is governed by the laws of England.

Should you have any questions concerning this Agreement, or if you desire to contact Microsoft for any reason, please use the address information enclosed in this product to contact the Microsoft subsidiary serving your country or write: Microsoft Customer Sales and Services, One Microsoft Way, Redmond, Washington 98052-6399, USA.

If you acquired your Microsoft® product in the United States of America or ANY OTHER COUNTRY, the following limited warranty applies to you:

LIMITED WARRANTY — Microsoft warrants that (a) the SOFTWARE will perform substantially in accordance with the accompanying written materials for a period of ninety (90) days from the date of receipt, and (b) any hardware accompanying the SOFTWARE will be free from defects in materials and workmanship under normal use and service for a period of one (1) year from the date of receipt. Any implied warranties on the SOFTWARE and hardware are limited to ninety (90) days and one (1) year, respectively. Some states/jurisdictions do not allow limitations on duration of an implied warranty, so the above limitation may not apply to you.

CUSTOMER REMEDIES — Microsoft's and its suppliers' entire liability and your exclusive remedy shall be, at Microsoft's option, either (a) return of the price paid, or (b) repair or replacement of the SOFTWARE or hardware that does not meet Microsoft's Limited Warranty and which is returned to Microsoft with a copy of your receipt. This Limited Warranty is void if failure of the SOFTWARE or hardware has resulted from accident, abuse, or misapplication. Any replacement SOFTWARE or hardware will be warranted for the remainder of the original warranty period or thirty (30) days, whichever is longer. **Outside the United States, neither these remedies nor any product support services offered by Microsoft are available without proof of purchase from an authorized non-U.S. source.**

NO OTHER WARRANTIES — TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, MICROSOFT AND ITS SUPPLIERS DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH REGARD TO THE SOFTWARE, THE ACCOMPANYING WRITTEN MATERIALS, AND ANY ACCOMPANYING HARDWARE. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHERS WHICH VARY FROM STATE/JURISDICTION TO STATE/JURISDICTION.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES — TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL MICROSOFT OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES WHATSOEVER (INCLUDING WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR ANY OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR INABILITY TO USE THIS MICROSOFT PRODUCT, EVEN IF MICROSOFT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. BECAUSE SOME STATES/JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

If you acquired this product in the United States, this Agreement is governed by the laws of the State of Washington. If this product was acquired outside the United States, then local law may apply.

Should you have any questions concerning this Agreement, or if you desire to contact Microsoft for any reason, please contact your local Microsoft subsidiary or sales office or write: Microsoft Sales and Service, One Microsoft Way, Redmond, Washington 98052-6399, USA.

Glossary

- A**
- account** *See* user account.
- Account policy** Controls the way passwords must be used by all user accounts of a domain, or of an individual computer.
- administrative alerts** Relate to server and resource use; warn about problems in areas such as security and access, user sessions, server shutdown because of power loss (when UPS is available), directory replication, and printing. When a computer generates an administrative alert, a message is sent to a predefined list of users and computers. *See also* Alerter service.
- Alerter service** Notifies selected users and computers of administrative alerts that occur on a computer. Used by the Server and other services. Requires the Messenger service. *See also* administrative alerts.
- archive bit** Backup programs use the archive bit to mark files after backing them up, using the normal or incremental backup types.
- ASCII file** *See* text file.
- associate** To identify a filename extension as “belonging” to a certain application so that when you open any file with that extension, the application starts automatically.
- Audit policy** For the servers of a domain or for an individual computer, defines the type of security events that are logged.
- auditing** Tracking activities of users by recording selected types of events in the security log of a server or a workstation.
- authentication** Validation of a user’s logon information. When a user logs on to an account on a Windows NT workstation, the authentication is performed by that workstation. When a user logs on to an account on a Windows NT Advanced Server domain, that authentication may be performed by any server of that domain. *See also* server, trust relationship.
- B**
- batch program** An ASCII file (unformatted text file) that contains one or more Windows NT commands. A batch program’s filename has a .BAT or .CMD extension. When you type the filename at the command prompt, the commands are processed sequentially.
- boot loader** Defines the information needed for system startup, such as the location for the operating system’s files. Windows NT automatically creates the correct configuration and checks this information whenever you start your system.
- boot partition** The volume, formatted for either an NTFS, FAT, or HPFS file system, that contains the Windows NT operating system and its support files. The boot partition can be (but does not have to be) the same as the system partition.
- branch** A segment of the directory tree, representing a directory and any subdirectories it contains.

browse To look through lists of directories, files, user accounts, groups, domains, or computers.

buffer A temporary storage place for information.

built-in groups The default groups provided with Windows NT and Windows NT Advanced Server. Built-in groups have been granted useful collections of rights and built-in abilities.

In most cases, a built-in group will provide all the capabilities needed by a particular user. For example, if a domain user account belongs to the built-in Administrators group, logging on with that account gives a user administrative capabilities over the domain and the servers of the domain. To provide a needed set of capabilities to a user account, assign it to the appropriate built-in group. *See also* group, User Manager, User Manager for Domains.

C

check box A small, square box in a dialog box that can be selected or cleared, representing an option that you can turn on or off. When a check box is selected, an X appears in the box.

choose To pick an item that begins an action in Windows NT. You often choose a command on a menu to perform a task, and you choose an icon to start an application.

click To quickly press and release a mouse button.

client A computer that accesses shared network resources provided by another computer (called a server). *See also* server.

Clipboard A temporary storage area in memory, used to transfer information. You can cut or copy information onto the Clipboard and then paste it into another document or application, or into the ClipBook. *See also* ClipBook.

ClipBook Permanent storage of information you want to save and share with others. This differs from the Clipboard, which temporarily stores information. You can save the current contents of the Clipboard by using the ClipBook Viewer to copy it into your local ClipBook. You can then share that information, allowing others to connect to the ClipBook on your computer. *See also* Clipboard, ClipBook page.

ClipBook page A unit of information pasted into a local ClipBook. The ClipBook page is permanently saved. Information on a ClipBook page can be copied back onto the Clipboard and then pasted into documents. You can share ClipBook pages on the network.

Clipboard service Supports the ClipBook Viewer application, allowing pages to be seen by remote ClipBooks.

Computer Browser service Maintains an up-to-date list of computers and provides the list to applications when requested. Provides the computer lists displayed in the Select Computer and Select Domain dialog boxes, and for Windows NT Advanced Server only, the lists in the Server Manager window.

computer name A unique name of up to 15 uppercase characters that identifies a computer to the network. The name cannot be the same as any other computer or domain name in the network.

configuration registry A database repository for information about a computer's configuration.

connected user A user accessing a computer or a resource across the network.

Control menu A menu that contains commands you can use to manipulate a window.

Control-menu box The icon at the left of the title bar. This icon opens the Control menu for a window.

controller *See* domain controller.

D

DDE *See* dynamic data exchange.

default printer The printer that is used if you choose the Print command without first specifying which printer you want to use with an application. You can have only one default printer; it should be the printer you use most often.

default profile

See system default profile, user default profile.

dependent service

A service that requires the support of another service. For example, the Alerter service is dependent on the Messenger service.

desktop The background of your screen, on which windows, icons, and dialog boxes appear.

destination directory The directory to which you intend to copy or move one or more files.

destination document The document into which a package or a linked or embedded object is being inserted. For an embedded object, this is sometimes also called the container document.

device contention The way Windows NT allocates access to peripheral devices, such as a modem or a printer, when more than one application is trying to use the same device.

device driver A program that enables a specific piece of hardware (device) to communicate with Windows NT. Although a device may be installed

on your system, Windows NT cannot recognize the device until you have installed and configured the appropriate driver.

dimmed Unavailable, disabled, or grayed. A dimmed button or command is displayed in light gray instead of black, and it cannot be chosen.

directory Part of a structure for organizing your files on a disk. A directory can contain files and other directories (called subdirectories). *See also* directory tree.

directory replication The copying of a master set of directories from a server (called an export server) to specified servers or workstations (called import computers) in the same or other domains. Replication simplifies the task of maintaining identical sets of directories and files on multiple computers, because only a single master copy of the data must be maintained. Files are replicated when they are added to an exported directory and every time a change is saved to the file. *See also* Directory Replicator service.

Directory Replicator service Replicates directories, and the files in those directories, between computers. *See also* directory replication.

directory tree A graphical display of a disk's directory structure. The directories on the disk are shown as a branching structure. The top-level directory is the root directory.

directory window A File Manager window that displays the contents of a disk. The window shows both the directory tree and the contents of the current directory.

disabled user account A user account that does not permit logons. The account appears in the user account list of the User Manager window and can be restored to enabled status at any time. *See also* user account.

disk configuration information

The Windows NT Registry includes information on the configuration of your disk(s): assigned drive letters, stripe sets, mirror sets, volume sets, and stripe sets with parity.

disk duplexing

Establishing a mirrored copy on a disk with a different controller.

disk mirroring Maintaining a fully redundant copy of a partition on another disk.

disk striping Writing data in stripes across a volume that has been created from areas of free space on from 2 to 32 disks.

domain For Windows NT Advanced Server, a collection of computers that share a common domain database and security policy. Each domain has a unique name. *See also* workgroup.

domain controller For a Windows NT Advanced Server domain, the server that authenticates domain logons and maintains the security policy and the master database for a domain. *See also* server.

domain database *See* SAM database.

domain name The name by which a domain is known to the network.

domain synchronization *See* synchronize.

double-click To rapidly press and release a mouse button twice without moving the mouse. Double-clicking carries out an action, such as starting an application.

downloaded fonts Fonts that you send to a printer either before or during the printing of a document. When you send a font to a printer, it is stored in printer memory until it is needed.

drive icon An icon in a directory window in File Manager that represents a disk drive on your system. Different icons depict floppy disk drives, hard disk drives, network drives, RAM drives, and CD-ROM drives.

drivebar Allows you to change drives by selecting one of the drive icons.

dynamic data exchange A form of interprocess communication (IPC) implemented in the Microsoft Windows family of operating systems. Two or more programs that support dynamic data exchange (DDE) can exchange information and commands.

E

embedded object Presents information created in another application. Information in the embedded object does not exist in another file outside your document.

encapsulated PostScript (EPS) file

A file that prints at the highest possible resolution for your printer. An EPS file may print faster than other graphical representations. Some Windows NT and non-Windows NT graphical applications can import EPS files.

environment variable A string consisting of environment information, such as a drive, path, or filename, associated with a symbolic name that can be used by Windows NT. You use the System option in Control Panel or the **set** command from the Windows NT command prompt to define environment variables.

event Any significant occurrence in the system or in an application that requires users to be notified, or an entry to be added to a log.

Event Log service Records events in the system, security, and application logs.

export path In directory replication, a path from which subdirectories, and the files in those subdirectories, are automatically exported from an export server. *See also* directory replication.

export server In directory replication, a server from which a master set of directories is exported to specified servers or workstations (called import computers) in the same or other domains. *See also* directory replication.

extended partition Created from free space on a hard disk, it can be subpartitioned into zero or more logical drives. Only one of the four partitions allowed per physical disk can be an extended partition, and no primary partition needs to be present to create an extended partition.

extension The period and up to three characters at the end of a filename. An extension usually indicates the type of file or directory.

external command A command that is stored in its own file and loaded from disk when you use the command.

F

family set A collection of related tapes containing several backup sets.

FAT File allocation table; a table or list maintained by some operating systems to keep track of the status of various segments of disk space used for file storage.

file allocation table (FAT) *See* FAT.

file system In an operating system, the overall structure in which files are named, stored, and organized.

font set A collection of font sizes for one font, customized for a particular display and printer. Font sets determine what text looks like on screen and on paper.

free space An unused and unformatted portion of a hard disk that can be partitioned or subpartitioned. Free space within an extended partition is available for the creation of logical drives. Free space that is not within an extended partition is available for the creation of a partition, with a maximum of four partitions allowed.

full name A user's complete name, usually consisting of the last name, first name, and middle initial. The full name is information that can be maintained by User Manager as part of the information identifying and defining a user account. *See also* user account.

G

global account For Windows NT Advanced Server, a normal user account in a user's home domain. Most user accounts are global accounts. If there are multiple domains in the network, it is best if each user in the network has only one user account, in only one domain, and each user's access to other domains is accomplished through the establishment of domain trust relationships. *See also* local account.

global group For Windows NT Advanced Server, a group that can be used in its own domain, servers and workstations of the domain, and trusting domains. In all these places it can be granted rights and permissions and can become a member of local groups. However, it can contain only user accounts from its own domain. Global groups provide a way to create handy sets of users from inside the domain, available for use both in and out of the domain.

Global groups cannot be created or maintained on Window NT workstations. However, for Windows NT workstations that participate in a domain, domain global groups can be granted rights and permissions at those workstations, and can become members of local groups at those workstations. *See also* group, local group.

group In User Manager, an account containing other accounts that are called members. The permissions and rights granted to a group are also provided to its members, making groups a convenient way to grant common capabilities to collections of user accounts. For Windows NT, groups are managed with User Manager. For Windows NT Advanced Server, groups are managed with User Manager for Domains. *See also* built-in groups, global group, local group, user account.

group memberships The groups to which a user account belongs. Permissions and rights granted to a group are also provided to its members. In most cases, the actions a user can perform in Windows NT are determined by the group memberships of the user account the user is logged on to. *See also* group.

group name A unique name identifying a local or global group to Windows NT. A group's name cannot be identical to any other group name or user name of its own domain or workstation. *See also* global group, local group.

group window: In Program Manager, a window that displays the program-item icons in a group.

H

high-performance file system *See* HPFS.

home directory A directory that is accessible to the user and contains files and programs for that user. A home directory can be assigned to an individual user or can be shared by many users.

HPFS High-performance file system (HPFS); primarily used with the OS/2 operating system version 1.2 or later. It supports long filenames but does not provide security.

I

import computers In directory replication, the servers or workstations that receive copies of the master set of directories from an export server. *See also* directory replication.

import path In directory replication, the path to which imported subdirectories, and the files in those subdirectories, will be stored on an import computer. *See also* directory replication.

internal command Commands that are stored in the file CMD.EXE and that reside in memory at all times.

interrupt request lines (IRQ) Hardware lines over which devices can send signals to get the attention of the processor when the device is ready to accept or send information. Typically, each device connected to the computer uses a separate IRQ.

K

kernel driver A driver that accesses hardware.

L

linked object A representation or placeholder for an object that is inserted into a destination document. The object still exists in the source file and, when it is changed, the linked object is updated to reflect the changes.

list box In a dialog box, a box that lists available choices—for example, a list of all files in a directory. If all the choices do not fit in the list box, there is a scroll bar.

local account For Windows NT Advanced Server, a user account provided in a domain for a user whose global account is not in a trusted domain. Not required where trust relationships exist between domains. *See also* global account, user account.

local group For Windows NT, a group that can be granted permissions and rights only for its own workstation. However, it can contain user accounts from its own computer, and (if the workstation participates in a domain) user accounts and global groups both from its own domain and from trusted domains. Local groups provide a way to create handy sets of users from both inside and outside the workstation, to be used only at the workstation.

For Windows NT Advanced Server, a group that can be granted permissions and rights only for the servers of its own domain. However, it can contain user accounts and global groups both from its own domain and from trusted domains. Local groups provide a way to create handy sets of users from both inside and outside the domain, to be used only at servers of the domain. *See also* global group, group.

local printer A printer that is directly connected to one of the ports on your computer.

logical drive A subpartition of an extended partition on a hard disk.

logon hours For Windows NT Advanced Server, a definition of the days and hours during which a user account can connect to a server. When a user is connected to a server and the logon hours are exceeded, the user will either be disconnected from all server connections or will be allowed to remain connected but denied any new connections.

logon script Typically a batch file, a logon script runs automatically every time the user logs on. It can be used to configure a user's working environment at every logon, and it allows an administrator to affect a user's environment without managing all aspects of it. A logon script can be assigned to one or more user accounts.

logon script path When a user logs on, the computer authenticating the logon locates the specified logon script (if one has been assigned to that user account) by following that computer's local logon script path (usually C:\WINNT\SYSTEM32\REPL\IMPORT\SCRIPTS). *See also* logon script.

logon workstations For Windows NT Advanced Server, the workstations from which a user is allowed to log on.

M

mandatory user profile For Windows NT Advanced Server, a user profile created by an administrator and assigned to one or more users. A mandatory user profile cannot be changed by the user and remains the same from one logon session to the next. *See also* personal user profile, user profile.

maximum password age The period of time a password can be used before the system requires the user to change it. *See also* Account policy.

Messenger service Sends and receives messages sent by administrators or by the Alerter service.

minimum password age The period of time a password must be used before the user can change it. *See also* Account policy.

minimum password length The fewest characters a password can contain. *See also* Account policy.

MS-DOS-based application An application that is designed to run with MS-DOS, and therefore may not be able to take full advantage of all Windows NT features.

N

named pipe An interprocess communication mechanism that allows one process to communicate with another local or remote process.

Net Logon service For Windows NT Advanced Server, performs authentication of domain logons, and keeps the domain's database synchronized between the domain controller and the other Windows NT Advanced Servers of the domain.

Network DDE service The Network DDE (dynamic data exchange) service provides a network transport and security for DDE conversations.

Network DDE DSDM service The Network DDE DSDM (DDE share database manager) service manages shared DDE conversations. It is used by the Network DDE service.

network device driver Software that coordinates communication between the network adapter card and the computer's hardware and other software, controlling the physical function of the network adapter cards.

network directory *See* shared directory.

non-Windows NT application Refers to an application that is designed to run with Windows 3.x, MS-DOS, OS/2, or POSIX, but not specifically with Windows NT and that may not be able to take full advantage of all Windows NT features (such as memory management).

NT *See* Windows NT.

NT file system *See* NTFS.

NTFS Windows NT file system; an advanced file system designed for use specifically within the Windows NT operating system. It supports file system recovery, extremely large storage media,

and various features for the POSIX subsystem. It also supports object-oriented applications by treating all files as objects with user-defined and system-defined attributes.

O

object Any piece of information, created by using a Windows-based application with object linking and embedding capabilities, that can be linked or embedded into another document.

object linking and embedding A way to transfer and share information between applications.

option button A small, round button that appears in a dialog box. Within a group of related option buttons, you can select only one button.

orphan A member of a mirror set or a stripe set with parity that has failed in a severe manner, such as a loss of power or a complete head crash. When this happens, the fault-tolerance driver determines that it can no longer use the orphaned member and directs all new reads and writes to the remaining members of the fault-tolerance volume.

P

package An icon that represents an embedded or linked object. When you choose the package, the application used to create the object either plays the object (for example, a sound file) or opens and displays the object.

page In ClipBook, one complete entry that has been pasted in. In memory, a fixed-size block.

paging file *See* swap file.

partition A portion of a physical disk that functions as though it were a physically separate unit. *See also* system partition.

password A unique string of characters that must be provided before a logon or an access is authorized. A password is a security measure used to restrict logons to user accounts and access to computer systems and resources. For Windows NT, a password for a user account can be up to 14 characters, and is case-sensitive. *See also* Account policy.

password uniqueness The number of new passwords that must be used by a user account before an old password can be reused. *See also* Account policy.

path Specifies the location of a file within the directory tree. For example, to specify the path of a file named README.WRI located in the WINDOWS directory on drive C, you would type `c:\windows\readme.wri`.

permission A rule associated with an object (usually a directory, file, or printer) to regulate which users can have access to the object and in what manner. *See also* right.

personal groups In Program Manager, a program group you have created and that contains program items. Personal groups are stored with your logon information and appear each time you log on. *See also* group.

personal user profile For Windows NT Advanced Server, a user profile created by an administrator and assigned to one user. A personal user profile retains changes the user makes to the per-user settings of the Windows NT environment, and reimplements the newest settings each time that user logs on at any Windows NT workstation. *See also* mandatory user profile, user profile.

plotter font A font created by a series of dots connected by lines. Plotter fonts can be scaled to any size and are most often printed on plotters. Some dot-matrix printers also support plotter fonts.

port A connection or socket used to connect a device, such as a printer, monitor, or modem, to your computer. Information is sent from your computer to the device through a cable.

primary partition A portion of a physical disk that can be marked for use by an operating system. There can be up to four primary partitions (or up to three, if there is an extended partition) per physical disk. A primary partition cannot be subpartitioned.

printer driver A program that controls how your computer and printer interact.

printer fonts Fonts that are built into your printer. These fonts are usually located in the printer's read-only memory (ROM).

printer window Shows information for one of the printers that you have installed or to which you are connected. For each printer, you can see what documents are waiting to be printed, who owns them, how large they are, and other information.

program file A file that starts an application or program. A program file has an .EXE, .PIF, .COM, or .BAT filename extension.

program group In Program Manager, a collection of applications. Grouping your applications makes them easier to find when you want to start them.

program information file (PIF) A file that provides information about how Windows NT should run a non-Windows NT application. PIFs contain such items as the name of the file, a start-up directory, and multitasking options for applications running in 386 enhanced mode.

program-item icon An application, accessory, or document represented as an icon in a group window.

Q

quick format Deletes the file allocation table and root directory of a disk but does not scan the disk for bad areas.

R

refresh To update displayed information with current data.

registry *See* configuration registry.

remote administration Administration of one computer by an administrator located at another computer and connected to the first computer across the network.

remote procedure call RPC, a message-passing facility that allows a distributed application to call services available on various computers in a network. Used during remote administration of computers.

Remote Procedure Call service

See RPC service.

replication

See directory replication.

resource Any part of a computer system or a network, such as a disk drive, printer, or memory, that can be allotted to a program or a process while it is running.

right Authorizes a user to perform certain actions on the system. Rights apply to the system as a whole, and are different from permissions, which apply to specific objects. *See also* permission.

root directory *See* directory tree.

RPC *See* remote procedure call.

RPC Locator service The Remote Procedure Call Locator service allows distributed applications to use the RPC Name service. The RPC Locator service manages the RPC Name service database.

The server side of a distributed application registers its availability with the RPC Locator service. The client side of a distributed application queries the RPC Locator service to find available compatible server applications.

RPC service The Remote Procedure Call service is the RPC subsystem for Microsoft Windows NT. The RPC subsystem includes the endpoint mapper and other miscellaneous RPC services.

S

SAM Security accounts manager. A Windows NT protected subsystem that maintains the SAM database and provides an application programming interface (API) for accessing the database.

SAM database A database of security information that includes security information (such as user account names and passwords) and the settings of the security policies. For a Windows NT workstation, it is managed with User Manager. For a Windows NT Advanced Server domain, it is managed with User Manager for Domains.

Schedule service Supports and is required for use of the **at** command. The **at** command can schedule commands and programs to run on a computer at a specified time and date.

screen buffer The size reserved in memory for the command prompt display.

screen fonts Fonts displayed on your screen. Soft-font manufacturers often provide screen fonts that closely match the soft fonts for your printer. This ensures that your documents look the same on the screen as they do when printed.

scroll To move through text or graphics (up, down, left, or right) in order to see parts of the file that cannot fit on the screen.

scroll bar A bar that appears at the right and/or bottom edge of a window or list box whose contents are not completely visible. Each scroll bar contains two scroll arrows and a scroll box, which enable you to scroll through the contents of the window or list box.

security accounts manager *See* SAM.

security database *See* SAM database.

security ID A unique name that identifies a logged-on user to the security system. Security IDs (SIDs) can identify one user or a group of users.

security identifier
See security ID.

security log
Records security events. This helps track changes to the security system and identify any possible breaches to security. For example, depending on the Audit settings in User Manager, attempts to log on to the system may be recorded in the security log. *See also* event.

security policies For a Windows NT workstation, the security policies consist of the Account, User Rights, and Audit policies, and are managed with User Manager.

For a Windows NT Advanced Server domain, the security policies consist of the Account, User Rights, Audit, and Trust Relationships policies, and are managed with User Manager for Domains.

selection cursor The marking device that shows where you are in a window, menu, or dialog box and what you have selected. The selection cursor can appear as a highlight or as a dotted rectangle around text.

server For Windows NT, refers to a computer that provides shared resources to network users. *See also* client.

For Windows NT Advanced Server domains, refers to a computer that receives a copy of the domain's security policy and domain database, and authenticates network logons. *See also* domain controller.

Server Manager In Windows NT Advanced Server, an application used to view and administer domains, workgroups, and computers.

Server service Provides RPC (remote procedure call) support, and file, print, and named pipe sharing.

service A process that performs a specific system function and often provides an application programming interface (API) for other processes to call. Windows NT services are RPC-enabled, meaning that their API routines can be called from remote computers.

share To make resources, such as directories, printers, and ClipBook pages, available to network users.

share name The name of a shared resource.

shared directory A directory that network users can connect to.

shared network directory *See* shared directory.

shared page In ClipBook, a page that has been made available for others to access.

shared resource Any device, data, or program that is used by more than one other device or program. For Windows NT, shared resources refer to any resource that is made available to network users, such as directories, files, printers, and named pipes.

shortcut key A key or key combination, available for some commands, that you can press to carry out a command without first selecting a menu. Shortcut keys are listed to the right of commands on a menu.

SID *See* security ID.

source directory The directory that contains the file or files you intend to copy or move.

source document The document where a linked or embedded object was originally created.

split bar Divides a directory window in two parts: the directory tree is displayed on the left, and the contents of the current directory are on the right.

status bar A line of information related to the application in the window. Usually located at the bottom of a window. Not all windows have a status bar.

string A data structure composed of a sequence of characters, usually representing human-readable text.

subdirectory A directory within a directory.

swap file A special file on your hard disk. With virtual memory under Windows NT, some of the program code and other information is kept in RAM while other information is temporarily swapped to virtual memory. When that information is required again, Windows NT pulls it back into RAM and, if necessary, swaps other

information to virtual memory. Also called a paging file.

synchronize To replicate the domain database from the domain controller to one server of the domain, or to all the servers of a domain. This is usually performed automatically by the system, but can also be invoked manually by an administrator.

syntax The order in which you must type a command and the elements that follow the command. Windows NT commands have up to four elements: command name, parameters, switches, and values.

system default profile For Windows NT Advanced Server, the user profile that is loaded when Windows NT is running and no user is logged on. When the Welcome dialog box is visible, the system default profile is loaded. *See also* user default profile, user profile.

system partition The volume that contains the hardware-specific files needed to load Windows NT. *See also* partition.

T

Task List A window that shows all running applications and enables you to switch between them. You can open Task List by choosing Switch To from the Control menu or by pressing CTRL+ESC.

text file A file containing only letters, numbers, and symbols. A text file contains no formatting information, except possibly linefeeds and carriage returns. A text file is an ASCII file.

text-only An ASCII file; contains no formatting.

time-out If a device is not performing a task, the amount of time the computer should wait before detecting it as an error.

time slice The amount of processor time allocated to an application, usually measured in milliseconds.

toolbar A series of shortcut buttons providing quick access to commands. Usually located directly below the menu bar. Not all windows have a toolbar.

trust *See* trust relationship.

trust relationship Trust relationships are links between domains that enable pass-through authentication, in which a user has only one user account in one domain, yet can access the entire network. User accounts and global groups defined in a trusted domain can be given rights and resource permissions in a trusting domain, even though those accounts don't exist in the trusting domain's database. A trusting domain honors the logon authentications of a trusted domain.

U

uninterruptible power supply (UPS)

See UPS.

UPS Uninterruptible power supply; a battery-operated power supply connected to a computer to keep the system running during a power failure.

UPS service Manages an uninterruptible power supply connected to a computer. *See also* UPS.

user account Consists of all the information that defines a user to Windows NT. This includes such things as the user name and password required for the user to log on, the groups in which the user account has membership, and the rights and permissions the user has for using the system and accessing its resources. For Windows NT, user accounts are managed with User Manager. For Windows NT Advanced Server, user accounts are managed with User Manager for Domains. *See also* group.

user account database *See* SAM database.

user default profile For Windows NT Advanced Server, the user profile that is loaded by a server when a user's assigned profile cannot be accessed for any reason, when a user without an assigned profile logs on to the computer for the first time, or when a user logs on to the Guest account. *See also* system default profile, user profile.

User Manager A Windows NT workstation tool used to manage the security for a workstation. Administers user accounts, groups, and security policies.

User Manager for Domains A Windows NT Advanced Server tool used to manage security for a domain or an individual computer. Administers user accounts, groups, and security policies.

user name A unique name identifying a user account to Windows NT. An account's user name cannot be identical to any other group name or user name of its own domain or workstation. *See also* user account.

user profile Configuration information can be retained on a user-by-user basis, and is saved in user profiles. The information includes all the per-user settings of the Windows NT environment, such as the desktop arrangement, personal program groups and the program items in those groups, screen colors, screen savers, network connections, printer connections, mouse settings, window size and position, and more. When a user logs on, the user's profile is loaded and the user's Windows NT environment is configured according to that profile.

User Profile Editor For Windows NT Advanced Server, a tool used to create, edit, and save personal user profiles, mandatory user profiles, the user default profile, and the system default profile. *See also* user profile.

user right *See* right.

User Rights policy Manages the assignment of rights to groups and user accounts.

V

virtual memory Space on a hard disk that Windows NT uses as if it were actually memory. Windows NT does this through the use of swap files. The benefit of using virtual memory is that you can run more applications at one time than your system's physical memory would otherwise allow. The drawbacks are the disk space required for the virtual-memory swap file and the decreased execution speed when swapping is required.

virtual printer memory In a PostScript printer, a part of memory that stores font information. The memory in PostScript printers is divided into banded memory and virtual memory. The banded memory contains graphics and page-layout information needed to print your documents. The virtual memory contains any font information that is sent to your printer either when you print a document or when you download fonts.

volume A partition or collection of partitions that have been formatted for use by a file system.

W

wildcard A character that represents one or more characters. The question mark (?) wildcard can be used to represent any single character, and the asterisk (*) wildcard can be used to represent any character or group of characters that might match that position in other filenames.

Windows NT The portable, secure, 32-bit, preemptive multitasking member of the Microsoft Windows operating system family.

Windows NT Advanced Server A superset of Windows NT, Windows NT Advanced Server provides centralized management and security, advanced fault tolerance, and additional connectivity.

workgroup For Windows NT, a workgroup is a collection of computers that are grouped for viewing purposes. Each workgroup is identified by a unique name. *See also* domain.

workstation In general, a powerful computer having considerable calculating and graphics capability. For Windows NT, computers running the Windows NT operating system are called workstations, as distinguished from computers running Windows NT Advanced Server, which are called servers. *See also* server, domain controller.

Workstation service Provides network connections and communications.

Index

A

Access

- permissions *See* Permissions
- Remote Access Service (RAS) *See* Remote Access Service (RAS)
- restricting, to backup tapes 387–389
- to files and directories
 - auditing 100–102, 379, 402
 - controlling 15
 - permissions 90–104
 - viewing events 409

Accounts *See* User accounts

Addresses

- I/O port base addresses, troubleshooting 481
- Mail addresses 217
- memory buffer addresses, troubleshooting 481

Administrators

- Administrative Tools group, Program Manager 7
- Administrator account 352
- Administrators group 369
- Mail administrator accounts 229–231

Alerts

- Alerter service *See* Services, Alerter
- managing administrative alerts 173–174
- Performance Monitor alerts *See* Performance Monitor, alerts
- sending messages after power failure 147, 148

Applications

- See also* Programs
- Applications group 40
- associating files with applications 78–79
- changing application response time 144
- communications applications 120
- configuring the system, overview 12–14
- correct procedure for logging off 5, 39
- creating program items 45–48
- custom startup files 334–336
- defining startup applications 7
- displaying Control menu 23
- installing with Windows NT Setup 322, 338
- LAN adapter numbers 157
- memory use 142
- MS-DOS–based *See* MS-DOS–based applications
- OLE applications 295

Applications (*continued*)

- OS/2 applications 314, 320
- returning to Program Manager from applications 52
- running *See* Running applications
- setting up 322–323
- setting up to run from Program Manager 338, 498
- shortcut keys *See* Keys, application shortcut keys
- starting *See* Starting applications
- supported by Windows NT subsystems 314
- switching between applications 19, 23, 24, 52, 119
- transferring information 30–32, 280–282
- Windows 3.1-based *See* Windows 3.1-based applications
- Windows NT applications, overview 6–7

Appointments, scheduling *See* Schedule+

Audio *See* Sounds

Auditing

- access to files and directories
 - description 402
 - overview 100–102
 - viewing events 409
- adding groups or users to auditing list 96–104
- Audit policy 16, 379–380
- events 379–380
- printer usage 198–200
- security events 379–380, 402

AUTOEXEC.BAT, customizing MS-DOS environment 13

AUTOEXEC.NT

- custom startup files 334–336
- description 316
- running memory-resident programs 319

B

Backing up

- See also* Backup tapes; Drives, tape drives
- automating with batch files 392–393
- Backup Operators group 370
- backup policies 385
- Backup program
 - backing up files to tape 385–393
 - backup status 391–392
 - overview 381–384
 - restoring files from tape 394–399
 - stopping before backup completion 392, 399

Backing up (*continued*)

backup sets

- appending a new set 388
- backup catalog 394–396
- containing corrupt files 395
- family sets 391
- replacing old sets with new ones 388
- setting options 389

backup types 390

commands used 384

files

- backing up to tape 385–393
- backup catalog 394–396
- backup status 391–392
- corrupt files 392, 395
- local registry files 387–389
- log options 390
- overview 381–384
- selecting files 385–387
- to floppy disks with backup or xcopy commands 384
- mail folders and system files 236–237
- restoring files *See* Restoring files from tape
- risk assessment 385
- verifying backups 387–389, 394, 397

Backup tapes

See also Backing up; Drives, tape drives

- appending a new backup set 387–389
- building a partial catalog 396
- erasing 400
- formatting 400
- information on loaded tape 387–389, 397
- maintaining 400
- replacing old backup sets with new ones 387–389
- restricting access 387–389
- retensioning 400
- setting tape options 387–389

Batch files

- automating repeated backups 392–393
- command prompt batch commands 267
- description 280
- logon scripts *See* Logon scripts
- starting memory-resident programs 320
- UPS command file executed prior to system shutdown 148–149

Battery *See* UPS**Bindings** *See* Networks, bindings**Bitmaps, OLE objects** 297**Booting**

- See also* Logging on; Starting Windows NT; Startup boot loader 13
- boot partitions 424
- defining operating system variables 13

Booting (*continued*)

- setting boot devices 139
- starting Windows NT 2–3
- startup operating system 140, 424
- troubleshooting 474–476

Browsing the network

- Computer Browser service 175
- for available printers 11
- for shared directories 9
- for shared printers 9
- turning off domain browsing 3–4

Built-in groups *See* Groups**Built-in user accounts** *See* User accounts**Buttons**

- dialog box buttons 29
- mouse buttons, customizing 131

C**Character-based applications** *See* MS-DOS–based applications**Characters**

- case of NTFS filenames 11, 60, 70
- conventions used in Windows NT documentation xxii
- prohibited in names 11
- sorting international characters 128
- special characters in command prompt parameters 277
- wildcard characters used in filenames 11, 69

Clipboard

See also ClipBook

- ClipBook Viewer 306
- copying and cutting information 30–32
- copying files from File Manager 76
- copying screen images 32
- formats 306
- saving contents 306

ClipBook**ClipBook Viewer**

- connecting to another computer 301
- description 299–306
- placing linked objects on another computer 301
- saving and sharing information 299–302
- tools 299
- online demonstration 4
- pages 299–300

Colors

- command prompt windows 265
- customizing desktop colors 112–115
- printing halftone colors 188
- supported by display adapters 112

Command prompt

- changing display 261–265
- commands *See* Command prompt commands

- Command prompt (*continued*)
 - getting help 27, 266
 - including optional parameters in PIFs 327
 - overview 260
 - QuickEdit mode
 - transferring information 280
 - turning on or off 262
 - screen buffer size 263–264
 - special purpose utilities 275
 - starting applications or programs 279–280, 323
 - starting or quitting 260
 - TCP/IP utilities reference 274
 - transferring information 280–282
 - windows
 - colors 265
 - fonts 263
 - toggleing between window and full screen mode 262
- Command prompt commands
 - batch commands 267
 - command symbols 275–276
 - configuration commands 273–274
 - editing 282
 - LAN Manager commands 287–289
 - MS-DOS commands 283–285
 - native commands 267–271, 276
 - net commands 267–271
 - new Windows NT system commands 283
 - online command reference 266
 - pausing or canceling commands 283
 - recalling with Doskey 282
 - subsystem commands 272
 - switches 278–279
 - syntax 276–279
 - using special characters in parameters 277
- Commands
 - choosing 21–22
 - command prompt commands *See* Command prompt commands
 - dimmed 22
 - included in OLE packages 308
 - initiating with mouse 18
- Common groups *See* Program Manager, groups
- Communications
 - applications 120
 - mail messaging system *See* Mail, system
 - settings 120–121
- Compression
 - compressing shared Mail folders 235
 - disk compression products 485
- Computername
 - changing 151–152
 - troubleshooting 478
- Computers *See* RISC-based computers; X86-based computers
- CONFIG.NT
 - custom startup files 334–336
 - description 316
 - MS-DOS commands 317
 - running memory-resident programs 319
 - subsystem configuration commands 273–274
- CONFIG.SYS
 - customizing MS-DOS environment 13
 - editing OS/2 configuration information 322
 - subsystem configuration commands 273–274
- Configuration
 - See also* Control Panel
 - commands 273–274
 - customizing with Control Panel 110
 - customizing working environment, suggestions 6–8
 - disk configuration information
 - See also* Registry
 - recovering 428–429
 - saving 428
 - searching for 429
 - MS-DOS configuration 316–318
 - network 8–9
 - OS/2 configuration 321–322
 - system 12–14, 338–339
 - troubleshooting hardware configuration 472–473
 - Windows NT 493–498
- Control menu
 - description 23–24
 - displaying 20
 - keyboard shortcut reference 34
- Control Panel
 - changing
 - application response time 144
 - computer name 151–152
 - environment variables 141–142
 - virtual memory paging file 142–144
 - configuring
 - desktop appearance 115–118
 - device drivers 132–135
 - device startup 139
 - fonts 121–123
 - screen savers 119–120
 - serial ports 120–121
 - system date, time, and time zone 125–127
 - system, overview 12
 - UPS 145–148
 - customizing
 - desktop colors 112–115
 - keyboard, cursor, and mouse 129–131
 - defining options for the operating system 140–149

Control Panel (*continued*)

- Devices option 138–139
- international options 111, 127–128
- joining a domain or workgroup 9, 157–158
- managing sounds 135–137
- network configuration 8, 150–162
- overview 110–111
- sending messages after power failure 147, 148
- Server option
 - closing resources 169
 - disconnecting users 165, 167
 - managing administrative alerts 173–174
 - managing server properties 163
 - setting up an import computer for directory replication 169–173
 - viewing connected users 164–165
 - viewing resources in use 168–169
 - viewing shared resources 166–167
- Services option
 - configuring service startup 14
 - configuring services 175
 - sharing printers 188

Conventions used in Windows NT documentation xxii

Copying

- files and directories with File Manager 74–76
- floppy disks 106
- information
 - from command prompt window 280–282
 - overview 30–32
 - with ClipBook Viewer 299
- program items to another program group 49–50
- screen images 32

Counters *See* Performance Monitor, counters

Cursor

- adjusting blink rate 130
- customizing with Control Panel 129, 130

Cutting information

- overview 30–32
- with ClipBook Viewer 299

D

Data

- archiving in Schedule+ 257
- default data type for printers 194
- dynamic data exchange *See* DDE
- managing files, overview 10–11
- protecting, overview 16
- storing, ClipBook Viewer 299

Data Link Control (DLC) *See* Protocols, Data Link Control

Date, display and configuration 125–127

DDE

- changing file type information in File Manager 80
- description 297
- Network DDE DSDM service 175
- Network DDE service 175

Deleting

- application shortcut keys 334
- archived event logs 413
- device drivers 135
- directories *See* Directories, deleting
- files *See* Files, deleting
- fonts 124
- groups 374
- mail messages 215, 222
- mirror sets 429
- partitions 427, 431
- program items 48
- Program Manager groups 48
- stripe sets 434
- unlocked OLE objects 310
- user accounts 364–365
- user profiles 345
- volume sets 432
- volumes 427

Demonstration *See* Online demonstration

Desktop

- configuring appearance 7–8, 115–118
- customizing 7–8, 112–120
- icons 117–118
- patterns 116
- screen savers 119–120
- wallpaper 117
- windows 118

Device drivers

- adding SCSI drives 343
- adding tape drives 343, 382
- changing system settings 134, 338
- command prompt commands 273
- configuring with Control Panel 132–135, 138
- correcting installation errors 342
- installing 132–135, 341
- kernel drivers 132
- network adapter cards *See* Network adapter cards
- obtaining new device drivers 341
- OS/2 device names 322
- printer drivers, installing 182, 184
- removing
 - from Drivers list 135
 - SCSI drives 343
 - tape drives 343
- required by some applications 315

- Device drivers (*continued*)
 - setting device startup type 139
 - setting up new or revised device drivers 342
 - starting and stopping devices 138
 - third party device drivers 134
 - Windows NT Driver Library 341
 - Devices *See* Control Panel, Devices option; Device drivers
 - Dialog boxes 27–29
 - Directories
 - auditing *See* Auditing, access to files and directories
 - copying with File Manager 74–76
 - creating with File Manager 73
 - deleting
 - turning off confirmation messages 83
 - with File Manager 76
 - directory tree
 - collapsing and expanding 63–64
 - description 56
 - displaying 59
 - navigating in File Manager 61–66
 - shortcut keys 62
 - directory windows
 - arranging 58
 - description 56–57
 - displaying only certain files 69
 - moving split bar 60
 - multiple windows 57
 - navigating in File Manager 61–66
 - sorting directory contents 68
 - updating 58
 - home directories
 - assigning to user accounts 362
 - copying user environment profiles 364
 - description 362
 - permissions 362
 - keyboard shortcut reference 34
 - managing with File Manager 70–84
 - moving
 - turning off confirmation messages 83
 - with File Manager 74–76
 - naming conventions 11, 60, 70–71
 - network provider search order 162
 - ownership 91, 104
 - permissions
 - adding groups or users 102–104
 - changing 93
 - customizing 96–98
 - overview 90–91
 - removing 94
 - setting 91–94
 - setting through shared directories 98–100
 - Directories, permissions (*continued*)
 - special access permissions 90, 96–98
 - standard permissions 90, 91
 - viewing 93
 - renaming 77
 - replicating *See* Directory replication
 - root directory, description 56
 - securing 15, 90–104
 - selecting directory for Windows NT files 493
 - selecting in File Manager 71–73
 - shared directories *See* Shared directories
 - sorting directory contents with File Manager 68
 - specifying working directories when creating program items 46
 - startup directory 328
 - Directory replication
 - description 169
 - Directory Replicator service
 - assigning user accounts 169, 177
 - description 175
 - restrictions 177
 - import computers
 - managing locks 171–173
 - setting up 169–173
 - viewing imported subdirectories 171–173
 - importing directories to a workstation 169–173
 - prerequisites 169
 - Replicator group 177, 370
- Directory Replicator service *See* Directory replication
 - Disabling user accounts 364–365
 - Disconnecting users 165, 167
 - Disk Administrator
 - See also* Disks
 - creating
 - extended partitions 422–423
 - primary partitions 421–422
 - stripe sets 433–434
 - volume sets 430–432
 - deleting
 - mirror sets 429
 - partitions, volumes, or logical drives 427
 - stripe sets 434
 - volume sets 432
 - extending volumes and volume sets 432
 - managing disks 418–434
 - managing partitions 419–429
 - overview 416
 - recovering disk configuration information 428–429
 - Disk space
 - checking before adding files from Setup 344

Disk space (*continued*)

- creating
 - extended partitions 419, 422–423
 - logical drives 419, 423
 - primary partitions 421–422
 - volume sets 430
- free space, description 419
- freeing by removing non-essential Windows NT components 343–345
- organizing 416
- required for Mail 229, 234–235

Disks

- configuration information 428–429
- Disk Administrator *See* Disk Administrator
- disk compression products 485
- disk space *See* Disk space
- drive letters *See* Drive letters
- Emergency Repair disk 428, 475, 484
- floppy disks
 - backing up to 384
 - checking for bad sectors 105
 - copying 106
 - drive letters reserved for floppy disk drives 425
 - formatting 105
 - labeling 107
- formatting *See* Formatting
- hard disks *See* Hard disks
- labeling *See* Labeling
- maintaining with File Manager 105–107
- managing 10–11, 418–434
- new hard disks
 - assigning drive letters to volumes 425, 428
 - setting up 419–420
- partitions *See* Partitions
- physical disk activity *See* Performance Monitor
- restoring *See* Restoring
- stripe sets *See* Stripe sets
- volume sets *See* Volumes, volume sets
- volumes *See* Volumes

Display

- See also* Desktop; Screen
- changing system settings 338
- setting up new or revised device drivers 342

Documentation

- conventions xxii
- Windows NT documentation xxi

Documents

- attaching to mail messages 211, 220, 222
- copying screen images 32
- document files displayed in File Manager 67
- document windows 21

Documents (*continued*)

- keyboard shortcut reference 34
- OLE *See* OLE
- opening automatically when starting applications 46
- printing *See* Printing, documents
- transferring formats with Clipboard 306
- transferring information *See* Transferring information

Domain Name Service (DNS) *See* TCP/IP

Domains

- adding a computer 159
- description 9, 157
- joining
 - after Setup 9
 - during Setup 496
 - from a remote workstation 159
 - with Control Panel 157–158
- logging on from a remote workstation 3–4
- logon scripts *See* Logon scripts

Doskey, description 282

Dragging

- data file icons onto program file icons to start applications 82
- description 18
- files and directories to move or copy them 74
- files in File Manager to print them 82
- linking and embedding OLE file packages with drag-and-drop 307

Drive letters

- caution for system partitions 426
- reserved for floppy disk drives 425
- restoring 428–429
- static assignment 425, 428
- stripe sets 434
- volumes 425

Drivers *See* Device drivers; Network adapter cards, drivers; Protocols

Drives

- command prompt commands 273
- disk-partitioning schemes, examples 420
- drive letters *See* Drive letters
- hard drives *See* Hard disks
- logical drives
 - creating 423
 - deleting 427
 - free space in extended partitions 419
- navigating in File Manager 61–66
- network drives 64–66
- SCSI drives
 - adding 343
 - installing Windows NT 485
 - removing 343

Drives, SCSI drives (*continued*)
 tape backup devices supported by Windows NT 384
 troubleshooting 472
 tape drives
 See also Backing up; Backup tapes
 adding 343
 backup commands 384
 loading tape backup drivers 383
 multiple tape drives 384
 removing 343
 setting tape options 387–389
 setting up 384
Duplicating program items 50
Dynamic data exchange *See* DDE

E

E-mail *See* Mail
Embedding *See* OLE
Emergency Repair disk 346–348, 428
EMS memory *See* Memory, expanded (EMS) memory
Environment
 customizing working environment, suggestions 6–8
 MS-DOS *See* MS-DOS, environment
 OS/2 *See* OS/2
 user environment profiles *See* User profiles, user environment profiles
 user environments *See* User environments
 variables *See* Environment variables
 Windows 3.1 *See* Windows 3.1
Environment variables
 changing 141–142
 deleting 142
 viewing 140
Event logs
 archived logs 407, 412–414, 484
 clearing 406, 413
 filtering options 409
 formatting in other applications 414
 full 406
 log file format 412
 logging options 405
 overwriting events 406
 searching for events 410
 security log 402
 sorting events 407, 414
 system log 402
 types 402
 viewing 404, 413
 viewing specific logged events 407
Event Viewer *See* Events, Event Viewer

Events
 assigning sounds 136–137
 auditing *See* Auditing
 description 401
 details 411, 414
 Event Log service
 description 175
 logging events 401
 sending messages after power failure 148
 event logs *See* Event logs
 event types 379, 403, 410
 Event Viewer
 archiving logs 412
 filtering events 407
 overview 402
 searching for events 410
 selecting logs 404
 sorting events 407
 viewing event details 411
 filtering
 options 409
 procedure 407
 restoring default criteria 408
 turning off 408
 interpreting data 411
 monitoring 457–461
 overwriting 406
 reminders *See* Schedule+, reminders
 saving data 412
 scheduling *See* Schedule+
 searching for events 410
 sorting 407
 viewing
 details 411
 for another computer 404
 specific logged events 407
Executive, Windows NT 314
Expanded memory *See* Memory, expanded (EMS) memory
Export servers *See* Directory replication, export servers
Extended memory *See* Memory, extended (XMS) memory
Extending volumes and volume sets 432

F

FAT file system *See* File systems, FAT
File Manager
 associating embedded files with file types and extensions 307
 associating files with applications 78–81
 changing
 file type information 80

File Manager, changing (*continued*)

- font used 60
 - program item properties 48
 - share properties 88
 - creating directories 73
 - creating program items 45, 47
 - displaying information
 - contents list icons 67
 - for the selected directory 58, 59
 - for the selected drive 58, 59
 - in directory windows 57–58
 - on files 67–68
 - only certain files 69
 - types of files 69
 - drivebar 54, 61
 - file version information 84
 - files and directories
 - collapsing and expanding 63–64
 - copying 74–76
 - deleting 76
 - moving 74–76
 - renaming 77
 - searching for 77–78
 - securing 90–104
 - selecting 71–73
 - setting attributes 83–84
 - setting permissions 90–104
 - sharing 85–89
 - sorting 68
 - taking ownership 104
 - keyboard shortcut reference 34
 - linking and embedding objects 307–308
 - maintaining disks 105–107
 - minimizing when running applications 81
 - navigating through directory structure 61–66
 - network drives
 - connecting to 64–66
 - disconnecting from 66
 - displaying shared directories 64
 - path 65
 - overview 54
 - printing files 82
 - starting applications 81–82, 323
 - status bar 54
 - toolbar 54–56
 - turning off confirmation messages 83
- File replication *See* Directory replication
- File systems
- boot partitions 424
 - disk-partitioning schemes, examples 420

File systems (*continued*)

- FAT
- advantages and disadvantages 492
 - disk partitions shared by Windows NT and MS-DOS 418
 - installing Windows NT 490–493
 - overview 10
 - RISC-based computers 419, 424
- HPFS
- advantages and disadvantages 492
 - installing Windows NT 490–493
 - overview 10
- NTFS
- advantages and disadvantages 492
 - extending volumes and volume sets 432
 - file-naming conventions 11, 70–71
 - installing Windows NT 490–493
 - overview 10–11
 - reformatting NTFS partitions containing Windows NT 423
 - removing NTFS partitions, troubleshooting 482
 - security considerations 90–91
 - supported by Windows NT 10–11
- Files
- associating files with applications 78–81
 - attaching to mail messages 211, 220, 222
 - attributes, setting 83–84
 - auditing *See* Auditing, access to files and directories
 - backing up *See* Backing up, files
 - batch files *See* Batch files
 - changing file type information in File Manager 80
 - copying
 - to the Clipboard 76
 - turning off confirmation messages 83
 - with File Manager 74–76
 - custom startup files 335–336
 - deleting
 - caution 76, 83
 - files with long names 76
 - non-essential Windows NT components 343–345
 - turning off confirmation messages 83
 - with File Manager 76
 - document files 67, 69, 81–82
 - embedding 306–308
 - hidden files 67, 69
 - keyboard shortcut reference 34
 - linking 307–308
 - mail system and message files *See* Mail message files; Mail, system
 - managing 10–11, 70–84

Files (*continued*)

- moving
 - turning off confirmation messages 83
 - with File Manager 74–76
 - naming conventions 11, 70–71
 - opening data files when starting applications 82
 - opening with keyboard 34
 - ownership 91, 104
 - paging files *See* Paging files
 - permissions
 - adding groups or users 96–104
 - changing 95
 - customizing 96–98
 - online demonstration 4
 - removing 96
 - securing directories and files 90–104
 - setting 94–96
 - special access permissions 90, 96–98
 - standard permissions 90, 91
 - preventing data loss, overview 16
 - printing *See* Printing, documents
 - program files 67, 69, 81–82
 - Program Information Files (PIFs) *See* PIF files
 - removing non-essential Windows NT files 343–345
 - renaming 77
 - replicating *See* Directory replication
 - restoring backup files from tape *See* Restoring files from tape
 - searching for with File Manager 77–78
 - securing 15, 90–104
 - selecting directory for Windows NT files 493
 - selecting in File Manager 71–73
 - separator files for printing 192
 - setting up Windows NT master files on a server 500–502
 - shared files *See* Shared files
 - sound files 136
 - system files 67, 69
 - viewing version information 84
- Filtering events *See* Events, filtering
- Floppy disks *See* Disks, floppy disks
- Fonts
- changing font used in File Manager 60
 - command prompt fonts 263
 - configuring with Control Panel 121–123
 - description 121
 - installing 122–123
 - printer font cartridges 188
 - removing 124
 - screen fonts 121–123
 - TrueType fonts 121–123
 - vector fonts 122

Formats

- archived event log file format 412
 - Clipboard formats 306
 - currency 128
 - date and time 126
 - event data 412
 - international options 127–128
 - numbers 128
 - OLE objects 297
 - transferring with Clipboard 306
- Formatting
- floppy disks 105
 - format command 423
 - partitions 423–424, 490–493
 - Quick Format 105
 - volumes 423
- Forms *See* Printing, forms
- FTP Server service 527–532

G

- Graphics, Clipboard formats 306
- Graphics-based applications *See* MS-DOS–based applications
- Groups
- adding to auditing or permissions list 96–104
 - adding to printer permissions list 197–198
 - Administrators group 369
 - auditing events 379
 - auditing printer usage 198–200
 - Backup Operators group 370
 - built-in groups 366–370
 - common groups *See* Program Manager, groups
 - deleting 374
 - description 14, 366
 - granting permissions to groups rather than to users 356
 - group memberships
 - copying 355
 - global groups 367
 - local groups 366
 - managing 359–364
 - group names 367
 - Guests group 370
 - local groups
 - adding 371–372
 - adding user accounts 372
 - copying 372
 - creating 371
 - description 366
 - managing properties 373
 - removing user accounts 372

Groups (*continued*)

- managing groups 366–374
- permissions
 - copying 355
 - customizing 96–98
 - removing 94, 96, 100
 - setting 91, 102–104
- Power Users group 369
- Program Manager groups *See* Program Manager, groups
- Replicator group 370
- setting up 14
- special groups 370
- Users group 369

Guests

- Guest account 352
- Guests group 370

H

Hard disks

- adding new hard disks 428
- assigning drive letters to volumes 425, 428
- guidelines for disk partitions 489
- setting up 419–420
- troubleshooting 472

Hardware

- applications requiring new or updated device drivers 315
- configuring the system, overview 12–14
- hardware interrupt levels *See* Printers, hardware interrupt levels; Network adapter cards
- troubleshooting configuration 472–473
- Windows NT system requirements xix

Help

- actions possible in Help 26
- at command prompt 27, 266
- keyboard shortcut reference 34
- product support 4
- searching for topics 4, 26
- using Help 4, 25

Home directories *See* Directories, home directories

HPFS file system *See* File systems, HPFS

I

I/O

- command symbols 275–276
- optimizing the system with stripe sets 433
- troubleshooting I/O port base addresses 481

Icons

- desktop arrangement
 - aligning on desktop 118
 - arranging File Manager icons 59

Icons (*continued*)

- arranging program-item icons 42–43
- changing program-item icons 51
- preventing titles from overlapping 117
- starting and running applications
 - choosing commands from toolbars 21
 - dragging data file icons onto program file icons to start applications 82
 - from program groups 19, 51
 - keyboard shortcut reference 34
 - minimizing applications when you start them 33, 82
 - minimizing Program Manager group windows 41
 - order in Startup group 52
 - running File Manager as an icon 81
 - running Program Manager as an icon 52
 - selecting with mouse 18

types

- embedded as OLE packages 293, 306–308
- files and directories in File Manager 67
- Program Manager group icons 39
- Schedule+ icons in time slots 243

Import computers *See* Directory replication, import computers

Installing Windows NT

- See also* Setup
- caution with stripe sets, volume sets, and mirror sets 489
- configuring existing Windows environment 316
- configuring Windows NT 493–498
- Express vs. Custom Setup 487–488
- file systems 489, 490–493
- files copied 499
- formatting partitions for file systems 489, 490–493
- information required 484, 493
- into existing Windows directory 488, 493
- joining a workgroup or domain 496
- making an Emergency Repair disk 484
- migrating Windows 3.1 settings 500
- overview 483–500
- preparing the computer 488–493
- RISC-based computers 487
- selecting directory for Windows NT files 493
- setting up
 - applications to run from Program Manager 498
 - local accounts 497
 - local printers 494
 - network adapter cards 494–495
 - virtual memory 498
 - Windows NT master files on a server 500–502
- specifying disk partitions 488–492
- troubleshooting 473
- using multiple operating systems 490
- x86-based computers 485–486

- International settings
 - configuring with Control Panel 127–128
 - date and time formats 126
- Interrupts (IRQs) *See* Printers, hardware interrupt levels; Network adapter cards

K

- Key combinations *See* Keys
- Keyboard
 - adjusting delay and repeat rate 129
 - changing system settings 338
 - choosing commands 21
 - command prompt commands 273
 - common actions 33
 - customizing with Control Panel 129
 - general conventions governing use of keys 33
 - international options 127–128
 - opening files 34
 - overview 32–36
 - setting up new or revised device drivers 342
 - shortcut reference 34
 - starting applications 33
- Keys
 - ALT+ENTER, toggling between window and full screen mode in command prompt window 262
 - ALT+ESC, moving through open applications 52
 - ALT+HYPHEN, displaying document window Control menu 23
 - ALT+SPACEBAR, displaying application window Control menu 23
 - ALT+TAB, moving through open applications 19, 52, 119
 - ALT+TAB+ESC, returning to original application 119
 - application shortcut keys
 - assigning 333–334
 - deleting 334
 - reserved key combinations 320, 332
 - specifying in PIFs 333
 - specifying when creating program items 47
 - conventions governing use of keys 33
 - conventions used in documentation 32
 - CTRL+ALT+DEL, logging on to Windows NT 2
 - CTRL+ESC, displaying Task List 24
 - opening files 34
 - shortcut reference 34
 - starting applications 33

L

- Labeling
 - floppy disks 107
 - label command 423

- Labeling (*continued*)
 - new volumes 417, 423
 - OLE packages 308
- LAN adapter numbers, network bindings 157
- LAN Manager commands
 - changes 288
 - not available at the Windows NT command prompt 289
 - vs. Windows NT commands 287
- Linking *See* OLE
- Locator 162, 175
- Locking OLE objects 310
- Logging off
 - correct procedure 39
 - from Mail 215–216
 - from Schedule+ 241
 - quitting Windows NT 5, 39
- Logging on
 - entering unique identifiers 2
 - logon scripts *See* Logon scripts
 - online demonstration 4
 - starting applications automatically 52
 - starting Windows NT 2–3
 - to a domain from a remote workstation 2–4
 - to Mail 214
 - to Schedule+ 240
 - to services 177
 - troubleshooting 476
- Logon scripts
 - assigning to users 361
 - copying user environment profiles 364

M

- Mail
 - accounts
 - adding to WGPOs 233
 - administrator accounts 229–231
 - changing passwords 214
 - creating 212–213
 - disk space required 229
 - information contained in WGPOs 226
 - modifying 233
 - removing 234
 - restoring passwords 237
 - Address Book 217
 - folders
 - backing up 236
 - description 211
 - restoring 236
 - shared folders 224, 234–235
 - sharing folders 231–232
 - storing messages 224

Mail (*continued*)

- message files
 - copying to a computer or disk 224
 - corrupted 237
 - description 210
 - moving offline 224
- Message Finder 223
- messages
 - addressing 216–219
 - attaching files 211, 220, 222
 - creating without being connected to postoffice 224–225
 - deleting 222
 - finding 223
 - headers 211
 - including OLE packages 222, 308
 - message templates 223, 223
 - reading 219–220
 - replying to 221
 - sending 216–219
 - sending to another mail system 218, 238
 - typing 218
- passwords 210, 214, 237
- Postoffice Manager
 - creating WGPOs 229–231
 - managing accounts 233–234
 - managing mail system files 236–237
 - managing WGPOs 232–237
 - planning WGPOs 226–229
- postoffices *See herein* WGPOs
- starting 211, 214
- system
 - advanced features 222–225
 - backing up 236–237
 - description 226–228
 - managing files 236–237
 - overview 210–211
 - quitting 215–216
 - restoring 236–237
 - restoring user passwords 237
 - sending messages to another mail system 218, 238
 - setting up 226–228
- using with other systems and networks 238
- WGPOs
 - configuration examples 226–228
 - connecting to 211–212
 - creating 229–231
 - description 210
 - disk space required 229, 234–235
 - existing Mail postoffice 211
 - managing 232–237

Mail, WGPOs (*continued*)

- planning 226–229
- sharing 231–232
- working offline 224–225
- Memory
 - changing environment variables 141–142
 - expanded (EMS) memory
 - for MS-DOS–based applications 316
 - including information in PIFs 325
 - setting options 329
 - extended (XMS) memory 330
 - optimizing performance 142
 - running different processes 314
 - troubleshooting memory buffer addresses 481
 - virtual memory
 - changing virtual memory paging file 142–144
 - configuring during Setup 498
 - defining for operating system 13
 - defining for Windows 3.1-based applications 315
 - Windows NT system requirements *xix*
- Menus 21–22
- Messages
 - general dialog messages 30
 - low battery power warning 146
 - Mail *See* Mail, messages
 - sending after power failure 147, 148
 - Server Unavailable message during OLE 311
 - turning off confirmation messages in File Manager 83
- Microsoft Locator 162, 175
- MIDI Mapper 136–137
- Mirror sets
 - boot and system partitions 424
 - caution when installing Windows NT 489
 - deleting 429
 - restoring 428–429
- Mouse
 - configuring
 - changing system settings 338
 - customizing 129, 131
 - device drivers 132, 135, 341
 - pointers 18, 131
 - switching functions of buttons 131
 - turning off File Manager confirmation messages 83
 - using
 - choosing commands 21
 - clicking 18
 - creating program items quickly with File Manager 45
 - double-clicking 18, 131
 - guidelines 18
 - moving and sizing windows 20
 - selecting items 18

MS-DOS

- applications *See* MS-DOS-based applications
 - commands
 - changes and improvements 284
 - configuration commands 273–274, 317
 - not available in Windows NT 285
 - subsystem commands supported 272
 - vs. Windows NT commands 283
 - converting long file names 70
 - disk partitions shared with Windows NT 418, 490
 - environment
 - configuring 316–318
 - custom startup files 13, 335–336
 - customizing with PIFs 318
 - memory-resident programs 319–320, 327
 - naming conventions 11, 71
 - running pop-up programs in windows 320
 - Windows NT Setup considerations 490
- MS-DOS-based applications**
- application shortcut keys 333
 - character-based applications 316, 331
 - converting long file names 70
 - creating PIFs 324–336
 - expanded (EMS) memory 316, 329
 - extended (XMS) memory 330
 - graphics-based applications 316, 331
 - naming conventions 11, 71
 - run by Windows NT 314
 - running from command prompt 259
 - setting up 322–323
 - starting 323
 - toggleing between window and full screen modes 331
 - transferring information with Clipboard 30–32

N**Names**

- See also* Renaming
 - characters prohibited 11
 - computer names
 - changing 151–152
 - troubleshooting 478
 - Name Service Interface (NSI) 162
 - naming files or directories 11, 70–71
 - printer names 183
 - RPC name service provider 162
- NetBEUI protocol** 156, 504
- NetBIOS**
- applications, LAN adapter numbers 157
 - NetBEUI protocol 156, 504

NetWare

- NWLink protocol 156, 505–510
 - running Mail on a NetWare network 238
- Network adapter cards**
- adding 151
 - configuring during Setup 494–495
 - configuring the network 155
 - default settings in Windows NT 478–479
 - hardware interrupt levels 480–481
 - I/O port base addresses, troubleshooting 481
 - information required during Setup 484, 495
 - installing 152
 - LAN adapter numbers 157
 - memory buffer addresses, troubleshooting 481
 - removing 151, 154
 - smart cards 543
 - updating 151, 154
- Networks**
- accessing X.25 networks remotely *See* Remote Access Service (RAS), X.25 networks
 - bindings 157, 160–161
 - browsing *See* Browsing the network
 - configuring
 - network software 155
 - protocol software 156–157
 - with Control Panel 8–9, 150–162
 - connecting to network drives with File Manager 64–66
 - connecting to network printers 185–186
 - home directories *See* Directories, home directories
 - installing network software 153
 - LAN adapter numbers 157
 - logon scripts *See* Logon scripts
 - mail system *See* Mail, system
 - monitoring network activity and
 - performance *See* Performance Monitor
 - network provider search order 162
 - network settings, summary 151
 - printing *See* Printing; Printers
 - protocols *See* Protocols
 - removing components 154
 - troubleshooting network problems 477–481
 - updating components 154
 - viewing
 - connected users 164–165
 - resources in use 168–169
 - shared resources 166–167
 - Windows NT system requirements xix
- NTFS file system** *See* File systems, NTFS
- Numbers**
- formats 128
 - TCP/IP sequence numbers 512

NWLink protocol 156, 505–510

O

Object Packager 308–310

Objects

- description 292
- linking and embedding *See* OLE, objects
- Performance Monitor objects 441

OLE

- applications managing OLE activities 298
- applications with OLE capabilities 292
- associating files with file extensions 307
- changing filename of source document 310
- choosing data types with Paste Special command 298
- client applications 295
- ClipBook pages 299–300
- commands used 296
- compound documents, uses 295
- copying files to Clipboard from File Manager 76
- destination documents 293
- dynamic updating 294
- links

See also herein objects

- canceling 310
- creating linked objects 297
- fixing broken links 310
- manual links 309, 312
- updating 309

objects

- description 292
- editing 309–310
- embedded objects 222, 294, 297
- format 297
- inserting 296
- linked objects 222, 294, 297, 301, 309, 312
- locking or unlocking 310
- maintaining 309
- managing 298
- pasting 296

overview 292

packages

- description 293
- editing 309–310
- embedding in mail messages 222, 307
- embedding sound clips 306
- embedding, procedure 306–308
- including commands 308
- linking and embedding files 307–308
- linking multiple documents 307

OLE, packages (*continued*)

- navigating through linked documents 307
- running commands in documents 294
- picture formats 297
- server applications 295
- Server Unavailable message 311
- source documents 293
- text formats 297
- troubleshooting 310–312
- types of documents 293
- version restrictions 308

Online demonstration 4

Online Help *See* Help

Operating systems

- boot partitions 13, 424
- default startup system 13, 140–141
- defining
 - boot loader 13
 - options with Control Panel 140–149
 - user environment variables 13
 - virtual memory 13
 - which operating system to boot 13, 140, 424

MS-DOS *See* MS-DOS

OS/2 *See* OS/2

- startup path 13
- system partitions 424
- troubleshooting alternate operating system 476
- using multiple operating systems 490

Optimizing performance

- balancing data I/O across drives 431
- deleting partitions 431
- paging files 142–144
- stripe sets 433

OS/2

- 16-bit character-based applications 320
- applications run by Windows NT 314
- configuration commands 273–274, 321
- configuring environment 321–322
- device names 322
- running applications from command prompt 259
- setting up applications 322–323
- subsystem commands supported by Windows NT 272
- Windows NT Setup considerations 490

Ownership

- checking 104
- description 91
- information discarded when copying files or directories 74
- taking ownership of files or directories 104
- taking ownership of printers 200

- P**
- Packages *See* Object Packager; OLE, packages
- Paging files
- configuring 13
 - description 142
 - modifying 142–144
 - recommended size 143
 - viewing 140
- Partitions
- assigning drive letters 425, 428
 - boot partitions 424
 - converting existing partitions during Setup 488–492
 - creating 419–423
 - deleting 427, 431
 - description 420, 424
 - disk-partitioning schemes, examples 420
 - extended partitions 420, 427
 - file systems *See* File systems
 - formatting 419, 423, 490–493
 - installing Windows NT 488–493
 - labeling new volumes 423
 - managing with Disk Administrator 419–429
 - marking as active 424
 - number possible 418, 420, 425
 - primary partitions 421–422
 - reformatting NTFS partitions containing Windows NT 424
 - removing, troubleshooting 482
 - securing system partitions on RISC-based computers 425
 - shared by Windows NT and MS-DOS 418
 - stripe set restrictions 424, 433
 - system partitions
 - description 424, 489
 - drive letters 425
 - number possible according to operating system 418, 420
 - recommended size 489
 - troubleshooting Windows NT installation 473
 - volume set restrictions 430
- Passwords
- Account policy options 375
 - ensuring system security at logon 2
 - mail accounts 210, 214
 - managing workstation passwords 354
 - pressing CTRL+ALT+DEL before entering at logon 2
 - screen savers 119
 - user account passwords
 - changing 8, 178
 - logging on to services 177, 178
 - password options 355
 - unique identifier used at logon 2
- Pasting information
- in command prompt windows 280–282
 - with ClipBook Viewer 299
- Path
- changing path of OLE documents 311
 - environment variables 141
 - including in PIFs 326
 - Windows NT device drivers for OS/2 322
- Patterns, desktop *See* Desktop, patterns
- Performance
- monitoring *See* Performance Monitor
 - optimizing *See* Optimizing performance
 - troubleshooting 477
- Performance Monitor
- alerts
 - alert selections 458–460
 - changing alert options 461
 - creating alert logs 457–461
 - monitoring interval 461
 - setting on current activity 457–461
 - setting on input log files 468
 - tracking events 457–461
 - charts
 - chart highlighting mode 439
 - chart selections 450–451
 - charting current activity 449–453
 - charting input log files 467
 - counter options 452
 - customizing 452–453
 - formats 452
 - counters
 - activating 437
 - changing alert counters 460
 - changing charting counters 451
 - charting options 452
 - explained 442–444
 - logging current activity 454
 - monitoring multiple counters 458
 - selecting 445
 - current activity
 - logging 454–457
 - monitoring 444–448
 - reports 462–464
 - setting alerts 457–461
 - display 439–447
 - exporting data 447
 - instances 444
 - log files
 - adding bookmarks 457
 - adding information 455
 - changing log options 456
 - charting input log files 467

- Performance Monitor, log files (*continued*)
 - current activity 454–457
 - logging interval 456
 - monitoring multiple counters with alert log 458
 - relogging input log files 469
 - reports based on input log files 470
 - setting alerts on input log files 468
 - working with log file information 448
- monitoring performance, overview 440–448
- objects 444
- overview 436
- reports
 - adding information 463–464
 - based on input log files 470
 - changing report options 464
 - current activity 462–464
 - report interval 464
 - viewing 462
- selecting a different computer 446
- views 437, 439
- Permissions
 - customizing 96–98
 - description 376
 - directories *See* Directories, permissions
 - files *See* Files, permissions
 - granting remote access permission to users 537
 - granting to groups rather than to users 356
 - groups *See* Groups, permissions
 - NTFS security considerations 90–91
 - online demonstration 4
 - overview 90–91
 - removing 96
 - securing printers 195–198
 - setting through shared directories 98–100
 - special access permissions 90, 96–98
 - standard permissions 90, 91
 - vs. rights 376
- Personal groups *See* Program Manager, groups
- Pictures
 - bitmap formats 297
 - Clipboard formats 306
- PIF files
 - batch programs for starting memory-resident programs
 - with applications 320, 326
 - creating 324–336
 - custom startup files 335–336
 - customizing MS-DOS environment 318
 - description 318
 - PIF Editor 320, 324
 - setting up MS-DOS applications with Windows NT
 - Setup 322
- PIF files (*continued*)
 - specifying options 326–336
 - starting applications from PIFs 325
 - using multiple PIFs for an application 325
 - Windows NT default PIF 318, 324
- Ping utility 521
- Pointing
 - customizing pointing devices with Control Panel 131
 - description 18
 - mouse pointers 18
- Policies *See* Security policies
- Pop-up programs *See* MS-DOS, memory-resident programs
- Ports
 - configuring with Control Panel 120–121
 - I/O port base addresses, troubleshooting 481
 - installing printers 183
 - printer ports 194, 195, 484
 - serial ports, troubleshooting 480
- Postoffice Manager *See* Mail, Postoffice Manager
- Power failure
 - configuring UPS options 145–148
 - low battery power warning 146
 - sending messages 147, 148
 - system shutdown 145, 148–149
- Print Manager
 - See also* Printers; Printing
 - administering network print servers remotely 207–208
 - auditing printer usage 198–200
 - changing
 - document details 206–207
 - printer properties 187–195
 - printing order 205
 - choosing print destinations 182–183
 - connecting to network printers 185–186
 - defining printer priority 193
 - installing printer drivers 184
 - installing printers 181–184
 - overview 180–183
 - pausing and resuming printing 204
 - pooling printers 193–194
 - printing
 - directly to ports 194
 - documents 202–207
 - files from File Manager 82
 - removing printers 186
 - removing waiting documents 205
 - restarting printing documents 205
 - securing printers 195–198
 - setting
 - default printer 203
 - hours a printer is available 191

- Print Manager, setting (*continued*)
 - job defaults 189
 - printer details 191–195
 - printing options 188–189
 - time-out options 195
 - setting up to print 11
 - sharing printers 188
 - specifying print processor 194
 - taking ownership of printers 200
 - viewing document status 203
- Print servers, administering remotely 207–208
- Printer drivers, installing 182, 184
- Printers
- See also* Printing
 - adding groups or users to printer permissions
 - list 197–198
 - administering remotely 207–208
 - auditing usage 198–200
 - browsing the network 9, 11
 - connecting to
 - network printers 185–186
 - online demonstration 4
 - data types 194
 - default printer 203
 - defining multiple printers for one physical printer 182, 193
 - fonts *See* Fonts
 - hardware interrupt levels 480–481
 - Hewlett-Packard printers 183
 - hours a printer is available 191
 - information required during Setup 484
 - installing 181–184
 - installing printer drivers 184
 - memory available 188
 - pausing and resuming printing 204
 - Print Manager *See* Print Manager
 - printer names 183
 - printer pools 193–194
 - printer priority 182, 193
 - printer properties 187–195
 - printer resolution affecting font display 121
 - printers that print to files 182, 183
 - removing printers 186
 - securing printers 195–198
 - separator pages 192
 - setting up a local printer during Setup 494
 - sharing printers 188
 - taking ownership 200
 - time-out options 195
 - using parallel ports 195
 - viewing document status 203
- Printing
- See also* Printers
 - changing file type information in File Manager 80
 - data types 194
 - destination 182–183
 - documents
 - changing details 206–207
 - changing document printing hours 207
 - changing document priority 207
 - changing print notification 206
 - changing printing order 205
 - from File Manager 82
 - margins 201–202
 - paper size and format 128, 201–202
 - removing waiting documents 205
 - restarting printing documents 205
 - spooled documents, description 194
 - viewing document status 203
 - forms 188, 189, 201–202
 - memory available to printers 188
 - pausing and resuming 204
 - Print Manager *See* Print Manager
 - printing directly to ports 194
 - separator pages 192
 - setting
 - job defaults 189
 - printing options 188–189
 - setting up to print 11
 - specifying print processor 194
 - taking ownership of printers 200
 - to files 182
- Privileges *See* Permissions; Rights
- Processes
- object type in Performance Monitor 444
 - running different processes in memory 314
- Profiles *See* User profiles
- Program Information Files (PIFs) *See* PIF files
- Program items
- arranging icons 42–43
 - changing icons 51
 - copying to another group 49–50
 - creating 45–48
 - deleting 48
 - description 40
 - properties
 - changing with File Manager 48
 - changing with Program Manager 47
 - setting with File Manager 48
 - setting with Program Manager 45
 - specifying application shortcut keys 47, 333

Program items (*continued*)

- specifying working directories 46
- starting applications minimized 47, 52

Program Manager

- arranging icons 42–43
- assigning application shortcut keys 47, 333
- built-in groups
 - Accessories group 40
 - Administrative Tools group 7
 - Applications group 40
 - Games group 40
 - Main group 6–7, 40
 - Startup group 7, 40, 52

groups

- changing group description 49
- common and personal groups 40
- creating 44
- deleting 48
- description 40
- group windows 39–41, 327
- icons 39
- installed during Setup 40
- keyboard shortcut reference 34
- opening documents automatically when starting
 - applications 46
- overview 38
- program items *See* Program items
- quitting Windows NT 39
- returning to Program Manager from applications 52
- running applications as icons 52
- running as an icon 52
- saving settings 43
- setting up applications 339
- setting up applications to run from Program Manager 498
- specifying startup directory 328
- starting applications 19, 33, 51, 323

Programs

- See also* Applications
- batch programs *See* Batch files
- displaying in File Manager 69
- MS-DOS memory-resident programs 319–320, 327
- pop-up programs 319–320, 327
- Program Information Files (PIFs) *See* PIF files
- program items *See* Program items
- running as icons 52
- running multiple programs 142
- starting from command prompt 279–280
- TSR programs 319–320, 327

Properties

- local group properties 373
- printer properties 187–195
- server properties 163

Properties (*continued*)

- share properties 88
- user account properties 356–364

Protocols

- changing protocol binding order 161
- Data Link Control 156, 183, 505
- description 503
- NetBEUI 156, 504
- NWLink 156, 505–510
- overview 504
- protocol software 156–157
- provided with Windows NT 156, 503
- TCP/IP *See* TCP/IP

Q

- Quick Format 105
- QuickEdit 262, 280
- Quitting Windows NT 5, 39

R

- Random Access Memory (RAM) 142
- Recovering data *See* Restoring
- Registry
 - See also* Configuration, disk configuration information
 - backing up local registry files 387–389
 - recovering disk configuration information 428–429
 - restoring local registry files from backups 397
- Reminders program *See* Schedule+, reminders
- Remote Access Service (RAS)
 - description 533–535
 - dial-up PADs
 - connecting with clients 545
 - PAD.INF format 546
 - granting remote access permission 537
 - intermediary devices
 - connecting through 547
 - supported 546
 - writing scripts 548–549
 - joining a domain 159
 - logging on to a domain from a remote workstation 3–4
 - security hosts 546
 - setting up 537
 - X.25 networks
 - configurations offered 538
 - configuring remote access software 546
 - dial-up PADs 538–543
 - setting up remote access clients and servers 544–545
 - support 538–544
 - X.25 packet handling 538

Remote Procedure Call service *See* Services, RPC service

Renaming

- See also* Names
- directories and files 77
- source OLE documents 310
- user accounts 365

Repair program 348

Replication *See* Directory replication

Resources

- closing 169
- scheduling with Schedule+ 253–254
- shared resources
 - disconnecting users 167
 - viewing 166–167
- viewing resources in use 168–169

Restarting your computer 39

Restoring

- assigned drive letters 428–429
- disk configuration information 428–429
- mail folders 236
- mail system files 236–237
- mirror sets 428–429
- stripe sets 428–429
- system
 - using last known good configuration 346, 475
 - with Emergency Repair disk 346–348, 475
- volume sets 428–429
- windows 20

Restoring files from tape

- building a partial catalog 396
- catalog information 394–396
- choosing what to restore 394
- corrupt files 392, 395
- from backups, overview 381–384, 394–399
- from third party backup programs 396
- local registry files 397
- log options 398
- restoration policies 394
- restore options 397–398
- restore status 399
- restoring permissions 397
- verifying restorations 394, 397

Rights

- advanced user rights 377
- description 376
- managing user rights 376–378
- programming rights 377
- rights of built-in groups 368
- User Rights policy 16, 376–378
- vs. permissions 376

RISC-based computers

- 16-bit character-based OS/2 applications 320
 - boot configuration 13, 424
 - disk-partitioning schemes, examples 420
 - formatting partitions for file systems 489, 490–493
 - important files copied during Setup 499
 - installing Windows NT 487
 - restoring the system with Emergency Repair disk 347, 475
 - running MS-DOS applications under Windows NT 316, 331
 - system partitions 419, 424, 425, 487, 489
 - Windows NT system requirements xix
- ## Running applications
- as icons 52
 - by double-clicking OLE packages 293
 - device drivers required 315
 - from command prompt 259
 - from Program Manager 498
 - in Windows NT 6–7, 314–315
 - regardless of operating system required 314
 - with MS-DOS memory-resident programs 319–320

S

Saving

- disk configuration information 428
- Program Manager settings 43

Schedule+

- advanced features 256–257

Appointment Book

- adding appointments 244–248, 255
- adding tasks 250–251
- dates and times 243
- description 243
- notes 243
- reminders 243, 245
- scheduling recurring appointments 243, 246–248
- tentative appointments 243, 246

archiving data 257

exchanging data with other scheduling programs 257

modifying tasks 250

moving files from one computer to another 257

overview 240

Planner

- planning workgroup meetings 251–254
- scheduling attendees 251–253
- scheduling resources 253–254
- viewing others' schedules 251

- Schedule+ (*continued*)
 - reminders
 - general options 256
 - options 243
 - Reminders program 241
 - setting 245
 - signing in 240
 - Task list
 - adding tasks 248–250
 - adding tasks to Appointment Book 250–251
 - modifying tasks 250
 - removing tasks 250
 - sorting tasks 248
 - time slots 243
 - views 241–242
 - working offline 257
- Screen
 - See also* Desktop; Display
 - copying screen images 32
 - screen savers *See* Screen savers
- Screen savers 119–120
- Scrolling 20, 29
- SCSI drives *See* Drives, SCSI drives
- Searching
 - for directories with File Manager 77–78
 - for disk configuration information 428
 - for events in Event Viewer 410
 - for files 11, 69, 77–78
 - for information in Windows NT Help 4
 - for Mail messages 223
 - for names in Mail Address Book 217
 - network provider search order 162
- Sectors, checking when formatting floppy disks 105
- Security
 - auditing access to files and directories 15, 409
 - auditing events 379
 - NTFS considerations 90–91
 - overview 15
 - password protected screen savers 119
 - permissions *See* Permissions
 - policies *See* Security policies
 - pressing CTRL+ALT+DEL before entering password at logon 2
 - securing system partitions on RISC-based computers 425
- Security policies
 - Account policy 16, 374
 - Audit policy 16, 379–380
 - auditing events 379
 - managing 374–380
 - managing security 15
 - setting up 16
 - User Rights policy 16, 376–378
- Selecting commands and information 18, 34
- Separator pages *See* Printing, separator pages
- Servers
 - administering network print servers remotely 207–208
 - global group memberships 367
 - home directories *See* Directories, home directories
 - logon scripts *See* Logon scripts
 - network provider search order 162
 - remote access servers *See* Remote Access Service (RAS)
 - Server *See* Services, Server service
 - server properties usage summary 163
 - Server Unavailable message during OLE 311
 - setting up Windows NT master files on a server 500–502
- Services
 - Alerter 148, 173, 175
 - Clipbook 175
 - Computer Browser 175
 - configuring
 - service startup 14, 177–178
 - with Control Panel Services option 14, 175
 - controlling startup parameters 14, 175, 176
 - correct procedure for logging off 39
 - DCE Cell Directory service (CDS) 162
 - default services provided with Windows NT 175
 - Directory Replicator *See* Directory replication
 - DNS *See* TCP/IP
 - Event Log 148, 175, 401
 - FTP Server service 527–532
 - logging on to services 177
 - managing services 175
 - Messenger 148, 173, 175
 - Name Service Interface (NSI) 162
 - Net Logon 175
 - Network DDE 175
 - Network DDE DSDM 175
 - pausing and continuing services 176
 - Remote Access Service (RAS) *See* Remote Access Service (RAS)
 - Remote Procedure Call (RPC) 162, 175
 - Server 85, 175, 177
 - SNMP *See* TCP/IP
 - starting 175, 176
 - stopping services 176
 - troubleshooting service startup 482
 - UPS 145, 175
 - Workstation 175
- Setup
 - checking disk space before adding files 344
 - configuring the system, overview 12
 - configuring Windows NT 493–498

Setup (*continued*)

- creating program items 45
- deleting user profiles 345
- Express vs. Custom Setup 487–488
- information required 484, 493
- installing Windows NT 483
- joining a workgroup or domain 496
- making an Emergency Repair disk 484
- migrating Windows 3.1 settings 500
- Program Manager groups installed 40
- removing NTFS partitions, troubleshooting 482
- selecting directory for Windows NT files 493
- setting up
 - applications to run from Program Manager 498
 - local accounts 497
 - local printers 494
 - network adapter cards 494–495
 - virtual memory 498
- Setup command switches 500–502
- starting and quitting Setup 338
- system maintenance 337
- troubleshooting Windows NT installation 473

Shared directories

- browsing the network 9
- changing share properties 88
- limiting number of users 86, 88
- on remote computers 85
- removing groups or users 100
- securing 90–104
- setting permissions 91–94, 98–100
- sharing directories 85–89
- stopping directory sharing 87

Shared files

- closing 89
- online demonstration 4
- securing 90–104
- sharing files 85–89
- stopping file sharing 87
- viewing 89

Sharing

- ClipBook information 300, 301
- directories *See* Shared directories
- files *See* Shared files
- information, online demonstration 4
- printers 188
- resources *See* Resources, shared resources
- WGPO mail directories 231–232

Shortcut keys *See* Keys

Shutdown

- turning off your computer 5, 39
- UPS command file executed prior to system shutdown 148–149

SNMP service *See* TCP/IP

Sorting

- archived event log files 414
- directory contents in File Manager 68
- events 407
- international characters 128

Sounds

- assigning to events 136–137
- embedding sound clips as OLE packages 306
- hardware required 135
- MIDI Mapper 135–137
- playing 306, 312
- sound files 136
- turning off 137

Starting applications

- automatically 52
- by dragging data file icons onto program file icons 82
- from command prompt 279–280, 323
- from File Manager 81–82, 323
- from PIFs 325
- from program groups 51
- from Program Manager 19, 323
- from program or document files 81–82
- minimized 33, 47, 82
- MS-DOS memory-resident programs 320
- opening documents automatically 46, 82
- overview 322–323

Starting Windows NT

See also Booting; Logging on; Startup
after completing Setup 499

- boot partitions 424
- configuring service startup 14
- configuring the network 8–9
- configuring the system, overview 12–14
- customizing working environment, suggestions 6–8
- defining
 - boot loader 13
 - operating system variables 13
 - startup applications 7

logging on 2–4

online demonstration 4

setting up

- security policies 16
- to print 11
- user accounts and groups 14

troubleshooting 474–476

Startup

boot configuration

- defining boot operating system 13, 140, 424
- RISC-based computers 13, 424
- tools for modifying 111
- x86-based computers 13, 424

Startup (*continued*)

- boot partitions 424
- configuring service startup 14, 177–178
- custom startup files 335–336
- defining
 - boot loader 13
 - operating system variables 13
 - startup applications 7
- faulty device drivers 342
- setting device startup type 139
- specifying default startup system 140–141
- starting applications automatically 52
- startup directory 328
- Startup group 7, 40, 52
- troubleshooting 474–476

Storage space *See* Disk space

Stripe sets

- caution when installing Windows NT 489
- creating 433–434
- deleting 434
- description 433
- drive letters assigned 434
- restoring 428–429
- restrictions 424, 433

Subsystems

- applications supported by Windows NT subsystems 314
- MS-DOS 316
- OS/2 320
- subsystem commands supported by Windows NT 272
- supported by Windows NT 314
- troubleshooting startup 482
- Windows 3.1 315

Swap files *See* Paging files

Switching to another application

- ALT+ESC 52
- ALT+TAB 19, 52, 119
- application shortcut keys *See* Keys, application shortcut keys
- Control menu 23
- keyboard shortcut reference 34
- Switch To command 23
- Task List 23

System

- accounts, specifying for service startup 178
- auditing events 379
- configuration
 - changing settings 338–339
 - customizing with Control Panel 110
 - device driver settings 134
 - overview 12–14
 - setting system devices 139
 - system settings in user profiles 345

System (*continued*)

- correcting faulty device driver installation 342
- default services provided 175
- environment variables *See* Environment variables
- mail system *See* Mail, system
- maintaining, overview 338
- performance *See* Optimizing performance; Performance; Performance Monitor
- restoring
 - using last known good configuration 346, 475
 - with Emergency Repair disk 346–348, 428, 475
- time *See* Time
- Windows NT system requirements xix
- SYSTEM.INI 316

T

Tape drives *See* Backing up; Backup tapes; Drives, tape drives

Task List

- keyboard shortcut reference 34
- managing windows and icons 23
- Schedule+ Task list *See* Schedule+, Task list

TCP/IP

- checksum 512
- configuring TCP/IP 516–521
- default gateway 514
- DNS connectivity 519–521
- example of packet delivery 514–515
- FTP Server service *See* Services, FTP Server service
- host IDs 513
- installing TCP/IP 515–516
- IP addresses 513
- network IDs 513
- ping utility 521
- port IDs 512
- sequence numbers 512
- SNMP service
 - agent information 526–527
 - configuring 522–524
 - configuring security 524–525
 - installing 521–522
- subnet masks 513
- TCP headers 512
- TCP/IP protocol, description 156, 510–514
- TCP/IP utilities reference 274
- troubleshooting IP connections 521

Threads 442

Time

- changing document printing hours 207
- customizing display 126

Time (continued)

- setting
 - hours a printer is available 191
 - system time 125–127
 - time zone 125
- time formats 126
- time-out options for printers 195

Time intervals

- default for sending power failure messages 147
- displaying list of operating systems at startup 141
- Performance Monitor alert monitoring interval 461

Titles

- preventing icon titles from overlapping 117
- specifying window titles with Program Manager 327

Transferring information

- between applications 31
- between command prompt windows 280–282
- between documents 280–282, 299
- with ClipBook Viewer 299

Troubleshooting

- alternate operating system 476
- hardware configuration 472–473
- hardware interrupt levels 480–481
- I/O port base addresses 481
- IP connections when installing TCP/IP 521
- logging on 476
- memory buffer addresses 481
- network adapter cards 473, 478–481
- network problems 477–481
- OLE 310–312
- performance problems 477
- removing NTFS partitions 482
- restoring your system 346
- services or subsystems not starting 482
- starting Windows NT 474–476
- Windows NT installation 473

TrueType fonts 121–123**TSR programs *See* MS-DOS, memory-resident programs****Turning off your computer 5, 39****U****Uninterruptible Power Supply *See* UPS****UPS**

- battery low power warning 146
- command file executed prior to system shutdown 148–149
- configuring 145–148
- testing configuration 149
- UPS service 146, 175

User accounts

- Account policy 16, 374
- adding
 - procedure 353–356
 - to local groups 372
- Administrator account 352
- built-in user accounts, description 352–353
- creating 354–356
- deleting 364–365
- description 14
- Directory Replicator service *See* Directory replication
- disabling 364–365
- Guest account 352
- Initial User account 353
- Mail accounts *See* Mail, accounts
- managing 351–364
- modifying 356–358
- online demonstration 4
- passwords *See* Passwords
- permissions *See* Permissions
- renaming 365
- setting up 14, 497
- specifying for service startup 178
- User Rights policy 376–378

User environments

- changing variables 141–142
- user environment profiles 363
- viewing variables 140

User Manager

- authorized users 351
- configuring user environment profiles 363
- disabling or deleting user accounts 364–365
- managing
 - Account policy 374
 - Audit policy 379–380
 - group memberships 359–364
 - groups 366–374
 - profiles 361–364
 - security policies 374–380
 - user accounts 351–364
 - User Rights policy 376–378
- overview 350

User profiles

- copying 355
- deleting 345
- description 345
- home directories *See* Directories, home directories
- logon script names 361
- managing with User Manager 361–364
- user environment profiles 363

Username, unique identifier used at logon 3, 353

Users

- adding to auditing or permissions list 96–104
- adding to printer permissions list 197–198
- auditing events 379
- communicating with other users, online demonstration 4
- disconnecting from servers 165
- granting permissions to groups rather than to users 356
- group memberships
 - copying 355
 - global groups 367
 - local groups 366
 - managing 359–364
- Initial User account 353
- mail accounts *See* Mail, accounts
- mail message files *See* Mail, message files
- passwords *See* Passwords
- permissions *See* Permissions
- Power Users group 369
- user accounts *See* User accounts
- user environments *See* User environments
- user names 353
- user profiles *See* User profiles
- user rights *See* Rights
- Users group 369
- viewing user sessions 164–165

V

Variables, environment *See* Environment variables

Version

- OLE restrictions 308
- viewing version information in File Manager 84

Virtual memory paging files *See* Paging files

Volumes

- assigning drive letters 425
- boot partitions 424
- deleting mirror sets 429
- deleting 427
- description 420
- extending 432
- formatting 423
- formatting new partitions 417
- labeling new volumes 423
- mirror sets *See* Mirror sets
- number possible in Windows NT 425
- stripe sets *See* Stripe sets
- volume sets
 - caution when installing Windows NT 489
 - creating 430–432
 - deleting 432

Volumes, volume sets (*continued*)

- description 430
- extending 432
- formatting new partitions 423
- maximum number of disks 431
- operating system restrictions 430
- restoring 428–429
- volume sizes 431

W

Wallpaper, desktop 117

WGPOs *See* Mail, WGPOs

Wildcards, searching for filenames 11, 69

WIN.INI 316

Windows

- active window, description 19
- application windows, displaying Control menu with ALT+SPACEBAR 23
- command prompt windows *See* Command prompt, windows
- desktop windows 118
- document windows
 - description 21
 - displaying Control menu with ALT+HYPHEN 23
- fast application switching 19, 24, 52, 119
- keeping pop-up programs easily available 320
- keyboard shortcut reference 34
- managing 19–21
- managing with Task List 23
- maximizing or minimizing 20
- moving 20
- printer windows 180
- Program Manager group windows 39, 41–42
- restoring 20
- scrolling contents 20
- sizing 20
- specifying titles with Program Manager 327

Windows 3.1

- configuring existing Windows environment when installing Windows NT 316
- migrating settings when installing Windows NT 500
- virtual memory 315

Windows 3.1-based applications

- environment 315
- run by Windows NT 314
- running from command prompt 259
- setting up 322–323
- starting automatically 52
- virtual memory 315

Windows NT

- adding components 343–345
- additional information xxi
- documentation xxi
- Driver Library 341
- Executive, description 314
- features xviii
- overview xviii
- removing non-essential components 343–345
- subsystems 314
- system requirements xx
- tools for configuring and monitoring the network 8
- vs. Windows for MS-DOS xix

Windows NT Locator 162, 175**Workgroups**

- description 9, 157
- joining
 - after Setup 9
 - during Setup 496
 - with Control Panel 157–158
- scheduling tool *See* Schedule+
- workgroup postoffices (WGPOs) *See* Mail, WGPOs

Workstations

- Audit policy 379–380
- group memberships
 - global groups 367
 - local groups 366
 - managing 359–364
- home directories *See* Directories, home directories
- logon scripts *See* Logon scripts
- managing user rights 376–378
- remote workstations
 - See also* Remote Access Service (RAS)
 - joining a domain 159
- user profiles *See* User profiles
- viewing events 404

X**X86-based computers**

- boot configuration 13, 424
- disk-partitioning schemes, examples 420
- guidelines for disk partitions 489
- important files copied during Setup 499
- installing Windows NT 485–486
- OS/2 applications 314, 320
- partitions 424
- restoring the system with Emergency Repair disk 347, 428, 475
- running MS-DOS-based applications under Windows NT 316, 331

X86-based computers (*continued*)

- running Windows NT Setup 485–486
- setting up Windows NT master files on a server 500–502
- standard IRQ assignments 480
- system partitions 419, 424, 426
- troubleshooting Windows NT installation 473
- Windows NT system requirements xx

Microsoft Windows NT Operating System Version 3.1 5.25" High-Density (1.2 MB) Disk Offer

Your Microsoft® Windows NT™ package includes 3.5" and 5.25" boot disks, 3.5" high-density (1.44 MB) disks, and a CD-ROM disc. If your system can use only 5.25" high-density disks (i.e., you do not have a 3.5" drive), please follow the instructions below, enter the appropriate information on the order coupon, and send this coupon plus your Windows NT registration card (if you haven't already sent it in) to the address below, or to your local Microsoft subsidiary. **In the United States**, there is no charge for ordering 5.25" high-density disks. Limit one disk set per coupon. **Outside the United States**, please contact your local Microsoft subsidiary for pricing information and availability. *No photocopies or facsimiles of this order coupon will be accepted.*

Please print your name, shipping address, and phone number.

Name

Company name (if company licenses product)

Shipping address

City

State/Province

Country

ZIP code/Postal code

()

Daytime phone (in case we have a question about your order)

Please send in the completed coupon and your registration card.

In the United States:

Microsoft Windows NT Disk Offer
P. O. Box 3023
Bothell, WA 98041-3023

Outside the United States:

Refer to the Microsoft Subsidiary Information card enclosed to contact your local Microsoft subsidiary

If you have any questions about this offer, in the United States call Microsoft Sales and Service at (800) 426-9400 before returning this coupon. In Canada call (800) 563-9048. If you require TDD/TT services for the deaf and hard of hearing, call (206) 635-4948 in the United States and (416) 568-9641 in Canada. Outside the United States and Canada, contact your local Microsoft subsidiary. **Please allow 2 to 4 weeks for delivery upon receipt of this order by Microsoft. OFFER EXPIRES MAY 31, 1994.** This coupon is not transferable.

Microsoft is a registered trademark and Windows NT is a trademark of Microsoft Corporation.

Kit No. 236-073-050

Microsoft®

Microsoft Windows NT Remote Access Service Client Disk Offer

The Microsoft® Windows NT™ operating system includes the Remote Access Service which enables an MS-DOS®, Windows™, or Windows NT-based computer to connect from remote locations. Additional client software is needed for MS-DOS- and Windows-based computers to dial in. The Remote Access Service Client software installs on Microsoft Network Clients, LAN Manager-, and Windows™ for Workgroups-based computers.

If you do not currently have this software and would like to receive it, use this coupon to order (both 3.5" and 5.25" high-density disks). Please follow the instructions below, enter the appropriate information on the order coupon, and send this coupon plus your Windows NT registration card (if you haven't already sent it in) to the address below or to your local Microsoft subsidiary. **In the United States**, there is no charge for ordering the Remote Access Service Client software. **Outside the United States**, please contact your local Microsoft subsidiary for pricing information and availability. Limit one disk set per coupon. *No photocopies or facsimiles of this order coupon will be accepted.*

Please print your name, shipping address, and phone number.

Name

Company name (if company licenses product)

Shipping address

City

State/Province

Country

ZIP code/Postal code

()

Daytime phone (in case we have a question about your order)

Please send in the completed coupon and your registration card.

In the United States:

Microsoft Windows NT Remote
Access Service Client Disk Offer
P. O. Box 3023
Bothell, WA 98041-3023

Outside the United States:

Refer to the Microsoft Subsidiary Information
card enclosed to contact your local Microsoft
subsidiary

If you have any questions about this offer, in the United States call Microsoft Sales and Service at (800) 426-9400 before returning this coupon. In Canada call (800) 563-9048. If you require TDD/TT services for the deaf and hard of hearing, call (206) 635-4948 in the United States and (416) 568-9641 in Canada. Outside the United States and Canada, contact your local Microsoft subsidiary. **Please allow 2 to 4 weeks for delivery upon receipt of this order by Microsoft. OFFER EXPIRES MAY 31, 1994.** This coupon is not transferable.

Microsoft and MS-DOS are registered trademarks and Windows and Windows NT are trademarks of Microsoft Corporation.

Kit No. 227-073-055

Microsoft®

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399

Microsoft®



Recyclable Paper™



* 3 6 3 2 7 *