HP 9000 Networking

NetWare® 4.1/9000
Supervising the Network

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Preface

Supervising the Network has two purposes:

- To help you set up your NetWare® network after completing the NetWare® 4.1/9000 NetWare Services installation procedure

- To help you manage your NetWare network after you have installed NetWare® 4.1/9000 NetWare Services.

This manual is to be used by network supervisors or system administrators responsible for maintaining all or part of a UnixWare 2.1 NetWare Services network.

Overview

Supervising the Network is organized to help you take advantage of your networking experience. It provides quick access to utility instructions while allowing a more detailed study of the theory and concepts behind NetWare® 4.1/9000 NetWare Services.

Once you are ready to work with the NetWare utilities, you can find step-by-step instructions for those utilities.

- The graphical NetWare Administrator utility is available for users of Microsoft* (MS) Windows (referred to as Windows in this manual).

- The NETADMIN, FILER, and PARTMGR text utilities are the DOS equivalent to the NetWare Administrator utility.

- The HP-UX command line is used for administering nwcm and other NetWare utilities.

Before You Begin

All of the tasks described in this manual are intended primarily for use by a NetWare network supervisor on an HP-UX 9000 system. Other users with sufficient rights can also perform these tasks.

For a definition of user types and a listing of rights and what they allow, see Chapter 3, "Managing the NetWare Services File System," in this manual.

Also, make sure you have installed and set up NetWare® 4.1/9000 and gone through the complete installation procedures for the NetWare® 4.1/9000

NetWare Services product. This includes running the required Directory Services Install (DS_Install) utility and creating your client diskettes (if desired). See *Installation Handbook* for complete instructions..

Before moving to other areas of this manual, we suggest you take a few minutes to read all of this preface; then read through the Table of Contents to understand the layout of this manual, and finally read Chapter 1, "Getting Started," to ensure that you have followed all of the appropriate steps before you begin to administer your NetWare network.

Checklist for Installing and Setting Up Your Network

To set up your NetWare® 4.1/9000 NetWare Services network, use the manuals in your NetWare® 4.1/9000 NetWare Services set in the order shown in the following checklist. (Chapter-only references refer to chapters within this manual.)

- Install the server and client software. See *Installation Handbook* for instructions.

- Understand NetWare Directory Services™ (NDS™) by reading *Introduction to NetWare Directory Services*.

- Set up NDS objects, such as organizations, groups, and user accounts. Chapter 2, "Setting Up and Managing NetWare Directory Services Objects," which gives you information and procedures about objects.

- Set up your NetWare protocol stacks and networking environment. See Chapter 7, "Maintaining the NetWare Server," for information.

- Set up your file system and install network applications. Chapter 3, "Managing the NetWare Services File System," contains the planning guidelines and instructions for creating directories and installing applications.

- Plan and create login scripts if desired. Chapter 5, "Customizing the User Environment," explains the types of login scripts you can create for network users.

- Set up printing. See *Print Services* for information and instructions.

Managing Your Network

After setting up your NetWare network, use this manual to help you keep your network updated and running efficiently.

This manual will help you perform such routine tasks as managing your NetWare Directory database and its associated objects, maintaining your

NetWare file system, and setting up your NetWare servers.

Software Requirements

- NetWare® 4.1/9000
- NetWare® 4.1/9000 NetWare Services
- DOS, Win 95, Win 3.11 and NT on the client

Other Requirements

Unless otherwise stated, all tasks documented in this manual are intended for a user having the Supervisor object right to the Root object and to the Server object for native NetWare, plus System Owner permissions for configuration.

Contents

Contents

Contents

Contents

Contents

Contents

Contents

5 Customizing the User Environment

Contents

Contents

Contents

Contents

Contents

1

Getting Started

Introduction

This chapter briefly explains the NetWare Directory Services™ (NDS™)
scenerio and what objects exist in the NDS tree immediately after you install
NetWare® 4.1/9000 NetWare® Services (NetWare Services). It also
explains how to set up users on HP-UX.

Setting Up Your Network

Before you can fully manage NetWare Services, we suggest that you perform these tasks:

- Install NetWare Services (as described in Installation Handbook).

- Run */opt/netware4/bin/dsinstall* to install the NDS database (as described in Installation Handbook).

- Ensure that the server is up and running (as described in Installation Handbook).

- Create client diskettes to install on each DOS, Windows 3.11, Win 95, or NT client (as described in Installation Handbook).

- Set up users on the network (as described later in this manual).

- Set up the network printers (as described in Print Services).

- Install and start the NetWare Administrator graphical utility for Windows 3.11, Win 95, or NT or the NETADMIN text utility for DOS (as described in later in this chapter).

- Create your container and leaf objects (as described later in this manual).

- Configure your NetWare server and network using NetWare Setup on HP-UX (as described later in this manual).

Administrator Status

As a network administrator, you will find the tasks in this manual require not only ADMIN status when working in NetWare, but also superuser status when using HP-UX:

- From a DOS or Windows client connected to NetWare, you will be using utilities such as NetWare Administrator, NETADMIN, FILER, and so on, to do network administration.

- From an HP-UX server, you will be using SAM, and other options to configure NetWare to run with HP-UX. To ensure that you are the System Owner or have System Owner privileges, see User Setup in the System Owner Handbook. This describes what privileges are necessary to administer HP-UX. If you installed NetWare® 4.1/9000 on your system, and you are designated as the superuser, you have the required privileges.

About Objects

Refer to the sections in Chapter 2, "Setting Up and Managing NetWare Directory Services Objects," for basic tasks on

- Creating and managing objects, such as Users, Groups, Organizational Roles, and Profiles.

- Searching for objects.

- Moving, deleting, and renaming objects.

- Changing properties of objects.

You can use either the NetWare Administrator graphical utility or the NETADMIN text utility to perform the tasks. Both methods are explained in detail in Chapter 2.

After Installing NetWare Services

Table 1-1 lists the objects that exist in a Directory tree immediately after you install NetWare Services and the default rights those objects have.

Table 1-1   **Default Objects and Rights in a Directory Tree**

Default objects after installation	Default rights after installation
NetWare Server object for the server on which NetWare Services was installed.	User object ADMIN has the Supervisor object right to the NetWare Server object, which means that the User object ADMIN also has the Supervisor right to the root directory of the file system of all volumes attached to the server.
Volume object SYS:.	The container object for Volume object SYS: is granted Read and File Scan rights to the volume's SYS:PUBLIC directory. This means that when users are created, they can access utilities located in the SYS:PUBLIC directory.
Volume objects for any other volumes on the server's disk besides SYS: that you created during installation.	Root is granted the Read property right to the property's Host Server Name and Host Resource on all Volume objects. This means that all objects in the Directory tree have access to the physical volume name and the physical server name.
	User object ADMIN has the Supervisor right to the root directory of the file systems on these volumes.

Table 1-1   **Default Objects and Rights in a Directory Tree**

Default objects after installation	Default rights after installation
User object ADMIN.	User object ADMIN receives a trustee assignment of Supervisor object right to the Root object of the Directory tree; therefore, the User object ADMIN has all rights to all the objects in the Directory tree.
When the User object ADMIN is first created, it is placed in the Organization container object by default. This may not be the same context in which you installed the server.	
	The User object ADMIN also has the Supervisor object right to the NetWare Server object; therefore, the User object ADMIN has the Supervisor right to the root directory of the file system of all volumes attached to the server.
	Public has the Browse object right at the root. Users who are attached to a NetWare Directory Services server, but who are not authenticated, can browse the tree.Users are granted all rights to their home directories, which are migrated when you migrate User objects.

Figure 1-1 shows objects in a sample Directory tree after you have installed a NetWare Services server (named TSERVER).
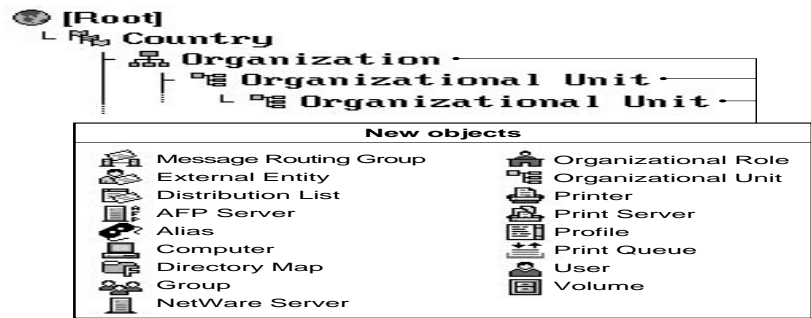
Figure 1-1   **Example of a New Directory Tree**

TSERVER is a newly installed NetWare Services server and was placed in the context TEST.MEDTEC (that is, in the Organizational Unit TEST which is in the Organization MEDTEC).

The Volume object TSERVER_SYS was created by default, and the Volume object TSERVER_PROJECTS was defined by the network supervisor during installation.

Setting Up Administration Utilities

The first time the network supervisor logs in, it must be as the User object ADMIN. This is the only object, after installation, that has rights to create and manage objects.

Before you can log in, however, you must first use the instructions in this section to install a single client workstation from which you can run either NetWare Administrator or NETADMIN to start creating objects on your network. You can install and customize other workstations later using the appropriate client manual.

If you want to	Go to
Create workstation installation diskettes from CD-ROM	"Creating Client Install Diskettes from CD-ROM"
Install a Windows workstation	"Installing a Windows Workstation and Starting NetWare Administrator"
Install a DOS workstation	"Installing a DOS Workstation and Starting NETADMIN"

Creating Client Install Diskettes from a Network Device

You can create disks using a network device.

Procedure

1 For DOS or Windows, format five high-density diskettes using the DOS FORMAT command.

2 Map a drive to a server directory containing the NetWare Services files and change to the SYS:PUBLIC\CLIENT directory.

3 Change to one of the following subdirectories.

If creating diskettes for	Go to this subdirectory
DOS	DOSWIN

If creating diskettes for	Go to this subdirectory
Windows	DOSWIN

4 If you are installing a language version other than English (the default language), set the "nwlanguage" environment variable by typing the following at the workstation command line:

```
SET NWLANGUAGE=language <Enter>
```

Replace language with the appropriate language found in the NLS subdirectory under either CLIENT\OS2 or CLIENT\DOSWIN.

5 Type

```
MAKEDISK drive_letter: <Enter>
```

Replace drive_letter with the letter that represents the driver into which you will insert the blank formatted diskettes. For example, type either

```
MAKEDISK A: <Enter>
```

or

```
MAKEDISK B: <Enter>
```

The MAKEDISK utility copies the client installation files from the CD-ROM directory to the diskettes. It prompts you to insert new empty formatted diskettes.

6 Attach a label to each diskette and label the diskettes as described in Table 1-2.

Table 1-2   **Client diskette labels**

Diskette number	Label for DOS/Windows	Label for OS/2
1	NetWare Client for DOS and MS Windows Disk 1	WSOS2_1
2	NetWare Client for DOS and MS Windows Disk 2	WSOS2_2
3	NetWare Client for DOS and MS Windows Disk 3	WSOS2_3
4	NetWare Client for DOS and MS Windows Disk 4	OSUTIL1

Table 1-2   **Client diskette labels**

Diskette number	Label for DOS/Windows	Label for OS/2
5	NetWare Client for DOS and MS Windows ODI LAN drivers	OS2DOC_X 1=English 2=French 3=German 4=Italian 5=Spanish
6		WSDRV_1
7		VLMBOOT (optional)

7 Save these diskettes until you are ready to install client software.

Installing a Windows Workstation and Starting NetWare Administrator

If you want to use the NetWare Administrator graphical utility to set up your network, follow these instructions to first install Windows software on the workstation. Then continue with this section.

Prerequisites

- A workstation cabled to the network and running Windows 3.1

- At least one NetWare Services server installed

- The WSDOS_1, WSWIN_1, WSDRV_1 and WSDRV_2 diskettes

- 1.2 MB of free disk space on the workstation

Procedure

1 Insert the WSDOS_1 diskette into your workstation's disk drive.

2 Load the client installation program by typing

```
drive:install <Enter>
```

Replace drive with the letter of your workstation's disk drive.

3 Follow the installation instructions on the workstation screen.

Use the arrow keys to move between the fields. Press <Enter> to modify a particular field.

Because this workstation is being installed to get you started with the network setup, you can do a standard installation with the default settings and configure other options later.

4 Exit the installation program.

5 Reboot your workstation.

In order for your modifications or new installation to function, you need to reboot your workstation.

6 From the network drive F:, use the LOGIN command to log in to the network as ADMIN.

The LOGIN command must include your context. Depending on the Directory tree structure you set up for the server during installation, use the name typing sequence of Common Name, Organizational Unit, Organization, and Country.

For example, if you installed this server in an Organization called ABC_INC, with no Organizational Unit or Country defined in the Directory tree, you would type

```
LOGIN .ADMIN.ABC_INC <Enter>
```

For more information on the LOGIN syntax and options, see "LOGIN" in Utilities Reference.

7 Enter a password if prompted; then press <Enter>.

8 Map the next network drive to the PUBLIC directory of Volume SYS: by typing

```
MAP N SYS:PUBLIC <Enter>
```

9 Change to the network drive that is mapped to the PUBLIC subdirectory.

For example, if you mapped network drive Z:, you'd type

```
Z: <Enter>
```

10 Start Windows.

11 Select the NetWare program group or another program group you want to start the NetWare Administrator from.

12 From the "Program Manager File" menu, choose "New."

13 Select "Program Item."

14 Choose "OK."

15 Enter "NWADMIN" in the "Description" field and press <Tab>.

16 Choose "BROWSE."

17 From the "Drives" drop-down list, select the drive that points to SYS:PUBLIC.

18 From the list under "File Name," select NWADMIN.EXE and choose "OK."

The path to the executable file is placed in the "Command Line" text box.

19 Again, choose "OK," and then choose "Yes."

The NetWare Administrator is created as a program item icon in the group you selected.

You can now use the NetWare Administrator graphical utility to complete your network setup.

20 To start NetWare Administrator, choose the "NWADMIN" icon.

21 Before exiting Windows, from the "Options" menu, select "Save Settings on Exit."

Additional Information

For more information about	Refer to
Installing MS Windows workstation software	NetWare Client for DOS and MS Windows User Guide
Using NetWare Administrator	"NetWare Administrator" in Utilities Reference
Logging in	"LOGIN" in Utilities Reference

Installing a DOS Workstation and Starting NETADMIN

If you want to use text utilities, such as NETADMIN, to set up your Directory tree, follow these instructions to install DOS workstation software.

Prerequisites

- A workstation cabled to the network and running DOS 3.30 or later

- At least one NetWare Services server installed

- The WSDOS_1, WSWIN_1, WSDRV_1, and WSDRV_2 diskettes

- 1.2 MB of free disk space on the workstation

Procedure

1 Insert the WSDOS_1 diskette into the workstation's disk drive.

2 Load the INSTALL.EXE program by typing

```
drive:install <Enter>
```

Replace drive with the letter of your disk drive.

3 Follow the instructions on your screen.

NOTE:

Use the arrow keys to move between the fields. Press <Enter> to modify a particular field.

Because this workstation is being installed to get you started with the network setup, you can do a standard installation with the default settings and configure other options later.

4 Exit the installation program.

5 Reboot your workstation.

In order for your modifications or new installation to function, you need to reboot your workstation.

6 From the network drive F:, use the LOGIN command to log in to the network as ADMIN.

The LOGIN command must include your context. Depending on the Directory tree structure you set up for the server during installation, use the name typing sequence of Common Name, Organizational Unit, Organization, and Country.

For example, if you installed this server in an Organization called ABC_INC, with no Organizational Unit or Country defined in the Directory tree, you would type

```
LOGIN .ADMIN.ABC_INC <Enter>
```

For more information on the LOGIN syntax and options, see "LOGIN" in Utilities Reference.

7 Enter a password if prompted; then press <Enter>.

8 Map the next network drive to the PUBLIC directory of volume SYS: by typing

```
MAP N SYS:PUBLIC <Enter>
```

9 Change to the network drive that is mapped to the PUBLIC subdirectory.

For example, if you mapped network drive Z:, you'd type

```
Z: <Enter>
```

You can now use text utilities such as NETADMIN to complete your network setup.

10 To start the NETADMIN utility, type

```
NETADMIN <Enter>
```

Additional Information

For more information about	Refer to
Installing DOS workstation software	NetWare Client for DOS and MS Windows User Guide
Logging in	"LOGIN" in Utilities Reference
NETADMIN text utility	"NETADMIN" in Utilities Reference

How Clients Can Access NetWare

Even though most of this manual discusses how to configure and manage servers, an overview of NetWare access may be helpful. Since the clients available with NetWare Services are DOS, Windows 3.11, Win 95 and NT, , the following items briefly explain how to get to NetWare from a client machine.

- NetWare Services. This allows NetWare clients to access HP-UX resources while maintaining their NetWare environment.

- NUC. This allows NetWare clients to access NetWare resources while maintaining their NetWare environment. See *Managing NUC Connectivity* or *System Owner Handbook* for information.

- NVT. This allows DOS and Windows clients to establish a NetWare remote login session and access NetWare resources in a NetWare environment. See *Managing NUC Connectivity* for information.

The tasks these clients can do with files and directories is described in Chapter 3, "Managing the NetWare Services File System."

2

Setting Up and Managing NetWare Directory Services Objects

Introduction

This chapter helps you set up and start managing your network objects after installing NetWare® 4.1 Services.

The sections in this chapter explain basic "getting started" tasks, including these:

- How to create and manage objects, such as Users, Groups, Organizational Roles, and Profiles
- How to search for objects
- How to move, delete, and rename objects
- How to change properties of objects

You can use either NetWare Administrator or NETADMIN. Both methods are explained in this chapter.

Rights Needed to Create and Manage Objects

As User object ADMIN, you initially have all rights to all objects in the Directory tree. However, if you allow users to manage parts of the Directory tree, you need to give them the rights necessary to manage their section of the tree.

Trustee Assignments

When you give an object, such as a user, rights to another object, such as a container, you make a trustee assignment. That user then becomes a trustee of that container. Any object with a trustee assignment to another object is a trustee of that object.

Each object contains a list of objects that have trustee assignments to it, called a trustee list. This list tells who can access that object. An object's trustee list is stored in its Access Control List (ACL) property.

Inherited Rights Filter

The Inherited Rights Filter (IRF) controls the rights that a trustee can inherit from parent directories and container objects. By default, the IRF allows every right to be inherited from the parent directory or container object.

The IRF cannot grant rights; it can only allow or revoke rights.

Security Equivalence

Security Equal To is a property of every User object that lists other objects. The user is granted all rights that any object (such as User, Group, or Printer) in that list is granted, both to objects and to files and directories.

Use the Security Equal To property to give a user temporary access to the same information or rights another user has access to.

For more information on Security Equal To, see "Security Equal To" in *Concepts*.

Types of Rights

Four kinds of rights exist in NetWare 4.1:

- **Object rights** control what a trustee can do with an object. These rights control the object as a single piece in the Directory tree, but do not allow access to information stored within that object (unless the Supervisor object right is granted).

- **Property rights** control a trustee's access to information stored within the object—that is, the information stored in the object's properties. Each object has several properties: Supervisor (grants all rights to the property), Compare (grants the right to compare property values), Read (grants the right to read the property values), Write (grants to right to add, change, or remove property values), or Add or Delete Self (grants the right to add or remove itself as a property value).

- **Directory rights** control what a trustee can do with a directory. Directory rights also apply to files in the directory unless explicit file rights are granted and the file's Inherited Rights Filter doesn't block the directory rights from flowing through.

- **File rights** control what a trustee can do with a file.

In bindery-based versions of NetWare, you could assign only directory and file rights. In NetWare Services, you can also assign rights to an object and to properties belonging to an object.

This section discusses only object rights and property rights.

Object and property rights are assigned separately so that you can control access to the pieces of information (or properties) contained in the object.

Any object to which you grant sufficient rights can make trustee assignments using NetWare Administrator or NETADMIN. This section discusses the rights that are needed to make various types of trustee assignments within NDS.

Directory rights and file rights apply only to the file system. For a discussion of these rights, see Chapter 3 ,"Managing the NetWare Services File System."

| *NOTE:* | In addition to the rights mentioned previously, NetWare® 4.1/9000 has its own security. The discussion of rights in this chapter is limited to those rights inherent to NetWare Services. For information about how these two sets of security work together see Chapter 3, "Managing the NetWare Services File System." |

Object Rights

Object rights control what trustees can do with the object of which they are a trustee. Object rights control the object as a single piece in the Directory tree, but do not allow the trustee to access information stored in that object's properties (unless the Supervisor object right is granted).

Table 2-1 lists and describes the object rights that you can assign to a trustee.

Table 2-1   **Object Rights**

Right	Description
Supervisor	Gives the network supervisor all rights to the object and to all its properties. However, the Supervisor object right can be blocked by the Inherited Rights Filter (IRF) below the object where the Supervisor right is granted.
Browse	Allows the trustee to see the object in the Directory tree. Also when the trustee searches for a value that matches the object, Browse allows that object to be listed.
Create	Allows the trustee to create a new object within a container object. Applies only to container objects because leaf objects cannot contain other objects.
Delete	Allows the trustee to delete an object from the Directory tree. You cannot, however, delete a container object unless all the objects in the container are deleted first.
Rename	Allows the trustee to change the name of the object, in effect, changing the naming property. This changes what the object is called when it is a part of complete names.

Property Rights

Object rights do not allow trustees to see the information stored in the object's properties. Property rights are required to read the information in an object's properties. Property rights control access to each property of an object.

For example, if you include a private telephone number as a property for a User object, you can use property rights to prevent others from seeing that telephone number. At the same time, you can use property rights to allow other properties, such as Address or Fax Number, to be viewed.

Table 2-2 lists and describes property rights that you can assign to a trustee.

Table 2-2   **Property Rights**

Right	Description
Supervisor	Gives all rights to the property. You can block the Supervisor property right with an Inherited Rights Filter.
Compare	Allows the trustee to compare any value with an existing value of the property. The comparison can return True or False, but cannot give the value of the property.
Read	Allows the trustee to read the values of the property. This right includes the Compare right; that is, if the Read right is given, Compare operations are allowed also.
Write	Allows the trustee to add, change, or remove any values of the property. The Write right implies the Add or Delete Self right. Giving the Write right to the ACL property is the same as giving the Supervisor right to the object.
Add or Delete Self	Allows the trustee to add or remove itself as a value of the property, but not to change any other values of the property. This right is only used for properties where a User object can be listed as a value, such as group membership lists or mailing lists. The Write right includes the Add or Delete Self right.

See the following references for more detailed information.

Additional Information

For more information about	Refer to
Access Control List	"Access Control List" in *Concepts*
Container and leaf objects	"Object" in *Concepts*
Trustees and rights	"Security" in *Concepts*

Managing Trustee Assignments to Objects

An object that is granted rights to work with another object is called a trustee of the object. Through trustee assignments you determine what level of rights you want trustees to have on the objects to which they are assigned.

For example, to make user KSMITH a trustee of Organizational Unit MARKETING, go to the Organizational Unit MARKETING and add KSMITH as a trustee, giving KSMITH whatever object and property rights you think are sufficient.

KSMITH's trustee assignment to MARKETING overrides any other rights that KSMITH may have inherited or received through security equivalence.

You can manage trustee assignments to objects by using either NetWare Administrator or NETADMIN. Both procedures are described in this section.

Additional Information

For more information about	Refer to
Inherited Rights Filter	"Inherited Rights Filter" in *Concepts*
Rights	"Rights" in *Concepts*
Security	"Security" in *Concepts*
Trustees	"Trustee" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Supervisor object right to the object to which trustees are to be assigned

Procedure

1 From the Windows Program Manager, choose the "NetWare Administrator" icon.

2 Select the object to which you want to assign trustees.

3 Right-click and choose "Trustees of this Object," or, from the "Object" menu, choose "Trustees of this Object."

All the trustees of this object are listed in the "Trustees" box.

From the "Trustees" dialog, you can

- View or change a trustee's effective rights to this object.

- Add a trustee to this object.

- Delete a trustee from this object.

- Change the object rights of a trustee.

- Change the property rights of a trustee.

- View or change the Inherited Rights Filter (IRF) of this object.

4 For instructions on completing any of the previous procedures, press the "Help" button and then select one of the procedures from the list.

Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Supervisor object right to the object to which trustees are to be assigned

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NETADMIN Options" menu, choose "Manage Objects."

3 Browse the Directory tree until you see the object you want to assign trustees to.

Use the instructions at the bottom of the screen to browse the directory. Press <F1> for help.

4 When the desired object appears in the "Object, Class " list, select it and press
    <F10>.

5 Select "View or Edit the Trustees of This Object."

From the "Trustees of This Object" menu you can

- Set the Inherited Rights Filter (IRF).

- Add or change trustee assignments.

- View the effective rights for a trustee.

6 From the "Trustees of This Object" menu, select one of the options.

For instructions on completing a procedure, press <F1>.

Creating Container Objects

You can create container objects using either NetWare Administrator or NETADMIN. Both of these methods are described in this section.

Considerations for naming container objects and suggestions for creating searchable objects are also described here.

Types of Container Objects

The kinds of container objects you can create are Country, Organization, and Organizational Unit. The top object, called Root, is created by default, and is placed at the top of the Directory tree when NetWare Services is installed.

Container objects form the top levels of the Directory tree. Use them to manage and organize the top level of the Directory tree.

For more information about planning the top levels of your Directory tree, see chapter 2, "Understanding NetWare Directory Services" in *Introduction to NetWare Directory Services*.

Figure 2-1 shows the hierarchy of container objects and leaf objects in NetWare Directory Services. (The icons represent the leaf objects as they appear in NetWare Administrator.)
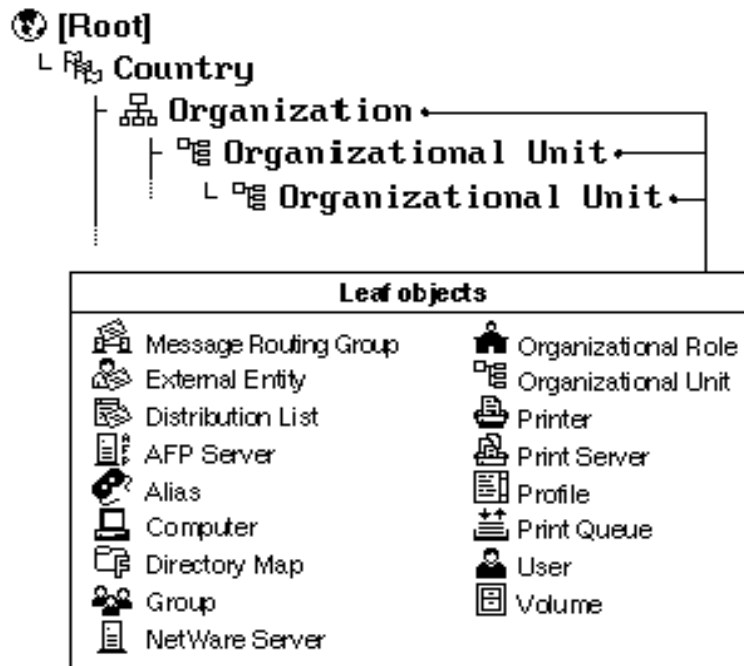
Figure 2-1   **Hierarchy of Objects**

You can create leaf objects only under the Organization and Organizational Unit container objects.

Table 2-3 describes each container object you can create and when to use it.

Table 2-3   **Container Objects You Can Create**

Container object	Description	When to use it
Country	Designates the countries where your network resides and organizes other objects within the country. You must always include the name type of the object in complete names when you include the Country container object in your Directory tree. Even when you refer to objects located in the same container object, you must designate the name type (CN, OU, or O) of the object.	This object is optional. If you choose to create a Country object, you can use it to represent the country where your organization headquarters resides or, if you have a multinational network, to represent each country that is a part of your network. You can create a Country container object only under the Root object.
Organization	Allows you to organize other objects in the Directory, to set defaults in a login script, and to create a user template for User objects you create in this container.	You can use an Organization object to designate a corporation, or location, etc. The Organization object is mandatory. The Directory tree must include at least one of these containers. You can create an Organization object only under the Root or Country object.
Organizational Unit	Allows you to organize leaf objects in the Directory tree, to set defaults in a login script, and to create a user template for User objects you create in this container.	You can use an Organizational Unit object to designate a division, a business unit, or a project team. You can create multiple levels of Organizational Units. You can create Organizational Units in Organization objects and other Organizational Unit objects.

Naming Container Objects

Try to keep container object names short and simple. This makes it easier for users to change context and to remember their own context.

The following rules apply to most objects. For specific rules about naming leaf objects, see "Naming Leaf Objects."

Object Naming Rules

Remember these rules when naming an object:

- The name must be unique in the branch (container) of the Directory tree where the object is located.

- The object name can be up to 64 characters in length, except for Country objects, which are limited to two characters.

- You can use any special characters. But if the object needs to be accessed from a client running a version of NetWare earlier than NetWare 4.1, you should avoid using special characters. (For a list of these characters, see "Object Name Restrictions for Bindery Services.")

- You can enter object names in either uppercase or lowercase. Object names are displayed with uppercase and lowercase letters as they were first entered, but they are not case sensitive. Therefore, "ManagerProfile" and "MANAGERPROFILE" are considered to be identical names.

- You can use spaces and underscores, but they are both considered spaces. Therefore, "Manager_Profile" and "Manager Profile" are considered to be identical names.

NOTE: If you anticipate managing objects created from different code pages, you must limit object names and properties to those characters common to all the applicable code tables.

Nondisplayable Unicode* characters for your code page are represented by an ASCII 3 character (a "heart" symbol). For more information, see "Unicode" in *Concepts*.

Object Name Restrictions for Bindery Services

When you create objects to be accessed from a client running a version of NetWare earlier than NetWare 4.1, the names of the objects must follow bindery naming rules or else the non-NetWare 4.1 client will not recognize them. Object names in bindery services are interpreted as the following:

- Spaces in object names are replaced by underscores.

- Object names longer than 47 characters are cut off after the 47th character.

You cannot use the following characters in an object name that must be accessed from a client running a version of NetWare earlier than NetWare 4.1:

/ slash

\ backslash

: colon

, comma

* asterisk

? question mark

Creating Searchable Container Objects

When you create a container object, you can enter various types of information about that object into its properties, such as location and telephone. If you enter data into the containers' properties in a consistent format, it is easier to search the Directory database for a particular type of information.

Many container object properties are optional; you are not required to enter information in order to create the object. However, information in objects' properties can help you track and manage container objects.

After you create container objects, you can use NetWare Administrator, NETADMIN, or NLIST to search for and list these objects. You can also search for their various properties.

Creating Container Objects Using Directory Services Installation

When you install a NetWare Services server on a host, you are required to type a context (the pathname from the container object to the Root) in which the NetWare Server object is placed.

If you create a new context, several events happen by default:

- An Organization or Organizational Unit container object is created, depending on the context you create.

- Bindery services is set for that container object, so that the server you installed in

the container object is running bindery services.

- A read/write replica of the Directory partition where the container object resides is stored on the server that you just installed.

For more information on how to create container objects using Directory Services Install (*dsinstall*), see the *NetWare 4.1/9000 Installation and Administration Guide.*.

Creating Container Objects Using NetWare Administrator or NETADMIN

The first time the network supervisor logs in, the User object ADMIN must be used. This is the only object after installation that has rights to create and manage objects.

Before you can log in, you must first install a single workstation and run either NetWare Administrator or NETADMIN to start creating objects on your network.

You can install and customize other workstations later, using the respective client manual.

Creating Container Objects Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator
- The Create object right to the container that will contain the new container object

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select the object that will contain the new container object.

   For information on moving around in the browser and choosing objects, press <F1>.

3   Choose "Create" from the "Object" menu.

4 From the "New Object" dialog box, select the new container object class that you want.

If the container object class you want to create does not appear under "New Object," you cannot create that object in the selected container. Choose "Cancel" to return to the browser; then select a different container type.

5 Choose "OK."

The "Create Object" dialog box appears.

6 Type a name for the object in the box provided.

7 (Optional) Select "Define Additional Properties."

Select this option if you want to use the same default information in the new container as was present in the parent container. This default information is used whenever you create a new user.

The user default information for each container is stored in a User object named USER_TEMPLATE.

8 (Optional) Select "Define User Defaults."

Select this option if you want to use the same default information in the new container as was present in the parent container. This default information is used whenever you create a new user.

The user default information for each container is stored in a User object named USER_TEMPLATE.

9 Choose "Create."

10 (Optional) Choose "Yes" if you want user template properties to be inherited from the parent container, or "No" if you want to define a new user template.

11 (Optional) Add information to the object dialog pages.

If you chose "Define Additional Properties," add the information now. Press <F1> for help.

12 Choose "OK" to save the properties you have just entered in the dialog pages.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*

For more information about	Refer to
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*
Using object dialog pages in NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating Container Objects Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 and NETADMIN

- The Create object right to the object that will contain the new container object

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, choose "Manage Objects."

3 Select the container object that will contain the new container object.

The objects in the selected container are listed.

To see if you are in the right context, look at the title bar on the screen. Press <F1> for help.

4 Press <Insert>.

5 From the "Select an Object Class" screen, choose the container object class you want to create.

If the container object class you want to create does not appear, you cannot create that object in the selected container. Press <Esc> to return to the browser; then choose a different container type.

6 Type the new container object name.

7 Enter a Mailbox Location and press <Enter>.

If you are creating a Country object, you are not prompted to define a Mailbox Location or create a user template.

8 If you want to create a user template to be applied to new User objects created in this container, type "Y" and press <Enter>. If you do not want to create a user template, type "N" and press <Enter>.

The user template is a User object named USER_TEMPLATE.

A user template contains default information you can apply to users you create to give them default property values.

9 Press <F10> to save the information.

10 If you want to create another container object, choose "Yes." If you do not, choose "No" and press <Enter>.

If you choose "Yes," you are prompted to type the new container object name. Repeat Step 6 through 9, and then continue with Step 11.

If you choose "No," then after a short delay the container object is displayed in the Directory tree. Continue with Step 11.

11 To edit this object, press <F10>.

A menu appears from which you can choose to view or edit properties of this object and make trustee assignments to this object and to files and directories.

12 Choose an option from the "Actions" menu and add any necessary information.

13 To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Object properties	"Property" in *Concepts*
User templates	"Managing User Templates" in chapter 2
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Creating Leaf Objects

Leaf objects represent network resources, such as users, computers, printers, and lists. They do not contain any other objects.

You create leaf objects within a container object. Figure 2-2 lists the leaf objects you can create. (The icons represent the objects as they appear in NetWare Administrator.)

Leaf objects

	Message Routing Group		Organizational Role
	External Entity		Organizational Unit
	Distribution List		Printer
	AFP Server		Print Server
	Alias		Profile
	Computer		Print Queue
	Directory Map		User
	Group		Volume
	NetWare Server		
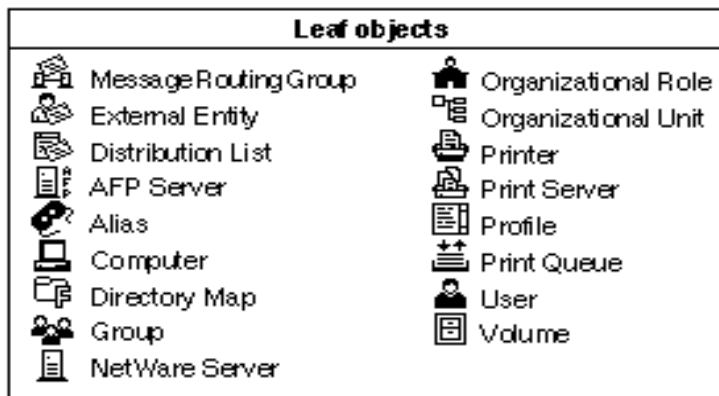
Figure 2-2　　　　　**Leaf Objects You Can Create**

NOTE:　　　　The first three leaf objects in the figure - Message Routing Group, External Entity, and Distribution List - are NetWare MHS Services objects. They appear in NetWare Administrator only if you have installed NetWare MHS Services on your NetWare server.

How to Use Leaf Objects

Table 2-4 describes in alphabetical order each leaf object you can create and when to use it.

Table 2-4   **Leaf Objects You Can Create**

Leaf object	Description	When to use
Alias	Points to another object in the Directory tree and makes it appear as if that object actually exists in the Directory tree where the alias is. Although an object appears both where it was actually created and where an alias referring to it was created, only one copy of the object really exists. If you delete or rename an alias, the object it is pointing to is not affected.	Use this object to allow easier access to an object that is in another context. For example, you can use an Alias to represent a resource, such as a special printer, that most users in the tree need to access. Also, when you move or rename a container object in a Directory tree, you have the option of creating an alias in place of the moved or renamed object. If you select this option, NetWare Administrator automatically creates the alias for you and assigns it the same name as the original object. Creating an alias in place of a moved or renamed container object allows users to continue logging in to the network and see the container objects (and the objects it contains) in its original Directory location.
Computer	Represents a nonserver computer on the network, such as a workstation or a router.	Use this object to store information about a nonserver computer, such as its network address, its serial number, or the person to whom the computer is assigned. This object has no effect on the operation of the network; it only stores information about the computer.

Table 2-4   **Leaf Objects You Can Create**

Leaf object	Description	When to use
Directory Map	Represents a particular directory in the file system. Directory Map objects can be especially useful in login scripts by pointing to directories that contain applications or other frequently used files. For example, if you have a directory that contains DOS 5.0, you will probably map a search drive to that directory in the login scripts you create. Later, if you upgrade to DOS 6.0 and rename the directory, you would have to change the mapping in every login script where that search mapping appears. With a Directory Map object, you change only the information in that one object.	Use this object to avoid making changes to many login scripts when the location of applications changes. For more information on Directory Map objects, see "Loading Operating Systems and Applications onto the Network" in Chapter 3.
Distribution List	Represents a list of mail recipients.	Use this object to simplify sending mail. For example, you could create a Distribution List object called Recreation Committee. Anyone wanting to send a message to all the members of the Recreation Committee can simply address the message to Recreation Committee, rather to each member.

Table 2-4   **Leaf Objects You Can Create**

Leaf object	Description	When to use
External Entity	Represents a non-native NDS object that is imported into NDS or registered in NDS. NetWare MHS Services use external entity objects to represent users from non-NDS directories to provide an integrated address book for sending mail.	If your messaging environment contains non-MHS servers, such as SMTP hosts, SNADS nodes, or X.400 MTAs, you might choose to add users and lists at these servers to your NetWare database as External Entities. Adding these objects to the database as external entities adds them to the address books of your messaging applications. When addressing messages, local users can choose non-MHS users and lists from a directory list.
Group	Assigns a name to a group of User objects that can be located anywhere in the Directory tree.	Create a Group object when you have many User objects that need the same trustee assignments. Rather than making many trustee assignments, you make just one trustee assignment to a Group object for all users who belong to the group.
Message Routing Group	Represents a group of messaging servers that can transfer messages directly with each other.	Create a Message Routing Group when you have two or more messaging servers that need to communicate with each other.

Table 2-4 **Leaf Objects You Can Create**

Leaf object	Description	When to use
NetWare Server	Represents a server running NetWare on your network. Stores information about the server in the NetWare Server object's properties, such as the server's address, the physical location of the server, and what services it provides. The NetWare Server object affects the network in that it is referred to by several other objects.	Use the NetWare Server object to associate the physical server on the network with the Directory tree. Without this object, users cannot access file systems that are on that server's volumes. If you have a non-NetWare 4.1 server, you must create this object to be able to access non-NetWare 4.1 volumes. When you create a NetWare Server object for a non-NetWare 4.1 server, the non-NetWare 4.1 server must be running.
Organizational Role	Defines a position or role within an organization.	Create an Organizational Role object so that you can assign rights to a particular position rather than the person who occupies that position. The occupant may change frequently, but the responsibilities of that position do not. You can assign any user to be an occupant of the Organizational Role object because every occupant receives the same rights that you granted to the Organizational Role object.
Print Queue	Represents a print queue on the network.	You must create a Print Queue object for every print queue on the network. This object cannot be created with NETADMIN. See *Print Services* for more information.

Table 2-4   **Leaf Objects You Can Create**

Leaf object	Description	When to use
Print Server	Represents a network print server.	You must create a Print Server object for every print server on the network. This object cannot be created with NETADMIN. See *Print Services* for more information.
Printer	Represents a physical printing device on the network.	You must create a Printer object for every printer on the network. This object cannot be created with NETADMIN. See *Print Services* for more information.
Profile	Contains a profile script (login script). When the Profile object is listed as a User object's property, the Profile Object's login script is executed when that User object logs in. The Profile login script executes after the system login script and before the user login script.	Create a Profile object for a set of users who need to share common login script commands but who are not located in the same container in the Directory tree, or who are a subset of users in the same container.

Table 2-4   **Leaf Objects You Can Create**

Leaf object	Description	When to use
User	Represents a person who uses your network. In the User object properties, you can set login restrictions, intruder detection limits, password and password restrictions, security equivalences, etc.	You must create a User object for every user who needs to log in to the network. When you create a User object, you can create a home directory for that user. When you create User objects, you can also choose to apply a user template to the user that provides default property values. For users who have NetWare 4.1 workstations, you can create the User objects anywhere in the Directory tree, but the users must know their context in order to log in. You should create User objects in the container where the users will typically log in. For users who have non-NetWare 4.1 workstations, you must create the User objects in the container at which the bindery services context is set for the server that they need to log in to. (Bindery services is set by default for every NetWare 4.1 server that is installed.) Non-NetWare 4.1 users do not need to know their context because they log in to the server rather than to the Directory tree.

Table 2-4   **Leaf Objects You Can Create**

Leaf object	Description	When to use
Volume	Represents a physical volume on the network. In the Volume object's properties, you can enter identification information, such as the host server, volume location, etc. You can also set restrictions for use of the volume, such as space limits for users.	You should create a Volume object for every physical volume on the network. During installation of NetWare® 4.1/ 9000 NetWare Services on a server, Volume objects are created for every physical volume on that server. When you create a volume, you are prompted for the server name and the volume name on the server. That information is placed in the Volume object's properties. You can use the Volume object to display the directories and files on that volume.

Naming Leaf Objects

The object naming rules described in the next section apply to most leaf objects. Special rules applying to NetWare Server objects and objects viewed through bindery services are described in separate sections. For rules about naming container objects, see "Naming Container Objects" in this chapter.

Object Naming Rules

Remember these rules when naming an object:

- The name must be unique in the branch (container) of the Directory tree where the object is located.

- The object name can be up to 64 characters in length.

- You can use any special characters. But if the object needs to be accessed from a client running a version of NetWare earlier than NetWare 4.1, you should avoid using special characters (see the next section).

- You can enter object names in either uppercase or lowercase. Object names are displayed with uppercase and lowercase letters as they were first entered, but they are not case sensitive. Therefore, "ManagerProfile" and "MANAGERPROFILE"

are considered to be identical names.

• You can use both spaces and underscores, but they are both considered spaces. Therefore, "Manager_Profile" and "Manager Profile" are considered to be identical names.

If you use a space in a name, you must place quotation marks around that text string whenever you use a command line utility that includes that text string.

NOTE: If you anticipate managing objects created from different code pages, you must limit object names and properties to those characters common to all the applicable code tables.

Nondisplayable Unicode characters for your code page are represented by an ASCII 3 character (a "heart" symbol). For more information, see "Unicode" in *Concepts*.

Object Name Restrictions for Bindery Services

When you create objects to be accessed from a client running a version of NetWare earlier than NetWare 4, the names of the objects must follow bindery naming rules or else the pre-NetWare 4 client does not recognize them. Object names in bindery services are interpreted as the following:

• Spaces in object names are replaced by underscores.

• Object names longer than 47 characters are cut off after the 47th character.

You cannot use the following characters in an object name that must be accessed from a client running a version of NetWare earlier than NetWare 4:

/ slash

\ backslash

: colon

, comma

* asterisk

? question mark

Naming Restrictions for NetWare Server Objects

The first NetWare Server object for a NetWare 4.1 server must be created with Directory Services Install. The object is given the same name as the physical server. Rules for naming physical servers appear in Help of Directory Services Install.

If you create a NetWare Server object for a non-NetWare 4.1 server, you must use the physical server name as well, because NetWare Directory Services must search for the server on the network to verify its existence.

For example, if you create a Server object for a NetWare 3™ server whose physical name on the network is SURFBOY, you must name the Server object SURFBOY.

Because of these restrictions, you can never rename a NetWare Server object, even if you have the Supervisor object right to it. For more information on NetWare Server objects, see "Object" in *Concepts*.

Creating Searchable Leaf Objects

When you create an object, you enter various types of information about that object into its properties. An object's properties can include a telephone number, a description, an address, etc.

Many object properties are optional; you are not required to enter information about such properties to create the object. However, information in objects' properties can help you track and manage those objects.

After you have created objects, you can use NetWare Administrator, NETADMIN, or NLIST to search for and list these objects. You can also search for the values contained in the objects' properties.

If you enter data into the properties in a consistent format, it is easier to search the Directory database for different types of information when you need them.

For example, you may want to search for all User objects at a certain location, such as building M1. You cannot easily list all objects located in building M1 if you have entered "Bldg. M1," "BLDG M1," and "M1" as values in the Location property of multiple User objects.

Standardizing the value for the Location property for all User objects at the site (such as M1, M2, and M3) makes it possible to search for objects located in each building.

Creating Leaf Objects Using NetWare Administrator

Prerequisites

* A 386 or later workstation and NetWare Administrator

* The Create object right to the container that will contain the new container object

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select the object that will contain the new leaf object.

For information on moving around in the browser and selecting objects, press <F1>.

If you are creating User objects, remember that users who are using non-NetWare 4.1 workstations must be created in the container where the bindery services context is set for the server that they need to log in to.

NOTE:　You can create User objects for users who have NetWare 4.1 workstations anywhere in the Directory tree, but the users must know their context in order to log in. You should create User objects in the container where the users will typically log in.

3 From the "Object" menu, choose "Create."

4 Select the class of object you are creating from the "New Object" dialog box.

If the class of object you selected does not appear under "New Object," you cannot create this object in this container. Select or create another container to hold the object.

5 Choose "OK."

Each type of leaf object that you create has a different "Create" dialog box. For details on each dialog box, choose "Help."

The property fields that are displayed in the "Create" dialog box are mandatory. You must enter information in these fields.

The check boxes that are displayed in the "Create" dialog box are optional. Usually, you can select only one box, not both.

For example, if you select "Define Additional Properties," the "Identification" page is displayed immediately after the object is created. Make this selection if you want to enter more information for the new leaf object at the time of creation. You can also enter additional property information later.

If you select "Create Another Object," another "Create" dialog box is displayed immediately after the object is created.

6 Choose "Create."

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*
Using the object dialog in NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating Leaf Objects Using NETADMIN

Prerequisites

*   A workstation running DOS 3.30 or later and NETADMIN

*   The Create object right to the object that will contain the new leaf object

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, select "Manage Objects."

3 Select the container that will contain the new leaf object.

The objects in the selected container are listed.

To see if you are in the right context, look at the title bar on the screen.

Press <F1> for help.

If you are creating User objects, remember that users who are using non-NetWare 4.1 workstations must be created in the container at which the bindery services context is set for the server that they need to log in to.

You can create User objects for users who have NetWare 4.1 workstations anywhere in the Directory tree, but the users must know their context in order to log in. You should create User objects in the container where the users will typically log in.

4 Press <Insert>.

5 From the "Select an Object Class" screen, select the object class that you want to create.

If the object class you want to create does not appear, you cannot create that object in the selected container. Press <Esc> to return to the browser; then select a different container type.

6 Type the information you are prompted for and press <Enter>.

Each leaf object that you create has a different dialog box. For details on each dialog box, press <F1> for help.

7 If you want to create another leaf object, choose "Yes." If you do not, choose "No."

If you choose "Yes," you are prompted for information about the next object you want to add. Repeat Step 6 and then continue with Step 8.

If you choose "No," the leaf object is displayed in the Directory tree. Continue with Step 8.

8 Press <F10> to edit this object.

A menu appears from which you can choose to view or edit information about this object.

9 Choose an option from the "Actions" menu and add any necessary information.

10 To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Managing Groups of User Objects

NetWare 4.1 allows you to manage User objects as a group, which is often more efficient than managing them individually. Six objects that can help you manage groups of User objects are described in Table 2-5.

Table 2-5   **Objects that Help Manage Users**

Object	Description
Organization	Allows you to assign trustee rights, login scripts, and user defaults to the User objects in the Organization.
Organizational Unit	Allows you to assign trustee rights, login scripts, and user defaults to the User objects in the Organizational Unit.
Group	Provides an efficient way to manage one object, the Group object, instead of many individual User objects.
Profile	Allows you to set up a specific work environment by using a common login script for groups of users who need similar work environments but who are not located in the same container object.
Organizational Role	Allows you to assign rights to a particular position and set of responsibilities rather than to a person. The person who occupies that position may change frequently, but the responsibilities of that position do not. The difference between a Group object and an Organizational Role object is that a Group object usually has many members, whereas an Organizational Role object usually has only one or two members.
USER_TEMPLATE	Allows you to apply default property values to any user that you create in a container object. You can choose to apply the information in the user template when you create new User objects. The template is actually a User object named USER_TEMPLATE.

Managing Group Objects

If you want a user to have access to an object, you must give the user a trustee assignment to that object. Rather than make trustee assignments to many users, you can create a Group object and make just one trustee assignment to grant access to all the users who belong to the Group.

Here are some guidelines to follow when setting up a Group object:

• Only User objects can be listed in a Group, and you can add User objects from any part of the Directory tree to a Group.

A Group object is not a container. It does not "contain" User objects; users' names are merely assigned to a Group object.

• To create a Group object, see "Creating Leaf Objects" in this chapter.

• You must create User objects before you can add them to the membership list of a Group object. See "Creating Leaf Objects" in this chapter for instructions on creating User objects.

• After you have created a Group object and added User object names to it, you manage the rights of the Group object rather than the rights of the individual users.

    For example, suppose you have a word-processor application on the network that many users need to access. You could create a Group object named WORD PROCESSOR USERS and add the User object names of the users who need access to the application.

    Then, rather than granting file trustee rights to each of the User objects, you would grant the file trustee rights to the Group object WORD PROCESSOR USERS for the application and the working directory.

• When a user is added to the membership list of a Group object, the Group is listed in that user's Security Equal To property. The user is granted all rights that any object (User, Group, Printer, etc.) in that list is granted, both object and file rights.

After you have created a Group object, use the procedures that follow to:

• Add members to a Group object.

• Give a Group object rights to files and directories.

• Delete members from a Group object.

You can use NetWare Administrator or NETADMIN to manage Group objects. Both procedures are described in this section.

Additional Information

For more information about	Refer to
Groups	"Group Objects" in *Concepts*
Object and property rights	"Rights Needed to Create and Manage Objects" in this chapter
Using NETADMIN	"NETADMIN" in *Utilities Reference*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Adding Members to a Group Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Write right to the Members property of the Group object

- The Write right to the Security Equal To property of the User object

- The Write right to the ACL (Access Control List) property of the Group object

- The Group object must already exist, and the User objects you want to add as members of the Group must already exist

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select the Group object you want to edit.

For information on moving around in the browser and selecting objects, press <F1>.

3 From the "Object" menu, choose "Details."

4 Choose the "Members" button at the right side of the "Object" dialog box.

5 Choose the "Add" button to browse the Directory tree for User objects.

6 Browse the Directory tree until the User object you want appears in the "Objects" box.

7 Choose "OK."

8   Repeat Step 5 through Step 7 to add more User objects to the Group object.

9   When you have finished adding User objects to the Group object, choose "OK" to save your changes and return to the browser.

Adding Members to a Group Object Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 and NETADMIN

- The Supervisor right to the Group object, or the Write or Supervisor right to the Members property of the Group object

- The Supervisor right to the Group object, or the Write or Supervisor right to the Security Equal To property of the User object

- The Supervisor or Write right to the ACL property of the Group and User objects

- The Group object must already exist, and the User objects you want to add as members of the Group must already exist

Procedure

1   At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2   From the "NetAdmin options" menu, choose "Manage objects."

3   Browse the Directory until the Group object appears on the screen.

Use the instructions at the bottom of the screen to browse the directory. Press <F1> for help.

4   When the Group object appears in the "Object" list, select it and press <F10>.

The "Actions" menu appears.

5   Choose "View or Edit Properties of This Object."

6   From the "View or Edit Group" menu, choose "Group Members."

7   At the "Group Members" screen, press <Insert> and then press <Insert> again to browse for the User object you want to add to the Group object.

8   When the User object you want to add appears in the Directory, select it and press <F10>.

9 When the selected User object appears in the " Members" screen, press <Enter>.

To select (mark) multiple User objects, press <F5>.

10 Continue to press <Insert> and select User objects until you have added all the users you want as Group members.

11 To save the list of Group members, press <F10>.

12 To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Giving Group Object Rights to Files and Directories Using NetWare Administrator

Prerequisites

• A 386 or later workstation and NetWare Administrator

• The Read object right to the Volume object

• Rights to the file system

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select the Group object you want to edit.

For information on moving around in the browser and selecting objects, press <F1>.

3 From the "Object" menu, choose "Details."

4 Select the "Rights to File System" button on the right side of the "Object" dialog box.

5 To choose a Volume, select "Include."

A list of Volumes appears in the "Select Object" box. You can also browse the Directory for a Volume.

6 From the "Volumes" list, select the volume that contains the directory or file.

7 Choose "Add."

8 Select the Volume that contains the directory or file you want to grant rights to.

9 From the "Files and Directories" dialog box, select the directory or file that you want to grant rights to.

The default rights that make up this object's trustee assignment to the file or directory appear in the "Rights" area.

10 Select the check boxes next to the rights that you want to add.

You must have the Access Control right to the file or directory to make trustee assignments to the file or directory.

11 Choose "OK."

The new trustee assignment is now effective for this object.

Giving a Group Object Rights to Files and Directories Using NETADMIN

Prerequisites

• A workstation running DOS 3.30 and NETADMIN

• The Read object right to the Volume object

• Rights to the file system

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, choose "Manage Objects."

3 Browse the Directory until the Group object appears on the screen.

Use the instructions at the bottom of the screen to browse the directory. Press <F1> for help.

4 When the Group object appears in the "Object" list, select it and press <F10>.

The "Actions" menu appears.

5 Choose "View or Edit Rights to Files and Directories."

6 Select a Volume object where you want to make the Group object the trustee of a directory or file.

Press <Insert> to type the Volume object name or press <Insert> twice to browse the Directory tree.

7 Press <Insert> to type a beginning pathname to the directories in which you want to make trustee assignments, or press <Insert> again to browse for the path.

8 Select "Directories/Files" and press <Enter>.

Choose whether you want to view files, directories, or both when you are selecting one to give a trustee assignment to.

9 Select "Trustee Search Depth" and press <Enter>.

Choose whether you want to view only the files or directories in the current directory, or to search subdirectories.

10 To list the trustee assignments, press <F10>.

The "Trustee Directory Assignments" screen appears.

11 To select a directory or file in which the Group object should be added as a trustee, press <Insert>.

12 To accept the directory you specified earlier, press <Enter>; or, to browse for the file system directories, press <Insert>.

13 To add or delete the rights, select "Trustee Directory, Rights" and press <Enter>.

The "Trustee Rights Granted" menu appears.

14 To view or add rights that are not yet granted, press <Insert>.

Press <F1> if you need help.

15 To save the trustee assignments, press <F10>.

16 Continue selecting directories and files and granting rights until finished.

17 To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Deleting Members from a Group Object Using NetWare Administrator

Prerequisites

• A 386 or later workstation and NetWare Administrator

• The Supervisor right to the Group object, or the Write or Supervisor right to the Members property of the Group object

• The Supervisor right to the Group object, or the Write or Supervisor right to the Security Equal To property of the User object

• The Supervisor or Write right to the ACL property of the Group and User objects

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2   Select the Group object you want to edit.

For information on moving around in the browser and selecting objects, press <F1>.

3   From the "Object" menu, choose "Details."

4   Select the "Members" button at the right side of the "Object" dialog box.

The list of User objects for this group appears.

5   From the "Members" dialog box, select the name you want to delete.

6   Choose "Delete."

7   If you want to delete other names, continue selecting names and choosing "Delete."

You can delete several users at a time by holding down the button on the mouse, dragging the mouse arrow over the names, and choosing "Delete."

8   When you have finished deleting members, choose "OK" to save your changes and return to the browser.

Deleting Members from a Group Object Using NETADMIN

Prerequisites

*   A workstation running DOS 3.30 and NETADMIN

*   The Supervisor right to the Group object, or the Write or Supervisor right to the Members property of the Group object

*   The Supervisor right to the Group object, or the Write or Supervisor right to the Security Equal To property of the User object

*   The Supervisor or Write right to the ACL property of the Group and User objects

Procedure

1   At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2   From the "NetAdmin Options" menu, choose "Manage Objects."

3   Browse the Directory tree until the Group object appears on the screen.

Use the instructions at the bottom of the screen to browse the directory. Press <F1> if you need help.

4   When the Group object appears in the "Object" list, select it and press <F10>.

    The "Actions" menu appears.

5   Choose "View or Edit Properties of This Object."

6   From the "View or Edit Groups" menu, select Group members.

7   Select the User object you want to delete from the Group object and press <Delete>.

    To select multiple User objects, press <F5>.

8   To confirm the deletion, choose "Yes."

9   To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Managing Profile Objects

Profile objects contain login scripts that are used by groups of users who need similar work environments but who are usually not located in the same container object.

When a Profile object is named in a User object, the Profile login script executes when the user logs in after any login script in the Organization or Organizational Unit has executed.

Users can have only one Profile, so only one Profile script can execute for any user.

For information about creating a login script, see Chapter 5,"Customizing the User Environment."

For an example of a login script used in a Profile object, see "Profile Login Script" in Chapter 5.

You can use NetWare Administrator or NETADMIN to create a Profile object. Both procedures are described in this section.

Additional Information

For more information about	Refer to
Profile objects	"Profile object" in *Concepts*

For more information about	Refer to
Creating login scripts	Chapter 5, "Customizing the User Environment"
Using NETADMIN	"NETADMIN" in *Utilities Reference*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating Profile Objects Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Create object right to the object that will contain the new Profile object

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select the object that will contain the new Profile object.

For information on moving around in the browser and choosing objects, press <F1>.

Only Organization and Organizational Unit objects can contain Profile objects.

3 From the "Object" menu, choose "Create."

4 Under "New Object," choose "Profile."

The "Create Profile" dialog box appears.

If "Profile" does not appear under "New Object," you cannot create Profile objects in this container; select or create another object to contain the Profile object.

5 Choose "OK."

6 Type the Profile object name in the box provided.

7 (Optional) Select "Define additional properties."

Select this option if you want to write a Profile login script or supply additional information about the new Profile object. Instructions for creating a Profile script are in Chapter 5 "Customizing the User Environment."

8 Choose "Create."

If you selected "Define Additional Properties," the "Identification" dialog box appears.

9 (Optional) Enter information in the fields provided in the "Identification" page of the "Object" dialog box.

10 (Optional) Choose the "See Also" button at the right side of the object dialog box.

The "See Also" page allows you to add information about the Profile object you are creating. For example, you might list the User objects to whom you have assigned this script.

Choose "Help" at any time for information on the current task.

11 (Optional) Choose the "Login Script" page at the right side of the "Object" dialog box to add commands to the Profile login script.

Use this page to specify commands that execute when a user logs in, such as a drive mapping command.

12 To save the new Profile object and return to the browser, choose "OK."

Creating Profile Objects Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Create object right to the object that will contain the new Profile object

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, select "Manage Objects."

3 Select the object that will contain the new Profile object.

The objects in the selected container are listed. To see if you are in the right context, look at the title bar on the screen. Press <F1> for help.

4 Press <Insert>.

5 Select "Profile."

If the Profile object class does not appear, you cannot create that object in the selected container. Press <Esc> to return to the browser, and then select a different container type.

6   Type the new Profile object name and press <Enter>.

7   If you want to create another Profile object, choose "Yes." If you do not, choose "No."

If you choose"Yes," you are prompted to type the new Profile object name. Repeat Step 3 and Step 7, and then continue with Step 8.

If you choose "No" then the Profile object is displayed in the Directory tree. Continue with Step 8.

8   To edit this object, press <F10>.

A menu appears from which you can choose to view or edit information about this object.

9   Choose "View or Edit Properties of This Object."

10 Choose "Login Script."

11 To enter new commands for this Profile login script, choose "No"; or, to copy a login script from another object, choose "Yes."

The commands you place in the Profile login script are executed when users who belong to this Profile object log in.

Press <F1> for information on the commands or see "Login Script Commands and Variables" in Chapter 5.

12 To save your changes, press <F10>.

13 To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Managing Organizational Role Objects

An Organizational Role object allows you to assign rights to a particular position rather than to the person who occupies that position. The people who occupy that position may change frequently, but the responsibilities of that position do not.

The user assigned to an Organizational Role is called the occupant and is granted all rights that are granted to the Organizational Role object.

For example, you decide that you need a print manager for SALES. You create an Organizational Role object called PRINT MANAGER. You grant the PRINT MANAGER object all object rights to all the Printer, Print Queue, and Print Server objects in that part of the Directory tree.

You may also grant the PRINT MANAGER object the property rights to the Print Job Configuration property of users.

You can assign anyone to the PRINT MANAGER object without having to re-create all the trustee assignments.

When a user is added to the occupant list of an Organizational Role object, the Organizational Role is listed in that user's "Security Equal To" property. The user is granted all rights that any object (User, Group, Printer, etc.) in that list is granted, both to objects and to files and directories.

You can use NetWare Administrator or NETADMIN to create an Organizational Role object. Both procedures are described in this section.

Additional Information

For more information about	Refer to
Organizational Role object	"Organizational Role object" in *Concepts*
Security equivalence	"Security Equal To" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating Organizational Role Objects Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Create object right to the object that will contain the new Organizational Role object

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select the object that will contain the new Organizational Role object.

For information on moving around in the browser and selecting objects, press
<F1>.

Only Organization and Organizational Unit objects can contain Organizational
Role objects.

3 From the "Object" menu, choose "Create."

4 From the "New Object" dialog box, choose "Organizational Role."

If "Organizational Role" does not appear under "New Object," you cannot
create Organizational Role objects in this container. Select or create another
object to contain the Organizational Role object.

5 Choose "OK."

The "Create Organizational Role" dialog box appears.

6 Type the Organizational Role object name in the box provided.

7 (Optional) "Select Define Additional Properties."

8 Select the "Create" button at the bottom of the window.

The "Identification" page of the "Object" dialog box appears.

9 Enter information in the fields provided in the "Identification" dialog box.

10 Choose the button to the right of "Occupant."

11 Choose "Add."

The "Select Object" window appears.

12 Select User objects from the "Directory Context" window until the objects you
want are shown in the "Object" window.

13 Select the User object in the left window to occupy the Organizational Role; then
choose "OK."

The object you selected appears in the "Occupant" window.

14 Choose "OK" in the "Occupant" window.

15 When you are finished adding User objects as Occupants, choose "OK" in the
"Organizational Role" window.

16 (Optional) Select the "See Also" button at the right side of the object dialog box.

The "See Also" page allows you to add information about the Organizational Role object you are creating. For example, you might list the User objects that you have assigned as occupants.

17 To save the new Organizational Role object and return to the browser, choose "OK."

Creating Organizational Role Objects Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 and NETADMIN

- The Create object right to the object that will contain the new Organizational Role object

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, choose "Manage Objects."

3 Select the object that will contain the new Organizational Role object.

The objects in the selected container are listed.

To see if you are in the right context, look at the title bar on the screen. Press <F1> for help.

4 Press <Insert>.

5 Select "Organizational Role."

If the Organizational Role object class does not appear, you cannot create that object in the selected container. Press <Esc> to return to the browser, and then select a different container type.

6 Type the new Organizational Role object name.

7 Type the Mailbox Location and press <Enter>.

8 If you want to create another Organizational Role object, choose "Yes." If you do not, choose "No."

If you choose "Yes," you are prompted to type the new Organizational Role object name. Repeat Step 6 and then continue with Step 9.

If you choose "No," then the Organizational Role object is displayed in the Directory tree. Continue with Step 9.

9 To edit this object, press <F10>.

A menu appears from which you can choose to view or edit information about this object.

10 Choose "View or Edit Properties of This Object."

11 From the "View or Edit Organizational Role" menu, choose "Identification."

12 Specify a User object for the Organizational Role.

   a Select the field next to "Occupant" and press <Enter>.

   b Press <Insert>.

   c Type the complete name of a User object in the space provided, or press <Insert> to browse the Directory tree and select a User object to be the occupant of the Organizational Role.

   The path from the object to the Root of the Directory tree forms the object's complete name.

13 Select additional User objects as needed.

14 To save the list of occupants, press <F10>.

15 Enter information in other fields as needed.

16 To save changes, press <F10>.

17 To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Managing User Templates

A user template contains default information that you can apply to User objects to give them default property values.

Use these guidelines as you create user templates:

• You can create a user template in an Organization or Organizational Unit object, either when you create the container object or later on.

• When you create a User object, you are prompted to use the defaults in the user template. If you do, the property values you entered in the user template, such as login time restrictions, password restrictions, etc., are copied into the User

object's properties.

- The user template is actually a User object named USER_TEMPLATE. You enter information in this User object just as you would for any other User object. However, not all properties of a User object can be copied from a user template.

- You can copy information from the parent container's user template. For example, if you create a user template in SALES.O=ACME, you are prompted to copy the user template from ACME, if one exists; thus, you avoid having to re-enter similar information for lower-level containers.

- User template information is taken from the nearest parent container. If the container object in which you create a User object does not have a user template, you can apply the parent container's user template to the User object.

When working with user templates, remember the following:

- Changing values in a user template does not change values in existing User objects. The changes apply only to User objects created after changing the user template values.

- To update information for existing users, you must enter the changes for each User object.

- You cannot use a user template to grant NDS or file system rights.

You can use NetWare Administrator or NETADMIN to create a user template. Both procedures are described in this section.

Additional Information

For more information on	Refer to
User defaults	"User template" in *Concepts*
User objects	"User object" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating and Editing User Templates with NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Create object right to the object that will contain the user template

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select the object that will contain the new user template.

For information on moving around in the browser and selecting objects, press <F1>.

Only Organization and Organizational Unit objects can contain User objects.

3 From the "Object" menu, select "User Defaults."

4 If you want the new user template to inherit the properties from the parent container's user template, choose "Yes." If not, choose "No."

If there is no parent container, this prompt does not appear. Continue with Step 5.

If you choose "Yes," a USER_TEMPLATE User object is created and the first page of defaults, "Identification," appears with the same information that is in the parent container's user template.

If you choose "No," a USER_TEMPLATE User object is created and the first page of defaults, "Identification," appears.

5 (Optional) On the "Identification" page, enter or change the information that you want to apply to new User objects.

For example, the location for all User objects to which you will apply the template might be New York. You would type "New York" in the "Location" field.

6 Select other USER_TEMPLATE pages as needed and enter the template information.

7 To save the user template and return to the browser, choose "OK."

Creating and Editing User Templates with NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Create object right to the object that will contain the user template

Procedure

1   At the DOS prompt, type

    ```
    NETADMIN <Enter>
    ```

    For information on moving around in NETADMIN and selecting objects, press
    <F1> after starting the utility.

2   From the "NetAdmin Options" menu, select "Manage Objects."

3   Browse the Directory tree to find and select the container object in which you
    want to add a new container object.

    The objects in the selected container are listed.

    To see if you are in the right context, look at the title bar on the screen. Press
    <F1> for help.

4   Press <Insert>.

5   From the "Select an Object Class" screen, select the container type that you want
    to create.

    If the container object class you want to create does not appear, you cannot
    create that object in the selected container. Press <Esc> to return to the browser,
    and then select a different container type.

6   Type the new container object name and press <Enter>.

7   If you want to create a user template to be applied to new User objects created in
    this container, type "Y" and press <Enter>.

    You are not prompted to create a user template if you are creating a Country
    container object.

8   Choose "View or Edit Properties of This Object."

9   Choose "Edit Template User."

    The "View or Edit User" screen appears.

10 Enter or change the values of the user template as needed.

The help line at the bottom of the screen gives information on each option as you highlight it.

For more information, press <F1>.

11 To save the information, press <F10>.

12 To exit, press <Esc> until you return to the "NetAdmin Options" menu.

Searching for Objects

When you want to find information in the Directory database without opening numerous containers to view the objects, you can use the Search feature.

With the Browse object right, you can search for object classes anywhere in the Directory tree. With the Compare property right, you can search for objects that have properties that match a particular value.

You can search for objects using NetWare Administrator, NETADMIN, or NLIST. All procedures are described in this section.

Searching for Objects Using NetWare Administrator

NetWare Administrator searches each object in the Directory database unless you narrow the search by specifying properties in combination with additional variables such as "less than" or "equal to."

For example, to find all users in New York, you could search for User objects with State or Province Name "equal to" New York. The Search feature then displays objects that meet the search criteria.

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Browse object right to the object you want to see in the search

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select an object in the Directory tree where the search should start.

3 From the "Object" menu, select "Search."

A "Search" window appears.

4 Select the browser icon to the right of the "Start From" field to select an object from which to start the search.

5 Specify how much of the Directory tree to search.

- To search everything below the "Start From" object, select "Search Entire Subtree."

- To search only among objects one level below the "Start From" object, continue with Step 6.

6 Select the down-arrow to the right of the "Search For" field to select an object class to search.

- If you want all the objects of this selected object class to be listed, choose "OK."

- If you want only objects that have properties that match certain criteria to be listed, continue with Step 7.

7 (Optional) Select the down-arrow to the right of the "Property" field to select which property's value will be examined.

The properties in this list change depending on which object class you selected in the "Search For" field.

8 (Optional) Select how you want to compare a value to the selected property.

You can select "Equal To," "Greater Than," "Less Than," or other choices.

9 (Optional) Enter a value in the field to the right of the comparison method that you entered in Step 8.

For example, if you are searching for a Profile object that has the value "Manager's Profile" in the Other Names property, you might select the property "Other Names," then use the comparison method "Equal To" and the value of "Manager's Profile."

10 Choose "OK."

Objects that match your selections are displayed in a "Search Results" window.

Additional Information

For more information about	Refer to
Properties	"Property" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Searching for Objects Using NETADMIN

NETADMIN searches each object in the Directory database unless you narrow the search by specifying properties in combination with additional variables such as "less than" or "equal to."

For example, to find all users in New York, you could search for User objects with State or Province Name "equal to" New York. The Search feature then displays objects that meet the search criteria.

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Browse object right to the object you want to see in the search

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NETADMIN Options" menu, choose "Manage According to Search Pattern."

3 Enter the object name you want to search on in the "Enter Object Name" field, use * to view all objects, or limit the search by combining characters with the *.

For example, if you want to view all objects whose names begin with "P," enter "P*" in the "Enter Object Name" field.

4 In the "Object Class" field, select the object class or classes for which you want to search. To search for all object types, select "/All classes/."

  a Press <Enter> to select the object classes.

  b If the object classes you want to search on don't appear in the "Object Classes Included" screen, press <Insert> to select additional object classes.

5 If you want to view an Alias object as an alias and not as the object the alias represents, choose "Yes" in the "Show Alias Class" field.

6 Press <F10>.

Objects that match your selections are displayed in the browse screen.

Additional Information

For more information about	Refer to
Properties	"Property" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Searching for Objects Using NLIST

NLIST is a workstation command line utility that allows you to

- List objects and object properties.

- View information about such objects as users, groups, volumes, and servers (such as object properties, names, property groups, and login information).

- Search for objects and object properties (including groups of properties for objects) on NetWare 2 and NetWare 3 servers.

For information about using the NLIST command, see "NLIST" in *Utilities Reference*.

Moving Objects in the Directory Tree

While previous versions of NetWare allowed you to move only leaf objects, NetWare 4.1 allows you to move both leaf objects and container objects to other containers in the Directory tree.

When you move a leaf or container object, NDS changes all references to the moved object. Although the object's common name remains unchanged, the context name of the object (and of all its subordinates) changes.

Keep the following in mind when you move container objects:

- You can move a container object only if it is the Root of an NDS partition that has no subordinate partitions.

- When you move a container object, you should create an alias object that points to the container object you are moving. Then users can continue to log in to the network and find the container object in its original Directory location.

- Because the context of a container object changes when you move it, users whose name context in their configuration file (NET.CFG file) references the moved container need to update their NET.CFG so that it references the container's new name.

  To automatically update users' NET.CFG files with a new name context after you move a container object, use the NCUPDATE utility. For instructions, see "NCUPDATE" in *Utilities Reference*.

NOTE: If you move a container object and do not create an alias, users who are unaware of the object's new location will not easily find the object in the Directory tree, since they will look for it in its original Directory location.

Also, users may not be able to log in if the name context in their configuration file (NET.CFG file) references the moved container.

You can use NetWare Administrator or NETADMIN to move objects in the Directory tree. Both procedures are documented in this section.

Moving Leaf Objects Using NetWare Administrator

NetWare Administrator lets you move objects using either dialog boxes or the drag-and-drop method. Both are documented here.

Using Dialog Boxes

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Browse object right to the object you want to see in the search

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the browser window, select one or more leaf objects.

To select multiple leaf objects, press <Ctrl> on the keyboard and, without releasing <Ctrl>, select the objects with the mouse.

3 From the "Object" menu, choose "Move."

4 Select the browser button to the right of the "Destination" box.

The "Directory Context" box appears in the lower right corner of the screen. Use this field to browse the Directory tree's containers.

The "Objects" box that appears in the lower left corner shows the containers that appear when you browse the Directory.

5 From the "Objects" box, select a container object (an Organization or Organizational Unit) as the location to move the listed objects to; then choose "OK."

6 In the "Move" dialog box, choose "OK."

The listed objects are moved to the destination container.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Using Drag-and-Drop

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Supervisor right for the object you want to move

- The Create object right to the destination container

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 (Optional) From the "Tools" menu, open another browser window by selecting "Browse."

  If you can see both the object and the destination container in one browser window, it is not necessary to open two browser windows. Go directly to Step 4.

3 Reshape the browser windows, using the window borders, so that you can view both windows at once.

4 From one of the browser windows, select one or more leaf objects.

  To select multiple leaf objects, press <Ctrl>, and without releasing <Ctrl> select the objects with the mouse.

5 Press <Ctrl> and, without releasing <Ctrl>, click and hold down on the object(s) and drag the object(s) to the destination container; then release the mouse button.

6 In the "Move" dialog box, choose "OK."

  The listed objects are moved to the destination container.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Directory tree	"Directory tree" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Moving Leaf Objects Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Supervisor right to the object you want to move

- The Create object right to the destination container

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, select "Manage Objects."

3 Select the object that you want to move.

- If the object you want to move appears on the list, select it and press <F10>.

- If the object is not on the list, browse the Directory tree by selecting container objects and pressing <Enter> until you see the object you want. Select it and press <F10>.

4 From the "Actions" menu, choose "Move."

5 Using the down-arrow key to reach the field, highlight the "New Context" field.

6 Assign a new context to the object you want to move.

- If you know the new context that you want the object to be in, type the new context in the highlighted field.

- If you do not know the new context that you want to object to be in, press <Insert> twice to browse the Directory tree for the destination container; then select the destination container and press <F10>.

7 To accept the new context as the destination container, press <Enter>.

8 To confirm that you want to move the object listed in the "Old Context" field to the container listed in the "New Context" field, press <F10>.

The selected object is moved to the destination container.

You may need to wait for processes throughout the Directory tree to complete before you can move this object again.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Directory tree	"Directory tree" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Moving Container Objects Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Supervisor right to the object you want to move

- The Create object right to the destination container

Procedure

1   From the Windows Program Manager, click on the "NetWare Administrator" icon.

2   From the "Tools" menu, choose "Partition Manager."

3   From the "Partition Manager" browser, select the partition that you want to move.

You can move a container object only if it is the Root of an NDS partition, and only if it contains no subordinate partitions.

In Partition Manager, the partition icon appears to the left of the object icon. If the container you want to move is not a partition, select the container and choose "Create as New Partition."

4   From the "Object" menu, choose "Move Partition."

5   Select the browser button to the right of the "Destination" box.

Use the browser in the "Directory Context" box to view the Directory tree's containers.

The "Objects" box that appears in the lower left corner shows the containers that you can select in the "Directory Context" box.

6   From the "Objects" box, select a container object (an Organization or Organizational Unit) as the location to move the listed objects to; then choose

"OK."

7 Choose "Create Alias in Place of Moved Container."

The Alias object will point to the partition's new location.

8 In the "Move" dialog box, choose "OK."

If you choose to create an alias in place of the moved container, NetWare Administrator polls for the creation of the Alias object before it moves the selected partition.

If you moved a container and created an alias in its place, you should use the NCUPDATE utility to update the name context of users in the moved container. For instructions, see "NCUPDATE" in *Utilities Reference*.

If you move a container object and do not create an alias, users who are unaware of the object's new location will not easily find the object in the Directory tree, since they will look for it in its original Directory location.

Also, users may not be able to log in if the name context in their configuration file (NET.CFG file) references the moved container.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Alias objects	"Alias object" in *Concepts*
Directory tree	"Directory tree" in *Concepts*
NCUPDATE	"NCUPDATE" in *Utilities Reference*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Moving Container Objects Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Create object right to the destination container

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, choose "Manage Objects."

Your current context appears in the upper left corner.

3 Select the object that you want to move.

- If the object you want to move appears on the list, select it and press <F10>.

- If the object is not on the list, browse the Directory tree by selecting container objects and pressing <Enter> until you see the object you want. Select it and press <F10>.

4 From the "Actions" menu, choose "Move."

You can move a container object only if it is the Root of an NDS partition, and only if it contains no subordinate partitions.

In NETADMIN, when you select a container object that is a partition, the context-sensitive help at the bottom of the screen reads "This is a partition."

If the container you want to move is not a partition, you must first use a partition management utility (PARTMGR or NetWare Administrator) and create the container as a new partition.

5 Using the down-arrow key to reach the field, highlight the "New Context" field.

6 Assign a new context to the object you want to move.

- If you know the new context that you want the object to be in, type it in the highlighted field.

- If you do not know the new context that you want the object to be in, press <Insert> twice to browse the Directory for the destination container; then select the destination container and press <F10>.

7 To accept the new context as the destination container, press <Enter>.

8 To confirm that you want to move the object listed in the "Old Context" field to the container listed in the "New Context" field, press <F10>.

9 To create an alias in place of the moved container, choose "Yes."

The Alias object will point to the partition's new location.

The selected object is moved to the destination container.

NOTE: You need to wait for processes throughout the Directory tree to be completed before you can move this object again.

If you moved a container and created an alias in its place, you should use the NCUPDATE utility to update the name context of users in the moved container. For instructions, see "NCUPDATE" in *Utilities Reference*.

CAUTION: If you do not create an alias, users who are unaware of the object's new location cannot easily find the object in the Directory tree, since they will look for it in its original Directory location.

Also, users might not be able to log in if the name context in their configuration file (NET.CFG) references the moved container.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Directory tree	"Directory tree" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Deleting Objects from the Directory Tree

When you delete a leaf object, NDS removes references to the deleted object. For example, if you delete a Profile object, that Profile object is deleted from any User objects that list it. Or, if you delete a User object, all trustee assignments listing that user are deleted.

Some special considerations apply when you delete particular objects, such as a NetWare Server object, a User object, or an Alias object. These are explained in the next three sections.

You cannot undo a Delete Object operation. To get the object back, you must re-create it and re-enter all data in its properties.

You can use NetWare Administrator or NETADMIN to delete objects from the Directory tree. Both procedures are described later in this section.

Cautions When Deleting Server Objects

An NDS server is one that you have installed in the Directory tree. Any server that is not in the Directory tree is a bindery server.

You can use NetWare Administrator or NETADMIN to delete bindery servers. But consider the following before you delete an NDS Server object:

- You cannot delete a NetWare server from the Directory tree using the NETADMIN utility.

- You must use the Partition Manager tool in NetWare Administrator to delete an NDS server from the Directory tree.

- You cannot delete a container object unless all the objects in the container are deleted first.

- If the server you want to delete contains a master replica, you must first change the master to a different type and designate another replica on another server as the master.

Cautions When Deleting User Objects

You must be careful not to delete a trustee object that has the only trustee assignment to a part of the Directory tree. If you do, you could cut off access to that part of the Directory tree.

Be careful not to block all users' rights to an object with an Inherited Rights Filter, which would leave no one with access to part of the Directory tree.

Therefore, be aware of the following before you delete a User object:

- To avoid losing access to any object, check the "Rights to other objects" and "Trustees of this object" attributes of the User object you want to delete.

  To view these attributes, select the User object, and right-click once. Then select the attribute you want to view from the available options.

  If the User object you want to delete has the Supervisor right to another object, transfer that Supervisor right to another User object before you delete the original User object.

  Or, give a User object in a higher container the Supervisor right to objects, and then block other users from deleting those objects.

- Do not delete User ADMIN until you have given another User object the same Supervisor right that ADMIN has.

- When you delete a User object, any security equivalences you have assigned to other trustees are lost; also, the home directories and mail directories are not deleted.

Cautions When Deleting Alias Objects

Be aware of the following before you delete an Alias object:

- If you delete an Alias object (which appears as the actual object it is pointing to), you delete only the Alias object, not the object it points to.

- If you delete the object that an Alias object points to, the Alias object is also deleted.

Deleting Objects Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Delete object right to the object that you want to delete

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select the object you want to delete.

Only leaf objects and container objects that are empty can be deleted.

3 Select (check) the "Trustees of This Object" and the "Rights to Other Objects" dialog boxes.

If a User object you want to delete has the Supervisor right to another object, give another User object that Supervisor right before you delete the original User object.

4 Choose "Delete" from the "Object" menu.

You cannot undo an object deletion. To get the object back, you must re-create it and re-enter all data in its properties.

5 To confirm the deletion, choose "OK."

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Deleting Objects Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Delete object right to the object that you want to delete from the Directory tree

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 Choose "Manage Objects" from the "NetAdmin Options" menu.

3 Browse the Directory until the object you want to delete appears.

Use the instructions at the bottom of the screen to browse the directory. Press <F1> for help.

4 Select the object and press <Delete>.

If a User object you want to delete has the Supervisor right to another object, give another User object that Supervisor right before you delete the original User object.

You cannot undo an object deletion. To get the object back, you must re-create it and re-enter all data in its properties.

5 To confirm the deletion, choose "Yes."

The object is deleted from the Directory tree.

6 Press <Esc> until you return to the "NetAdmin Options" menu.

Additional Information

For more information about	Refer to
Objects	"Objects" in *Concepts*
Rights	"Rights" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Renaming Leaf and Container Objects

You may want to rename objects to make the names more descriptive or to reflect your changing environment. For example, you may want to rename a printer from LASER IN BLDG D to LASER IN BLDG A, or an Organizational Unit from SALES to ACCOUNTS.

When you rename an object, NetWare Directory Services changes all references to the renamed object.

Renaming a leaf object changes only the object's common name, which is the name that is displayed in the Directory tree. It does not change the object's context. However, renaming a container object changes the object's common name as well as its context.

When renaming a container object, you should seriously consider creating an Alias object that points to the container object you are renaming. Then users can continue logging in to the network and can see the container object's original name.

If you rename a container object and do not create an alias, users who are unaware of the object's new name will not easily find the object in the Directory tree, since they will look for its original name.

Also, users may not be able to log in if the name context in their configuration file (NET.CFG file) references the renamed container.

To automatically update users' NET.CFG files with a new name context after you rename a container object, you can place a command in the renamed container's login script that will run the NCUPATE utility.

Renaming Objects Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator
- The Rename object right to the object that you want to rename

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator"

icon.

2 Using the browser, select the object that you want to rename.

3 From the "Object" menu, choose "Rename."

4 Type the new name for the object you selected.

5 (Optional) Select "Save Old Name."

Select this option if you want the old name saved as a value in the "Other Names" field of the "Details" screen.

If you save the old name, users who do not know the object's new name can search for the object under the old name.

6 (Optional) If you are renaming a container object, select "Create Alias in Place of Renamed Container."

If you do not create an alias, users who are unaware that the container has been renamed cannot easily find the object in the Directory tree. Also, users whose name context in their NET.CFG file references the renamed container might be unable to log in.

7 To save the changes and return to the browser, choose "OK."

If you renamed a container object, you should use the NCUPDATE utility to update the name context of users in the renamed container. For instructions, see "NCUPDATE" in *Utilities Reference*.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Alias objects	"Alias object" in *Concepts*
Directory tree	"Directory tree" in *Concepts*
NCUPDATE	"NCUPDATE" in *Utilities Reference*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Renaming Objects Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Rename object right to the object that you want to rename

Procedure

1   At the DOS prompt, type

    NETADMIN <Enter>

    For information on moving around in NETADMIN and selecting objects, press
    <F1> after starting the utility.

2   Choose "Manage Objects" from the "NetAdmin Options" menu.

    Your current context appears in the upper left corner of the screen.

3   Select the object that you want to rename.

    - If the object appears on the list, select it and press <F10>.

    - If the object is not on the list, browse the Directory tree by selecting container
      objects and pressing <Enter> until you see the object you want. Select it and
      press <F10>.

4   Choose "Rename."

5   In the "New Name" field, enter a new name for the object.

6   Choose "Yes" to save the old name; choose "No" to discard the old name.

    Choose "Yes" if you want the old name saved as a value in the "Other Names"
    field of the "Details" screen.

    If you save the old name, users who do not know the objects's new name can
    search for the object under the old name.

7   To save your changes, press <F10>.

8   To confirm that you want to save the new name, choose "Yes."

9   (Optional) To create an alias in place of the renamed container, choose "Yes."

    If you do not create an alias, users who are unaware that the container has been
    renamed cannot easily find the object in the Directory tree. Also, users whose
    name context in their NET.CFG file references the renamed container might be
    unable to log in.

10 Press <Esc> until you return to the "NetAdmin Options" menu.

If you renamed a container object, you should use the NCUPDATE utility to update the name context of users in the renamed container. For instructions, see "NCUPDATE" in *Utilities Reference*.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Alias objects	"Alias object" in *Concepts*
NCUPDATE	"NCUPDATE" in *Utilities Reference*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Changing Object Property Values

You can use NetWare Administrator or NETADMIN to change object property values. Both are described in this section.

In this section, the general procedures for changing object property values are followed by tables that describe how to change specific properties of specific objects.

For a complete list of all properties for all objects, see Appendix A, "NDS and Bindery Objects and Properties," of *Utilities Reference*.

Changing Object Property Values Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Create object right to the container of the object whose property value will be changed

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the browser, select the object whose property values you want to change.

   For information on moving around in the browser and selecting objects, press <F1>.

3 Choose "Details" from the "Object" menu.

   The "Identification" page appears.

4 Make any necessary changes.

   See Table 2-6 and Table 2-7 for details on object property values you can change. After you make changes, go to Step 5.

   Click on "Help" for details on each field and option.

   Do not choose "OK" until you have entered all the changes you want to make to every page of the dialog box.

Do not choose "Cancel" unless you want to lose all changes made to every page of the "Object" dialog box.

Table 2-6 describes how to change User object property values.

Table 2-6 **Changing User Object Property Values Using NetWare Administrator**

To	Choose this page of the "Object" dialog box; then…
Change the user's last name, other names, title, description, department, telephone number, fax number, or email address	"Details"; enter information in the fields.
Disable the user's account	"Details"; choose "Login Restrictions" and select (check) "Account Disabled."
Change the user's password	"Details"; choose "Password Restrictions," choose "Change Password," and then enter information in the fields.
Set the user's account expiration date or number of concurrent connections	"Details"; choose "Login Restrictions," check "Account Has Expiration Date" or "Limit Concurrent Connections," and then enter information in the fields.
Change the user's password restrictions (password length, periodic changes, uniqueness, grace logins)	"Details"; choose "Password Restrictions" and enter information in the fields.
Restrict the user's login times	"Details;" choose "Login Time Restrictions" and choose the days and hours that the user is restricted from logging in to the network.
Set the user's login address restrictions	"Details"; choose "Network Address," select the appropriate protocol, choose "Add," and then enter information in the fields.
Change the user's login script	"Details"; choose "Login Script" and enter login script commands.
Specify the user's Profile login script	"Details"; choose "Login Script," choose the browser button next to the "Profile" field, and then select a new Profile object from the "Select Object" dialog box.
Add the user to an existing Group	"Details"; choose "Group Membership," choose "Add," and then select a Group from the "Select Object" dialog.

Table 2-6   **Changing User Object Property Values Using NetWare Administrator**

To	Choose this page of the "Object" dialog box; then…
Unlock a user's account	"Details"; choose "Intruder Lockout" and enter information in fields to reset the User's account.
View, reset, or set up intruder detection on a user's account	"Details"; choose "Intruder Lockout" and view or reset information in fields. To set up intruder detection, you must go to the "Details" page of the container that the users reside in; then choose "Intruder Detection," and enter information in the fields.
Change a user's mailing address	"Postal Address," enter information in the fields.
Set up the user's security equivalences	"Security Equivalence"; choose "Add" and select an object from the "Select Object" dialog box.

Table 2-7 describes how to change other object (non-User, nonprinting) property values.

Table 2-7   **Changing Other Object Property Values Using NetWare Administrator**

To	Select this class of object	Choose this page of the "Object" dialog box; then…
Change information about the object's description, location, department, organization, etc.	Any class	"Details"; enter information in the fields.
Change the object's mailing address	Organization, Organizational Unit	"Details"; choose "Postal Address" and enter information in the fields.
Change the object's login script	Organization, Organizational Unit, Profile	"Details"; choose "Login Script" and enter login script commands.
View, reset, or set up intruder detection for the object	Organization, Organizational Unit	"Details"; choose "Intruder Detection" and enter information in the fields.

Table 2-7   **Changing Other Object Property Values Using NetWare Administrator**

To	Select this class of object	Choose this page of the "Object" dialog box; then…
Change the list of operators or resources associated with this object	Computer, NetWare Server	"Details"; choose "Operators," "Supported Services," "Resources," or "User"; click on "Add;" and then select other objects from the "Select Object" dialog box.
Set the object's network address and protocol	Computer, NetWare Server, Volume	"Details"; choose "Network Addresses," select a network protocol, choose "Add," and then complete the fields associated with that protocol.
Change the list of other objects affiliated with this object	Any class	"Details"; choose "See Also," choose "Add," and then select other objects from the "Select Object" dialog box.
Change the list of objects belonging to the Group	Group	"Details"; choose "Members," choose "Add," and then select other objects from the "Select Object" dialog box.
Change the object's volume time or usage information	Volume	"Details"; choose "Statistics," "Dates and Times," or "User Space Limits"; then enter information in the fields.

5 To save the changes you made in all pages of the dialog and return to the browser, choose "OK."

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Object properties	"Property" in *Concepts*
Rights	"Rights" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Changing Object Property Values Using NETADMIN

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Create object right to the container of the object whose property value will be changed

Procedure

1 At the DOS prompt, type

   ```
   NETADMIN <Enter>
   ```

   For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility.

2 From the "NetAdmin Options" menu, choose "Manage Objects."

3 Browse the Directory until the object you want appears.

   Use the instructions at the bottom of the screen to browse the directory. Press <F1> for help.

4 Select the object and press <F10>.

   The "Actions" dialog box appears.

5 Select "View or Edit Properties of This Object."

6 Select an option and make any necessary changes.

   See Table 2-8 and Table 2-9 for details on object property values you can change. After you make changes, go to Step 7.

   Press <F1> for details on each field and option.

   Table 2-8 describes how to modify User object property values.

Table 2-8 **Changing User Object Property Values Using NETADMIN**

To	Choose this option from the "View or Edit Properties of This Object" menu; then…
Change the user's last name, other names, title, description, location, department, telephone number, fax number, or email address	"Identification"; enter information in the fields.
Disable the user's account	"Account restrictions"; choose "Login restrictions," and enter "Yes" in the "Account Disabled" field.
Change the user's password	"Change password"; enter new password as prompted.
Set the user's account expiration date or number of concurrent connections	"Account restrictions"; choose "Login restrictions," and enter information in the fields.
Change the user's password restrictions (password length, changes, uniqueness, grace logins)	"Account restrictions"; choose "Password restrictions," and enter information in the fields.
View, reset, or set up intruder detection on a user's account	"Account restrictions"; choose "Intruder lockout status," then view or reset information in fields to detect intruder attempts. To set up intruder detection, you must go to the "View, Edit Properties of This Object" page of the container that the users reside in, then choose "Intruder Detection," and enter information in the fields.
Restrict the user's login times	"Account restrictions"; choose "Login time restrictions," and enter information in the fields.
Change the user's login script	"Login script"; enter login script commands.
Set the user's login address restrictions	"Account restrictions"; choose "Net address restrictions," press <Insert>, select the address type, and then enter information in the fields.
Specify the user's profile login script	"Groups/Security Equal To Profile"; choose "Profile," then enter the name and context of the Profile object (or press <Insert> and select the name from the list).

Table 2-8   **Changing User Object Property Values Using NETADMIN**

To	Choose this option from the "View or Edit Properties of This Object" menu; then…
Add the user object to an existing Group	"Groups/Security Equal To Profile"; select "Groups" and press \<Enter>, then press \<Insert> and enter the Group name (or press \<Insert> again and select the Group name from the list).
Give the user a security equivalence to another user	"Groups/Security Equal To Profile"; select "Security Equal To" and press \<Enter>, then press \<Insert> and enter the complete name (or press \<Insert> again and select the name from the list).
Change the user's mailing address	"Postal Address"; enter information in the fields.
Change the user's account balance, credit, or allow unlimited balance	"Account restrictions"; choose "Account balance," and enter information in the fields.
Change the list of other objects affiliated with this user object	"See also"; enter names (or press \<Insert> and select names from the list).

Table 2-9 describes how to modify other object (non-User and non-printing) property values.

Table 2-9   **Changing Other Object Property Values Using NETADMIN**

To	Select this class of object	Choose this option from the "View or Edit Properties of This Object" menu; then…
Change the information about an object's description, location, department, organization, etc.	Any class except Print Queue, Print Server, Printer, User	"Identification"; enter information in the fields.
Change information about the object's mailing address	Organization, Organizational Role, Organizational Unit	"Postal address"; enter information in the fields.
Change the object's login script	Organization, Organizational Unit, Profile	"Login script"; enter login script commands.

Table 2-9   **Changing Other Object Property Values Using NETADMIN**

To	Select this class of object	Choose this option from the "View or Edit Properties of This Object" menu; then…
Set up the object's accounting information	NetWare Server	"Accounting"; choose "Submenus," and enter information in the fields.
Set up the object's intruder detection lockout	Organization, Organizational Unit	"Intruder detection"; enter information in the fields.
Set the object's network address and protocol	Computer	"Other properties"; select "Network address" and press <Enter>, press <Insert> and select an address type, and then enter information in other fields.
Change the list of other objects affiliated with this object	Any class except Print Queue, Print Server, Printer, User	"See also"; enter names of objects (or press <Insert> and select names from the list).
Change the list of objects belonging to the Group	Group	"Group members"; enter names of objects (or press <Insert> and select names from the list).
View the object's volume time or usage information	Volume	"Volume statistics," "Volume restrictions," "Volume features," or "Volume dates/ times"; enter information in the fields.

7   To save your changes, press <F10>.

8   Press <Esc> until you return to the "NetAdmin Options" menu.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Object properties	"Property" in *Concepts*

For more information about	Refer to
Rights	"Rights" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

3

Managing the NetWare Services File System

Introduction

This chapter provides an explanation of user types, the file access control system, and the NetWare® file system directory structure.

The sections in this chapter provide step-by-step procedures to set up your network file system so that users can access the resources they need while keeping files secure. The following types of tasks are included.

- How to enable hybrid user mapping
- How to set up file limits
- How users access files in NetWare or UNIX® mode
- How to set up a directory structure
- How to load operating systems and applications
- How to manage files and directories
- How to secure the file system

User Types

On a NetWare 4.1/9000 NetWare Services server, three different types of users can work with files and directories in the file system:

- HP-UX users have an HP-UX user account and not a NetWare user account. These users cannot access a NetWare server but can manage a NetWare server from HP-UX.

- NetWare users have a NetWare user account and do not have an explicit HP-UX user account.

- Hybrid users have both NetWare and HP-UX user accounts. These are the users who want to maintain access to the same files regardless of whether they are logged in to a NetWare account or an HP-UX account.

Regardless of your user type (unless you are a hybrid user), when using NetWare Services to access files and directories, it is strongly recommeded that all users be set up as hybrid users. Otherwise, HP-UX users can access and modify HP-UX files as if they owned them.

HP-UX Users

HP-UX user accounts provide limited NetWare server administration such as installing NetWare Services, installing NetWare Directory Services™ (NDS™), repairing NDS, setting up volumes, and so on. To use these administration tasks, you must be the System Owner on HP-UX and have permission to administer a NetWare server. (Root and the System Owner are given permission to administer NetWare Services when it is installed.)

When NetWare Services is installed and the hybrid user feature is not enabled on HP-UX, the following HP-UX accounts are used for all NetWare users but do not have hybrid user status:

- nwroot is used by the NetWare ADMIN and server processes
- nwuser is used by all NetWare users

Since NetWare Services runs as a privileged process, NetWare Services has the right to set a file's owner, group, and permission mask. All files created by NetWare users are owned by nwuser, assigned to nwgroup, and assigned the umask permission mask defined in NetWare Setup on HP-UX.

Considerations for NetWare UNIX Client (NUC) Users

NUC users can log in to a NetWare server either through the HP-UX server console or by using nwlogin and nwlogout at the HP-UX command line (see *System Owner Handbook* for information). The NetWare volumes can be accessed from the HP-UX server console, from the automounter, or from the command line using mount.

We suggest that HP-UX users who will be using HP-UX or NetWare servers be set up as hybrid users. This ensures that they are the owners of the files they create; otherwise, nwuser is the owner.

Note the following items:

• UNIX mode volumes allow you to use your permissions if you are the owner. With NetWare mode volumes, if you are the owner, you are not granted privileges other than your effective rights.

• As shown in the examples in UNIX mode, files created by nonhybrid users are owned by every other user with equal (nonhybrid) permissions. Your files can, therefore, be opened and modified by other users. For the security of users, we suggest that when using UNIX mode, you set users up as hybrid users.

The NUC adopts the following rules for files and directories:

• The NUC attaches mapped IDs (from the /etc/netware4/nwusers file or the default nwuser and nwgroup for nonhybrid users) on the inode when the file or directory is created in the HP-UX file system.

• When checking files and directories, if the NetWare login ID maps to the ID on the inode, it displays the user's HP-UX UID and GID as the owner.

The following scenerios in Table 3-1 may help you to understand how users are seen from NUC:

Table 3-1   **NUC Behavior**

User Type	ID on the Inode	Ownership as Seen from NUC	Action Performed by NUC
1. Hybrid User 1	Mapped IDs of the Hybrid User	Native IDs	Creates a file and lists the file for ownership.

Table 3-1   **NUC Behavior**

User Type	ID on the Inode	Ownership as Seen from NUC	Action Performed by NUC
2. Hybrid User 2	Not applicable	Mapped IDs of the Hybrid User	Lists the file for ownership as created by Hybrid User 1.
3. Nonhybrid User 1	nwuser, nwgroup	Native IDs	Creates a file and lists the file for ownership.
4. Nonhybrid User 2	Not applicable	Native IDs	Lists the file created by Nonhybrid User 1.

NetWare Users

NetWare user accounts provide all of the usual NetWare administration and file and directory rights known to native NetWare users. NetWare users do not have privileges on HP-UX accounts unless they are a hybrid user.

Hybrid Users

Hybrid user is the feature that allows coordination between a NetWare user account and an HP-UX user account. This feature allows a user to access or own the same files regardless of whether he or she logs in as an HP-UX user or as a NetWare user.

Without the hybrid feature, users with both NetWare and HP-UX accounts would lose access to files they create in either account while logged in with the other account. This is because NetWare has no knowledge of HP-UX user accounts and HP-UX has no knowledge of NetWare user accounts.

When HP-UX users log in and create files, they maintain rights to the files they create because they are the owner of the files. When NetWare users log in and create files, they maintain rights to the files because of trustee

assignments. However, during the creation process, NetWare Services is required to assign a HP-UX owner to the file in order to store it on any type of HP-UX file system.

NetWare Services uses nwuser, or it uses nwroot if the user on a NetWare server is ADMIN or Supervisor. The hybrid feature solves this problem by mapping the NetWare account to the HP-UX account so that when a NetWare user creates a file, the HP-UX UID becomes the owner of the file.

When HP-UX users log in to a HP-UX user account, they are denied access to the files they created as NetWare users because nwuser owns those files; their HP-UX account does not.

Setting Up a Hybrid User

Hybrid users are set up in SAM in HP-UX. See *System Owner Handbook* for information.

The tasks in this section allow the system administrator to enable hybrid user mapping for NetWare and HP-UX users.

What Happens When Hybrid User Is Active?

Table 3-2 shows the value stored in the User ID (UID) and Group ID (GID) fields for a connection when the hybrid user feature is disabled and enabled.

Table 3-2   **UID/GID Values**

Action	UID	GID
Not logged in (user)	nobody (can access SYS:LOGIN)	nogroup
Not logged in (server process)	nwroot	nwgroup
NetWare user logged in; user not a hybrid user	nwuser (users) nwroot (admin)	nwgroup nwgroup
Hybrid user logged in	HP-UX UID	UNIX user group

Allowing NetWare Users without Hybrid User Mapping

This section discusses how to enable a hybrid user to be assigned to a NetWare user who does not have hybrid user mapping.

The hybrid user feature is enabled and logins are synchronized by default.

Prerequisites

• Hybrid user account set up in SAM

• Superuser permission to use SAM

Procedure

1 Under Admin Tools aunder HP-UX, double-click on NetWare_Setup in the Networking folder.

2 Double-click on NetWare Server.

3 Double-click on Hybrid Users.

4 Set the following variable in the "Hybrid Users" window as appropriate.
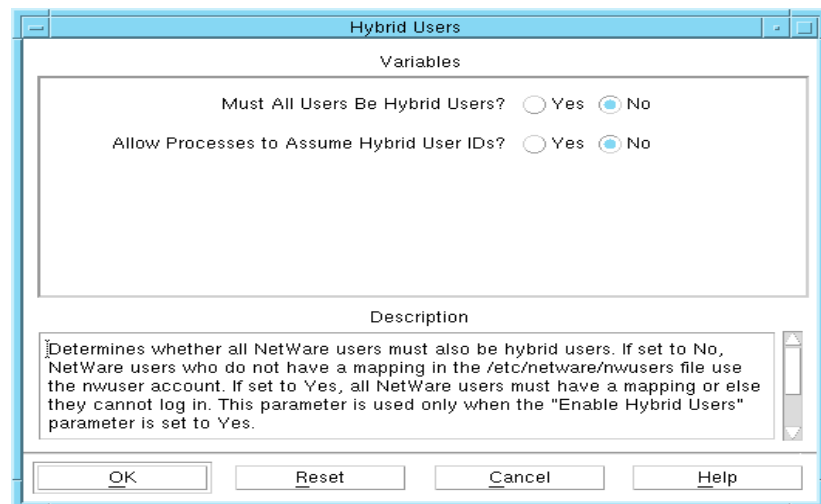
Figure 3-1   **Hybrid Users**

Must All Users Be Hybrid Users? This variable requires that all users who log in have an explicit hybrid user mapping to an HP-UX user. "Yes" means a hybrid user has mapping to an HP-UX user. The default is No.

Allow Processes to Assume Hybrid User IDs? This variable determines whether the NetWare processes use the UID or GID for the hybrid user when processing an NCP request. This is only required when a NetWare volume uses NFS to access files from remote HP-UX machines. The default is No.

5   Click OK.

File Access Control

In NetWare, trustee assignments are used to grant access to files and directories; these assignments are part of the file system. In NetWare Services, trustee assignments are kept in a separate, per-volume database in the volume's control directory.

Since NetWare Services is a process running on HP-UX, NetWare administrators can select how they want the NetWare trustee assignments and the HP-UX permissions to interact with each other in granting access.

NWS _Volume_Setup in NetWare Setup allows the network administrator to set variables for specific volumes or for volumes system-wide (see Chapter 7, "Maintaining the NetWare Server"),

Table 3-3 describes the possible modes.

Table 3-3   **File Access Control Modes**

Value	Description
None	All NetWare users are granted full access to all files and directories as if they had Supervisor rights. There are no access controls. See "Using Neither NetWare Nor HP-UX for File Access Control" in this chapter for more information.
NetWare	NetWare-only enforcement. NetWare trustee assignments and file attributes control a NetWare user's access to files and directories. File system security must be set up with NetWare utilities such as RIGHTS and NETADMIN. The HP-UX permissions are ignored. See "Using NetWare Only for File Access Control" in this chapter for more information.
UNIX	UNIX-only enforcement. HP-UX permissions control a NetWare user's access to files and directories. Trustee assignments are ignored and NetWare rights are granted according to HP-UX permissions. File system security must be set up with HP-UX utilities such as chmod, chown, and chgrp. See "Using HP-UX Only for File Access Control" in this chapter for more information.

Table 3-3   **File Access Control Modes**

Value	Description
Both	Both NetWare and HP-UX enforcement. Both NetWare trustee assignments and HP-UX permissions control file and directory access. File system security must be set from both NetWare and HP-UX. See "Using Both NetWare and HP-UX for File Access Control" in this chapter for more information.

The mode affects the performance of the Standard file system volumes. The "NetWare" and "None" modes are the fastest for the Standard file system volumes. The "UNIX" and "Both" modes are the slowest because they require more synchronization with the HP-UX file system. This slowness is most noticeable on directory searches and listings and increases with directory depth.

File Ownership

File ownership is dependent upon which user ID (UID) and group ID (GID) owns the files that are created by NetWare clients.

HP-UX UIDs and GIDs on a file are important only if

- UNIX access control is used

- The administrator wants to support hybrid users

Using Neither NetWare Nor HP-UX for File Access Control

When "None" is selected as the mode for file access control, NetWare Services ignores all file access checks. NetWare Services does not check the trustee database for trustee assignments, nor does it check NetWare file attributes.

Since NetWare Services runs as a privileged process, it can also ignore the HP-UX permissions. NetWare Services does not check to see if the user has permission as the owner, a member of the group, or other.

Volume options contain the only check NetWare Services makes when the "None" mode is set. If the Read-Only option is set, NetWare Services allows users read-only access to files.

Using NetWare Only for File Access Control

When "NetWare" is selected as the mode for file access control, rights checking is the same as it is on native NetWare. NetWare Services checks that the user has NetWare rights to the file or directory and that the NetWare file and directory attributes allow the action. Figure 3-2 illustrates this process.
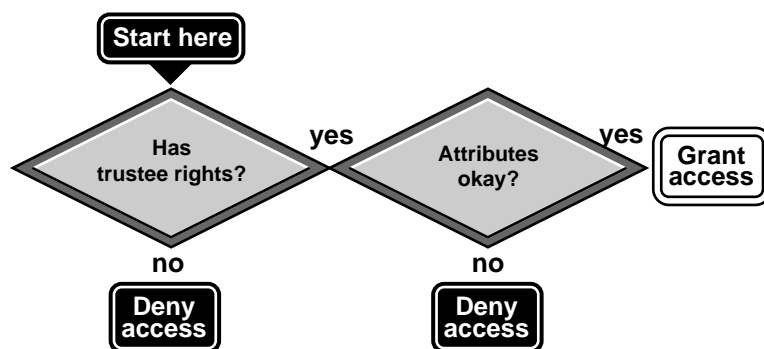
| Figure 3-2 | NetWare Security Checks |

If NetWare is the access control mode, the HP-UX permission bits are not checked at all. For client access, if files owned by Root are placed in the NetWare volume and NetWare rights allow the user to access the file, the user is allowed access.

NOTE: Remember that if the access control mode is NetWare, HP-UX file ownership and permissions are meaningless. HP-UX users creating files in NetWare volulmes may allow NetWare clients unintended access.

Trustee Rights

NetWare must calculate a user's effective rights, or rights the user can exercise, to each file and directory. This is because effective rights are determined by a combination of the Inherited Rights Filter, trustee assignments, and security equivalences.

The following basic rules are used:

1 NetWare Services compiles a list of object IDs for the user and the user's equivalencies (groups and other users).

2   If the user is the NetWare administrator or equivalent, the user is granted all rights to the file or directory.

3   NetWare Services scans up the tree from the node in question, looking for a trustee assignment granted to each object ID.

4   If one of the object IDs has been granted the Supervisor right, the user is granted all rights to the file or directory.

5   If the trustee assignment is for the node in question, the user is granted those rights.

6   If the trustee assignments are above the node in question, NetWare Services checks that rights are on in the trustee assignments and the rights in the IRFs. NetWare Services then allows these rights to be used by the user.

If multiple trustee assignments have been granted to an object ID in a branch of the tree, NetWare Services uses the trustee assignment closest to the node in question for all rights except the Supervisor right.

NetWare Services searches to the root of the volume to verify whether the Supervisor right has been granted. Since the Supervisor right cannot be revoked except in the directory where it was granted, this right overrides trustee assignments in lower directories, as well as modifications to Inherited Rights Filters.

Volume, File, and Directory Attributes

NetWare Services has one volume attribute, Read-Only. It overrides any HP-UX permissions that would allow NetWare users to write to or create files in the volume.

NetWare has a number of file and directory attributes (Delete-Inhibit, Read-Only, Rename-Inhibit, and so on) which are enforced for NetWare users.

File Access Control Utilities

Since only NetWare is used to control file access, all client access control must be set up with the NetWare utilities (such as NETADMIN, NetWare Administrator, FILER, RIGHTS, or FLAG for attributes). NetWare utilities should also correctly display the user's effective rights.

Using HP-UX Only for File Access Control

When "UNIX" is selected as the mode for file access control, the HP-UX permission bits are used to calculate effective NetWare rights to a file or directory. Each NetWare Services user has a UID and a GID and these are compared with the file or directory's UID and GID. The UID and GID are established by default or through the hybrid user feature.

Figure 3-3 illustrates this process.
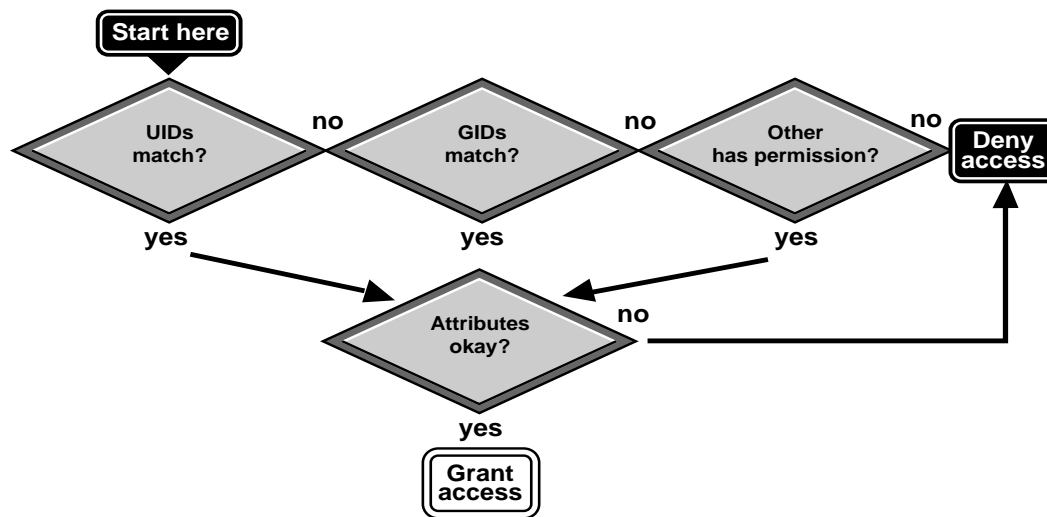
Figure 3-3   **HP-UX File Access Control Checks**

NetWare Services users can have a match on more than one UID. The UID matches under the following conditions:

- The NetWare user's hybrid UID matches the file's (or directory's) UID.

- The file's (or directory's) UID is nwuser and the user is logged in.

- The file's (or directory's) UID is nwroot and the user is logged in to the NetWare server as the network administrator.

If the user's hybrid UID is 0 (Root), the user is granted all HP-UX rights to the file or directory, regardless of HP-UX permission bits. Some NetWare rights are still restricted (namely, Supervisor and Access Control, which allow users to grant NetWare trustee assignments).

The GIDs match under the following conditions:

- The NetWare user's hybrid GID matches the file's (or directory's) GID.
  Although HP-UX allows a user to belong to more than one group, currently only
  the HP-UX user's primary group is used, the GID obtained with getpwnam ( ).
  All other group GIDs are ignored.

- The file's (or directory's) GID is nwgroup and the user is logged in.

The rights granted are determined by the HP-UX permission bits for the
UID, GID, or Other. These HP-UX permission bits are translated into
NetWare rights.

Two NetWare rights, Supervisor and Access Control, are never granted,
since granting them would imply that the user can use NetWare trustee
assignments to control access. With "UNIX" as the mode for file access,
access control changes must occur from HP-UX.

Table 3-4 shows how HP-UX rights are translated to NetWare rights.

Table 3-4 **Translating HP-UX Permissions to NetWare Rights**

HP-UX Permissions		NetWare Effective Rights	
Parent Directory	File or Directory	File	Directory
- - -	Any	No Rights	No Rights
r	Any	No Rights	No Rights
rw	Any	No Rights	No Rights
wx	Any	No Rights	No Rights
x	Any	No Rights	No Rights
w	Any	No Rights	No Rights
wx	Any	No Rights	No Rights
rwx	- - -	CE F	No Rights
rwx	r	R CE F	No Rights
rwx	rw	RWCE F	RWCE F
rwx	rwx	RWCE F	R E F

Table 3-4   **Translating HP-UX Permissions to NetWare Rights**

HP-UX Permissions		NetWare Effective Rights	
Parent Directory	File or Directory	File	Directory
rwx	r x	R CE F	No Rights
rwx	w	WCE F	No Rights
rwx	wx	WCE F	No Rights
rwx	x	CE F	No Rights
r x	- - -	F	No Rights
r x	r	R F	No Rights
r x	rw	RW F	No Rights
r x	rwx	RW F	RWC F
r x	r x	R F	R F
r x	w	W F	No Rights
r x	wx	W F	No Rights
r x	x	F	No Rights

Keep these rules for granting rights in mind:

- The File Scan right is given only if the directory has r and x permissions. In the parent directory, a user must have the x permission to access a subdirectory and r and x permissions to have any NetWare rights.

- The Modify right is given only if the user is the owner of the file and the parent directory has the Create right (HP-UX permission bits rwx are set in the parent directory).

- The Supervisor and Access Control rights are never granted.

- The Erase right is removed if the user is not the owner of the file or directory and the parent directory has the HP-UX sticky permission bit.

Additional Rules

In addition to mapping UID and GIDs and converting HP-UX permissions into NetWare rights, the following rules are used to determine HP-UX access to a file or directory:

- Attached NetWare users always have Read and Execute rights to the files in the SYS:LOGIN directory and any subdirectories.

- The path from the volume mount point is used to calculate access to a file or directory. HP-UX permissions above the volume mount point are ignored.

- To access a file or directory, a user must have the x permission in all directories from the volume mount point to the current directory in question.

  For the user to access a file in the current directory, the user must have r and x permissions to the current directory, as well as some file permissions.

Volume, File, and Directory Attributes

NetWare Services has one volume attribute, Read-Only. It overrides any HP-UX permissions that would allow NetWare users to write to or create files in the volume.

NetWare has a number of file and directory attributes: Delete-Inhibit, Read-Only, Rename-Inhibit, and so on) which are enforced for NetWare users.

Hybrid Variables

The hybrid variables affect the HP-UX enforcement of the permission bits.

Hybrid users are granted rights to files and directories that match with their hybrid UID and GID as well as to all files and directories owned by nwuser or nwgroup.

Since NetWare users who are not hybrid users use nwuser and nwgroup as their default UID and GID, all files and directories that these users create are accessible to all hybrid users.

If this is a security problem, you can set the "Hybrid Allow Default User" variable in NetWare Setup to "No." This forces every NetWare user to be a hybrid user in order to log in to the NetWare server. But it also allows all the HP-UX files and directories created from NetWare to be owned by the HP-UX user who created them.

If the NetWare volumes are NFS-mounted, set the "Allow Processes to Assume Hybrid User IDs?" variable in NetWare Setup to Yes.

Forcing all NetWare users to be hybrid users is the best method of enforcing security with the "UNIX" mode for file access. In this mode, all NetWare users should have sufficient rights to the files and directories that they create to control access from HP-UX.

File Access Control Utilities

Since neither the Supervisor or the Access Control right is ever granted on volumes with HP-UX-made access control, all the NetWare utilities (FILER, NetWare Administrator, NETADMIN, and RIGHTS) that allow users to make trustee assignments will return with an insufficient rights error. Therefore, even the NetWare administrator has insufficient rights to make trustee assignments.

Changes to NetWare rights must be done from HP-UX using HP-UX utilities. Hybrid users on DOS workstations can use NVT2™ (Novell Virtual Terminal™ 2) through Host Presenter to access the HP-UX side of the NetWare Services server and change permissions.

OS/2* clients can use NVT2 from a DOS session. For more information, see *Terminal Emulators for DOS/Windows*.

The NetWare utilities that display a user's rights should accurately display the user's effective rights as they have been translated from the HP-UX permissions.

Using Both NetWare and HP-UX for File Access Control

When "Both" is selected as the mode for file access control, the user must go through a two-operating-system check:

- NetWare must allow the access. If NetWare denies the access, the user cannot access the file or directory from NetWare.

- HP-UX must also allow the access. If the HP-UX permissions have been changed so that the NetWare user does not have permission to access to the file or directory, the user cannot access the file or directory from NetWare.

Figure 3-4 illustrates this process.
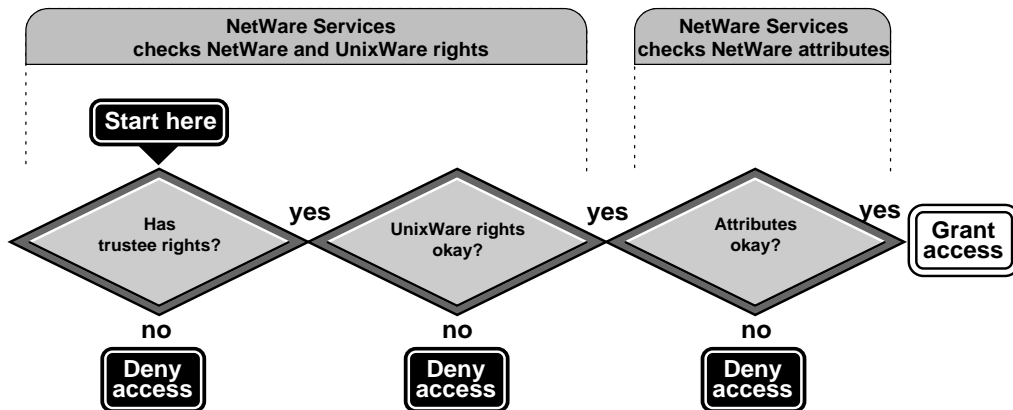
Figure 3-4   **NetWare and HP-UX File System Security Checks**

NetWare Services calculates the rights for both NetWare and HP-UX.

Once the rights are calculated for both systems, the right is granted only if both systems allow it. See Table 3-4 for information on how HP-UX permissions are translated to NetWare rights.

Three NetWare rights—Supervisor, Modify, and Access Control—do not match any HP-UX permissions. These rights are granted under the following conditions:

• The Supervisor and Access Control rights are granted from NetWare and the hybrid UID matches the HP-UX UID.

• The Modify right is granted from NetWare, the hybrid UID matches the HP-UX UID, and the user has the w (Write) permission in the parent directory.

File Access Control Utilities

The NetWare Services product access routines check both NetWare rights and HP-UX permissions before returning NetWare rights information.

NetWare and HP-UX utilities should display valid rights information except for the Supervisor right. It is possible for a user to have the Supervisor right and not have all rights to the file.

Setting Up Files

This section discusses how to set your default umask, enable host locking, and specify the number of open files allowed on a server.

Prerequisites

- Access to the server console
- Superuser permission to use SAM

Procedure

1   Under Admin Tools at the HP-UX server console, double-click on NetWare_Setup in the Networking folder.

2   Double-click on NetWare_Server.

3   Double-click on Files.

    The "NetWare Server Files Setup" window appears.
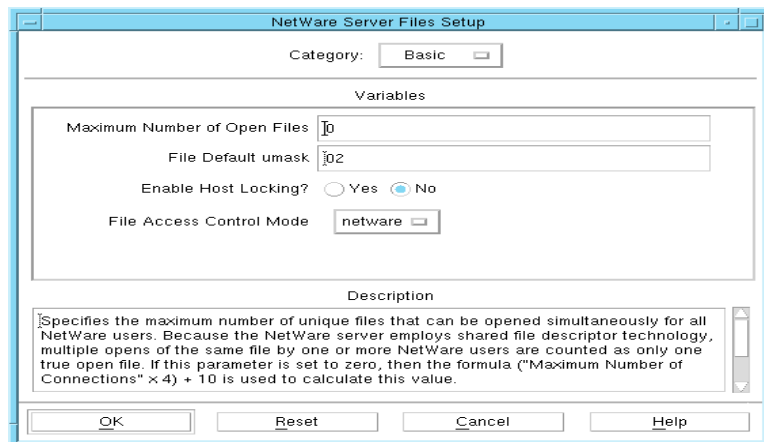
Figure 3-5   **File Configuration**

4   Set the following variables, as appropriate.

Basic. The Basic category shows the most commonly changed HP-UX file configuration variables.

Maximum Number of Open Files. This variable specifies the maximum number of simultaneous open files allowed on a server.

File Default umask. This variable specifies the host umask used to reduce host permissions on files created by NetWare users. The supported values are octal 0000 to 0777. The default is 0002 which assigns rwx permissions to the owner of the file.

Enable Host Locking? This variable specifies whether the NetWare byte range locks are mirrored on the HP-UX file system. "Yes" means any NetWare byte range lock is reflected as a HP-UX byte range lock on the entire file. "No" means the NetWare byte range lock is not reflected as a HP-UX byte range on the entire file. The default is No.

Advanced. The Advanced category shows and allows you to change the less commonly used file configuration variables.

Threshold for Purging Deleted File Entries. This variable specifies the number of deleted file entries that must exist in a directory if it is purged. By default, the value of the nwcm utility's npfs_directory_purge_threshold is used. The value can be overridden on a volume-to-volume basis using the voltab file. Smaller values cause deleted files to be purged more often. Larger values cause deleted files to be purged when the usinodes file is full. The default is 32.

Minimum Wait between Directory Synchronizations. This variable specifies the minimum number of seconds that will elapse between directory synchronization operations. By default, the npfs_directory_min_sync_interval is used. The value can be overridden on a volume-to-volume basis using the voltab file. The default is 10.

Maximum Wait between Directory Synchronizations. This variable specifies the maximum number of seconds that will elapse between directory synchronization operations. By default, the nwcm utility's npfs_directory_mandatory_sync_interval is used. The value can be overridden on a volume-to-volume basis using the voltab file. If the "Minimum Wait between Directory Synchronizations" variable is set higher than this value, "Minimum Wait between Directory Synchronizations" value is ignored. The default is 900.

5 Click OK.

Planning Directory Structures

Understanding how NetWare and HP-UX rights and permissions are translated makes file-system organization easier when administering the NetWare network. Read the following sections before planning your directory structure.

You should understand the differences between these types of directories:

- System-created directories
- Workstation operating-system directories
- Application directories
- Data directories

Figure 3-6 shows a sample directory structure.
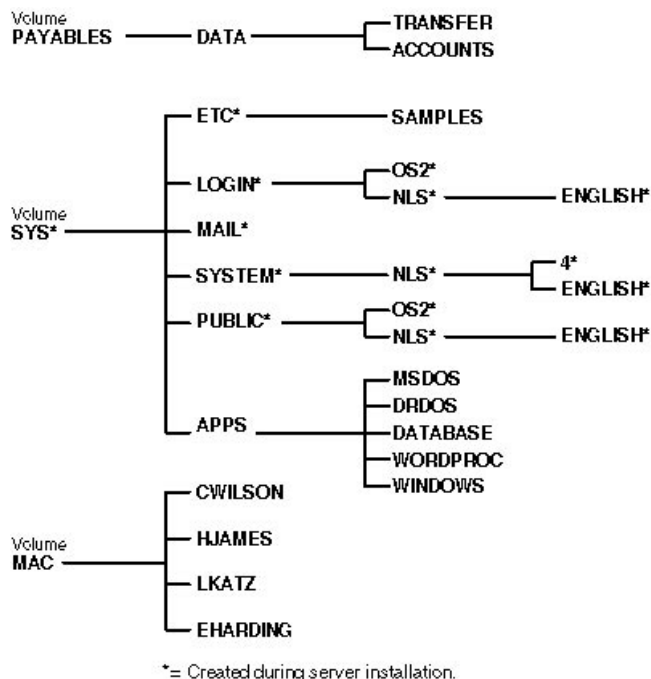
Figure 3-6   **Sample Network Directory Structure**

System-Created Directories

During NetWare Services installation, some directories are created automatically.

- SYS:ETC contains sample files to help you configure the server.

- SYS:LOGIN contains the programs necessary for users to log in to the network, such as LOGIN.EXE. The SYS:LOGIN directory has a subdirectory named NLS that contains subdirectories for each supported language of login message files.

- SYS:MAIL may or may not contain subdirectories or files. The SYS:MAIL directory may contain mail programs used by NetWare.

- SYS:SYSTEM contains NetWare operating-system files as well as NetWare utilities and programs for the supervisor. The SYS:SYSTEM directory also has an NLS subdirectory, containing subdirectories for each supported language of message files.

- SYS:PUBLIC allows general access to the network and contains NetWare utilities and programs for network users. Like SYS:LOGIN, SYS:PUBLIC has a an NLS subdirectory containing the message files for utilities.

- SYS:DOC contains electronic versions of the NetWare Services manuals. This directory is created if you install DynaText.* See *Installation Handbook* for information.

Workstation Operating-System Directories

You may want to put the workstation operating-system files on the network to save workstation disk space or to make diskless workstations possible.

Since the workstation operating-system files do not normally change, you can keep them on one set of backup diskettes and then skip these directories when doing network backups.

For information about loading operating system software on a network, see "Loading Operating Systems and Applications onto the Network" in this chapter.

Application Directories

For ease of management, you should keep application files in a different directory than data files.

Since the application programs do not normally change, you can keep one set of application files on backup diskettes and then skip the application directories when doing network backups.

For more information about loading applications on the network, see "Loading Operating Systems and Applications onto the Network" in this chapter.

Data Directories

Data directories can include work areas where groups or users keep work files. You can also create a directory to serve as a transfer point for copying files to and from various areas of the network.

Creating Directories and Copying Files

After you plan your directory structure for each NetWare volume, you can create directories and subdirectories to organize data and applications. (If you have not created the volume, see "Maintaining Volumes" in Chapter 7.)

You can use one of several tools to divide a NetWare volume into directories, for example, use NetWare Administrator, or FILER, or MKDIR (MD) to do this.

Two methods of creating directories and copying files (NetWare Administrator and FILER) are documented in this section.

Creating Directories Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Create right to the parent directory of the new directory

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select the directory to be the parent directory of the one you want to create.

 To create a root directory, select the Volume object. For more about moving around in the browser and selecting objects, choose "Help" from the menu bar.

 For a list of directories and files on a volume, select "View/Set Context" and specify the volume name.

3 From the "Object" menu, choose "Create."

4 Enter the name for the new directory in the "Create Directory" dialog box.

5 (Optional) If you want to enter properties for the directory, choose "Define Additional Properties."

 Choose this item to assign properties to the new directory now. You can add or modify properties after the directory is created. Properties include items such as trustees and access rights.

6 (Optional) To create another directory immediately after this one, choose "Create Another Directory."

7 To create another directory with the name you entered, choose "Create."

The new directory is created. You are returned to the browser.

Additional Information

For more information about	Refer to
Assigning directory and file rights	"Making the File System Secure and Accessible" in this chapter
Directories for workstation operating systems	"File system" in Concepts
Filesystem rights	"Attributes," "Effective rights," "Inherited Rights Filter," "Rights," and "Security" in Concepts
Using NetWare Administrator	"NetWare Administrator" in Utilities Reference

Creating Directories Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available on the workstation

- The Create right to the parent directory of the new directory

Procedure

1 At the DOS prompt, type

```
FILER <Enter>
```

A list of available options appears.

Your current context, Volume object, and path are shown in the upper left corner of the screen. Make sure you are in the correct location in the Directory tree when you create the new directory.

2 Select "Manage Files and Directories."

The "Directory Contents" list appears.

3 Find and select the volume, directory, or subdirectory in which you want to create a new directory by completing the following steps:

- If the item you want appears on the list, select it and press <Insert>.

- If the item is not on the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <Insert>.

- If you cannot find what you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 When you are prompted, type the name of the new directory and press <Enter>.

The directory or subdirectory is created. After you create it, you can change default attributes, assign rights, and make trustee assignments for the directory or subdirectory.

5 To exit, press <Esc> until the menu you want appears.

Additional Information

For more information about	Refer to
Assigning directory and file rights	"Making the File System Secure and Accessible" in this chapter
Filesystem rights	"Understanding File and Directory Rights" on in this chapter
	"Attributes," "Effective rights," "Inherited Rights Filter, " "Rights," and "Security" in Concepts"Adding a Trustee to a Directory or File" in this chapter
Using FILER	"FILER" in Utilities Reference

Copying or Moving Files Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator.

- The File Scan right to the source directory and the Create right to the destination directory. In addition, to move files (delete them from the source directory), you

need the Erase right.

Procedure

1   From the Windows Program Manager, click on the "NetWare Administrator" icon.

2   Using the browser, select the directory and then select one or more files in that directory that you want to copy or move.

To select multiple files, press <Ctrl> on the keyboard while clicking on the files.

For information about moving around in the browser and selecting objects, choose "Help" from the menu bar.

3   From the "Object" menu, choose "Move" or "Copy."

A list appears of the files you selected.

4   From the "Operation" dialog, select either "Move" or "Copy."

5   Choose the browser button next to the "Destination" field.

6   Using the browser, select a directory in a volume for the destination of the directories or files.

7   Choose "OK."

The destination directory is listed in the "Destination" field.

8   Choose "OK."

The listed files are copied or moved to the destination directory.

Additional Information

For more information about	Refer to
Filesystem directories and files	"Directory structure, file system" in Concepts
Filesystem rights	"Understanding File and Directory Rights" in this chapter
	"Attributes," "Effective rights," "Inherited Rights Filter, file system," Rights," and "Security" in Concepts

For more information about	Refer to
Using NetWare Administrator	"NetWare Administrator" in Utilities Reference

Copying or Moving Files Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER.

- A minimum of 512 KB of memory available on the workstation.

- The File Scan right to the source directory and the Create right to the destination directory. In addition, to move files (delete them from the source directory), you need the Erase right.

Procedure

1 At the DOS prompt, type

   ```
   FILER <Enter>
   ```

   A list of available options appears.

   Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

   The "Directory Contents" list appears.

3 Find the volume, directory, or subdirectory that contains the source files.

   Browse the directory structure by selecting a directory or subdirectory and pressing <Enter> until you see the directory or files you want to copy.

   If you cannot find the directory or files you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

   Depending on the operation you want to perform next, go to either Step 4 or Step 5.

4 (Optional) To move or copy a directory or subdirectory and all its contents,

complete the following steps.

a   Select the directory and press <F10>.

b   Select the option you want from the "Subdirectory Options" menu.

c   At the prompt, type in the complete path to the destination directory, or press <Insert> to search for the destination directory.

d   Press <F10> to start the copy or move process.

The progress of the transaction is shown in an information box.

5   (Optional) To copy specific files, complete the following steps:

a   Select the directory containing the files and press <F5>.

b   Press <F5> to mark the files you want to copy.

Browse the directory structure by selecting a directory and pressing <Enter> until you see the directory or files you want to copy.

If you cannot find the directory or files you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

c   After all the files are marked, press <F10>.

d   From the "Multiple File Operations" menu, select "Copy Marked Files."

The "Copy Files To:" box appears.

e   Type in the complete path to the destination directory or press <Insert> to search for the destination directory.

f   Press <F10> to start copying the files.

The progress of the transaction is shown.

6   To exit, press <Esc> until the menu you want appears.

Additional Information

For more information about	Refer to
Directories and files	"File system" in Concepts
Filesystem rights	"Understanding File and Directory Rights" in this chapter

For more information about	Refer to
	"Attributes," "Effective rights," "Inherited Rights Filter," "Rights," and "Security" in Concepts
Using FILER	"FILER" in Utilities Reference

Loading Operating Systems and Applications onto the Network

You may want to load workstation operating system (OS) files on the network to save workstation disk space or to allow diskless workstations to log in to the network. This section explains the following tasks:

- Loading DOS

- Loading Windows

- Loading other applications

- Assigning trustee rights to OS and application directories

Loading DOS onto the Network

Prerequisites

- A workstation running DOS 3.30 or later

- The Supervisor or Create right to the directory where you want to load the application

Procedure

1 Create a directory in SYS:PUBLIC for each workstation type and version of DOS you will be using on your network.

Name your directories according to the following convention:

```
SYS:PUBLIC\machine\os_type\os_version
```

For each directory, replace machine with the six-character machine name of the workstation (such as IBM_PC or COMPAQ).

Replace os_type with the type of DOS you are using (such as MSDOS or DRDOS). Replace os_version with the DOS version number.

For example, to install MS-DOS 5.0 on an IBM* PC, go to SYS:PUBLIC to create the DOS subdirectory. To use the DOS MD command, type the commands shown next (in order):

```
MD IBM_PC <Enter>
CD IBM_PC <Enter>
```

```
MD MSDOS <Enter>
CD MSDOS <Enter>
MD 50 <Enter>
CD 50 <Enter>
```

2   Load DOS.

Follow the instructions in the DOS documentation to load the DOS software into the directory you created.

3   In the system login script, map the second search drive to the DOS directory.

If all users have the same types of computers and are using the same version of DOS, you will probably have only one DOS directory. In this case, add a line similar to the following, substituting the correct directory names:

```
MAP S2:=SYS:PUBLIC\IBM_PC\MSDOS\50
```

If your network has more than one DOS directory, use variables to indicate the directory path. These variables are replaced by the correct information from the workstation software when each user logs in.

Enter the following command, exactly as shown, in the login script:

```
MAP   S2:=SYS:PUBLIC\%MACHINE\%OS\%OS_VERSION
```

(The first search drive should be mapped to the PUBLIC directory so that users can access NetWare utilities.) So that the %MACHINE variable will work, make sure the long machine type is set in each station's NET.CFG file.

For example, a station might have the following line in its NET.CFG file:

```
LONG MACHINE TYPE = IBM_PC
```

4   Add COMSPEC to the container login script.

Following is the proper syntax for the COMSPEC command:

```
COMSPEC=Y:COMMAND.COM
```

This command tells the workstation where to find the command processor.

Additional Information

For more information about	Refer to
Loading DOS on the network	The DOS manual that came with your software

For more information about	Refer to
Login scripts	Chapter 5, "Customizing the User Environment"
Running DOS on a workstation	NetWare Client for DOS/Windows User Guide

Loading Windows onto the Network

You can load Windows onto a network in several ways.

- Load all Windows files on a user's local hard drive.

- Load Windows program files on the server, and load user files on local hard drives.

- Load all Windows program and user files on the server. In most cases, this installation provides the easiest maintenance and most efficient use of resources.

Instructions for the first two options are included in the documentation that came with your Windows software. Instructions for loading program and user files on the server are included in this section.

Following are some advantages of having all Windows files installed on the server:

- Program and configuration files are backed up and secure.

- No hard disk is required on the user workstation.

- The .INI and driver files for all users can be updated from one location.

- Configuration files always match hardware.

The only disadvantage of having all Windows files installed on the server is that it causes more network traffic.

Files Needed for NetWare Functionality in Windows

Use the following files to run Windows with NetWare functionality. These files are in the Workstation for DOS/Windows client kit that is installed with NetWare Services.

File	Function
NETWARE.DRV	NetWare device driver. Contains executable code for NetWare-related functions.
NETWARE.HLP	Help file for NETWARE.DRV.
NETWARE.INI	Initialization file for NETWARE.DRV and other Windows utilities for NetWare. Automatically created by NETWARE.DRV.
NWPOPUP.EXE	Handler for broadcast messages.
VNETWARE.386	Virtual NetWare device driver. Performs virtualization among sessions when Windows is in 386 Enhanced mode.
VIPX.386	Virtual IPX™ device driver. Virtualizes IPX communications among sessions when Windows is in 386 Enhanced mode.

Guidelines for Running Windows on the Network

Follow these guidelines for running Windows on the network:

- Use a permanent swap file on a local hard drive, if possible; do not use network directories for swap files. If a local swap file is not possible, consider increasing RAM to a minimum of 8 MB.

- Ensure that the RAM plus swap file size is at least 10 MB.

- Remove Windows search drives from the workstation AUTOEXEC.BAT file.

- If users are running DR DOS, make sure DR DOS files are dated 07 April 1992 or later.

- If users are running DR DOS, make sure their CONFIG.SYS files install EMM386.SYS and configure it for use with Windows. See your DR DOS manual or DR DOS online help for configuration information.

Loading and Setting Up Windows

Prerequisites

- A workstation running DOS 3.30 or later

- The Supervisor or Create right to the directory where you are loading Windows

- A licensed network copy of Windows 3.1 or later

- 16 MB of available disk space

- NetWare Client for DOS and Windows

Procedure

1   Install Windows server software using the SETUP /A option.

For complete information about the Windows SETUP options and the installation procedure, see the documentation that came with your Windows software.

2   Create a Group object for users who will be running Windows.

For instructions on creating a Group object, see "Managing Group Objects" in Chapter 2.

3   Make the Windows Group object a trustee of the Windows directory.

For instructions on granting trustee assignments, see "Adding a Trustee to a Directory or File" in this chapter.

4   Create a directory for each user to store user-specific Windows files.

WIN.COM and files such as .GRP and .INI files are stored here.

5   Add the following information to the system login script.

An example of the syntax used for these login script entries appears at the end of this step.

a   Map a drive to the user-specific directories for the MS Windows group.

b   Map a search drive to the Windows directory for the MS Windows Group object.

c   Set the Windows TEMP directory to a subdirectory of the user directory.

The following example shows the container login script entries you would add to set up Windows 3.1 on the network:

```
IF MEMBER OF "WIN31" THEN
```

```
MAP INS P:=SYS:USERS\%LOGIN_NAME\WIN31
MAP INS S16:=SYS:APPS\WINAPPS\WIN31
SET TEMP = "P:\USERS\%LOGIN_NAME\WIN31\TEMP"
END
```

6 Set up the workstations by completing the following steps.

    a Change to the search drive mapped to the Windows directory.

       Enter the drive letter only.

    b Modify the user AUTOEXEC.BAT and CONFIG.SYS files by typing

       SETUP /N <Enter>

       Select the "Custom" option to make sure environment variables are correct. When Windows prompts for a path during setup, enter the drive letter instead of the path.

    c Install the NetWare Workstation for MS Windows software.

       Follow the instructions in NetWare Client for DOS/Windows User Guide to install the workstation software and update NetWare-specific files in the Windows directory.

Additional Information

For more information about	Refer to
Creating login scripts	Chapter 5, "Customizing the User Environment"
Installing Windows on the network	The Windows manual that came with your software
Running Windows on a workstation	*NetWare Client for DOS/Windows User Guide*

Loading Other Applications onto the Network

You can load various types of network applications, such as word-processing or spreadsheet programs, to make them available to users. When loading applications, keep the following in mind:

• You need the Create right in the directory where you will be loading the

application.

- Follow the instructions in the application's documentation for loading the application onto a network.

- Make sure the application is designed for network (multiuser) use, and that you observe any licensing restrictions on the number of users who can access the application.

- To allow users to access network-based applications, map search drives to the directories that contain these applications. To make these search drives permanent, place them in login scripts that are executed when users log in.

- If the application requires that it be installed at the root of a volume but you would rather install it in a subdirectory for security reasons, you can map the directory to a fake root. To map a fake root directory, use the MAP ROOT command as explained in "MAP" in this chapter.

- You can create a Directory Map object that points to an application directory.

  Directory Map objects are useful in login scripts—instead of mapping a drive to a specific directory path, you map a drive to a Directory Map object that points to a directory.

  If you change the directory path, you need to change only the Directory Map object's definition.

Additional Information

For more information about	Refer to
Creating login scripts	Chapter 5, "Customizing the User Environment"
Mapping search drives and fake roots in login scripts	"MAP" in Chapter 5

Assigning Trustee Rights to Operating-System and Application Directories

Application programs need a set of file system rights that make them available to users yet protect them from being corrupted. Keep the guidelines that follow in mind as you assign file and directory rights to executable, application, and program files.

When you are ready to assign file and directory attributes and rights, see "Making the File System Secure and Accessible" in this chapter.

Use the FLAG utility to assign rights as follows:

- Assign the Shareable and Read-Only attributes to application and workstation operating-system files.

- Assign the Execute Only attribute to executable files for which you keep permanent backups.

- Assign Read and File Scan rights to the User or Group objects that need to use the application.

Additional Information

For more information about	Refer to
Assigning file and directory rights	"Changing Attributes of a Directory or File" in this chapter
Understanding filesystem rights	"Effective rights" and "Rights" in *Concepts*
Using the FLAG utility	"FLAG" in *Utilities Reference*

Creating and Using Directory Map Objects

Directory map objects make it easier to find applications and files within a directory structure. You can create these objects by using either NetWare Administrator or NETADMIN. Both procedures are described in this section.

How to Use Directory Map Objects

A Directory Map object is an object that represents a particular directory in the file system. It can be especially useful in login scripts by indicating directories that contain applications or other frequently used files.

By using a Directory Map object, you can avoid having to make changes to the login scripts.

For example, if you have a directory that contains DOS 5.0, you will probably map a search drive to that directory in any login scripts you create.

If you should later upgrade to DOS 6.0 and rename the directory, you would have to change the mapping in every login script where that search mapping appears. To do this, you would create a Directory Map object called CURRENT_DOS that points to the DOS directory SYS:PUBLIC\IBM_PC\MSDOS\5.0.

Then in a MAP command in your login scripts, you would map a search drive to the Directory Map object rather than to the specific directory:

```
MAP INS S2:=.CURRENT_DOS.SALES.ACME_US
```

When users log in, their search drive is mapped to the CURRENT_DOS Directory Map object, which points to the directory containing DOS 5.0.

Later, if you upgrade to DOS 6.0 and change the directory's name to SYS:PUBLIC\IBM_PC\MSDOS\60, you would change only the Directory Map object to indicate the new path.

You would not have to change the MAP command in the login script because it still indicates the correct Directory Map object.

Additional Information

For more information about	Refer to
Creating login scripts	Chapter 5, "Customizing the User Environment"
Mapping drives to Directory Map objects in login scripts	"MAP" in Chapter 5
Using the MAP utility	"MAP" in *Utilities Reference*

Creating a Directory Map Object Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Create object right to the container where the Directory Map object will be created

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the browser, select the Organization or Organizational Unit object that will contain the Directory Map object.

 For information about moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Create."

4 From the "New Object" dialog box, choose "Directory Map."

5 Choose "OK."

6 Enter the name for the Directory Map object in the space provided.

7 In the "Volume" field, enter the name of the Volume to which this Directory Map object will point.

 You can either type in the complete name of the Volume object or choose the browser button to the right of the "Volume" field to browse for the Volume object.

8 In the "Path" field, enter the path of the directory to which this Directory Map

object will point.

You can type in the path, or you can choose the browser button to the right of the "Path" field to browse for the directory to which the Directory Map object will point.

If the Directory Map Object will point to the root of the specified Volume, leave the "Path" field blank.

9 (Optional) To define additional properties immediately after creating the Directory Map object, choose "Define Additional Properties."

10 (Optional) To create another Directory Map object immediately after this one, choose "Create Another Directory Map."

11 Choose "Create."

The Directory Map object is created.

If you chose "Create Another Directory Map," the Create dialog box appears.

If you chose "Define Additional Properties," the identification screen appears.

Additional Information

For more information about	Refer to
Directory Map objects	"Directory Map object" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating a Directory Map Object Using NETADMIN

Prerequisites

• A workstation running DOS 3.30 or later and NETADMIN

• A minimum of 512 KB of memory available on the workstation

• The Create object right in the container where the Directory Map object will be created

Procedure

1 At the DOS prompt, type

```
NETADMIN <Enter>
```

2 From the "NetAdmin Options" menu, choose "Manage Objects."

3 Find the Organization or Organizational Unit object that will contain the Directory Map object.

Browse the Directory tree by selecting objects and pressing <Enter>. When you find the object that will contain the Directory Map object, select it and press <Enter>.

4 Press <Insert>.

5 From the "Select an Object Class" menu, choose "Directory Map."

6 Type the name for the Directory Map object and press <Enter>.

7 In the "Volume Object Name" field, press <Insert>.

8 Enter the name of the Volume object to which this Directory Map object will point.

You can either type the Volume object's complete name, or you can press <Insert> to browse through the Directory tree.

9 In the "Path on Volume:" field, press <Insert>.

10 Enter the path of the directory to which this Directory Map object will point.

You can either type the full path or press <Insert> to browse through the file-system directory structure in the Volume defined in Steps 7 and 8; then press <Enter>.

If the Directory Map object will point to the root of the specified Volume, leave the "Path" field blank and press <Enter>.

11 From the "Name Spaces" box, select the type of name space for the volume and press <Enter>.

12 To save the changes, press <F10>.

Additional Information

For more information about	Refer to
Directory Map objects	"Directory Map object" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Making the File System Secure and Accessible

Ensuring filesystem security is essential when hundreds of thousands of users are accessing directories and files on a NetWare server daily. The following sections discuss how to add, delete, and modify owners, trustee rights, and attributes for directories and files.

Understanding File and Directory Rights

Filesystem security includes assigning trustee rights and setting file and directory attributes. These two types of security are discussed in the following sections.

Trustee Rights

Trustee rights are given to User objects, Group objects, or Organizational Role objects. These rights determine the access users may have to directories and files. These rights are explained in Table 3-5.

Table 3-5   **Trustee Rights**

Right	Allows object to
Access Control	Add and remove trustees and change rights to files and directories.
Create	Create subdirectories and files.
Erase	Delete directories and files.
File Scan	View file and directory names in the filesystem structure.
Modify	Rename directories and files and change file attributes.
Read	Open and read files; open, read, and execute applications.
Supervisor	Grant all rights listed in this table.
Write	Open, write to, and modify a file.

Directory and File Attributes

Directory and file attributes assign properties to individual directories or files. Some are only meaningful when applied at the file level. Some apply to both the directory and the file levels. Not all attributes are supported on the NetWare server (see Table 3-6).

Be careful when assigning directory and file attributes. Attributes apply to all users and can supersede trustee rights.

For example, if you assign a file the Delete Inhibit attribute, no one, including the owner of the file or the system supervisor, can delete the file.

Table 3-6   **Directory and File Attributes**

Attribut	Description	Applies to
A	Archive Needed identifies files that have been modified since the last backup. This attribute is assigned automatically.	Files only
Ci*	Copy Inhibit prevents Macintosh* users from copying a file. This attribute overrides Read and File Scan trustee rights.	Files only
Dc*	Don't Compress keeps data from being compressed. This attribute overrides settings for automatic compression of files not accessed within a specified number of days.	Directories and files
Di	Delete Inhibit prevents the file or directory from being deleted. This attribute overrides the Erase trustee right.	Directories and files
Dm*	Don't Migrate prevents files and directories from being migrated from the server's hard disk to another storage medium.	Directories and files
Ds*	Don't Suballocate prevents data from being suballocated.	Files only
H	The Hidden attribute hides files and directories so they can't be seen using the DIR command. A user with File Scan rights can use FILER or NDIR to list directories and files with the Hidden attribute.	Directories and files
l*	Index allows large files to be accessed quickly by indexing files with more than 64 File Allocation Table (FAT) entries. This attribute is set automatically.	Files only

Table 3-6   **Directory and File Attributes**

Attribut	Description	Applies to
Ic*	Immediate Compress sets data to be compressed as soon as a file is closed. If it is applied to a directory, every file in the directory is compressed as it is closed.	Directories and files
N	Normal indicates the Read/Write attribute is assigned and the Shareable attribute is not. This is the default attribute assignment for all new files.	Directories and files
Ri	Rename Inhibit prevents the file or directory name from being modified.	Directories and files
Ro	Read Only prevents a file from being modified. This attribute automatically sets Delete Inhibit and Rename Inhibit.	Files only
Rw	Read/Write allows users to write to a file. All files are created with this attribute.	Files only
Sh	Shareable allows more than one user to access the file at one time. This attribute is usually used with Read Only.	Files only
Sy	The System attribute hides the file or directory so it can't be seen by using the DIR command. It can be seen if a user with File Scan rights uses FILER or NDIR. System is normally used with operating-system files, such as DOS system files.	Directories and files
T*	Transactional allows a file to be tracked and protected by the Transaction Tracking System™ (TTS™).	Files only
X	The Execute Only attribute prevents the file from being copied, modified, or backed up. The attribute cannot be removed unless the file is deleted. It does not allow renaming. Use the attribute for program files such as the .EXE or .COM files. Make a copy of a file before you flag it Execute Only, so you can replace the file if it becomes corrupted.	Files only

* Not supported by NetWare Services, even though it may be set.

Adding a Trustee to a Directory or File

You can add a trustee to a directory or file using either NetWare Administrator or FILER. Both procedures are described in this section.

Adding a Trustee Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Access Control right to the file or directory to which you want to add the trustee

Procedure

1 From the Windows Program Manage, click on the "NetWare Administrator" icon.

2 Using the browser, select the directory or file to which you want to add a trustee.

For information about moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Details."

4 From the "Identification" page, choose "Trustees of This Directory."

5 From the "Trustees of This Directory" page, choose "Add Trustee."

6 Select a trustee from the list.

If the object does not appear in the list, browse the Directory tree to find the object that you want to make a trustee of the file or directory.

7 Choose "OK."

8 To grant rights to the trustee name, mark the appropriate check boxes below the trustee.

9 To return to the browser, choose "OK."

Additional Information

For more information about	Refer to
File-system rights	"Trustee Rights" in this chapter
Trustees	"Trustee" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Adding a Trustee Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available in the workstation

- Access Control right to the file or directory to which you want to add the trustee

Procedure

1 At the DOS prompt, type

```
FILER <Enter>
```

A list of available options appears.

Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

The "Directory Contents" list appears.

3 Find and select the file or directory you want.

- If the item you want appears in the list, select it and press <F10>.

- If the item is not in the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <F10>.

- If you cannot find the directory you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 Select "View/Set File [or Directory] Information" and press <Enter>.

Information for that file or directory appears.

5 Use the arrow keys to move to the "Trustees" field and press <Enter>.

A list of trustees for that file or directory appears.

6 To add a trustee, press <Insert> and locate the trustee's name in the list. Select the name and press <Enter>.

The new trustee, object type, and default rights appear in the list.

7 (Optional) Add another trustee to this file or directory.

Press <Esc> until you get to the "View/Set File [or Directory] Information" screen and then repeat Steps 5 and 6.

8 (Optional) Assign rights to the new trustee.

You can assign or modify trustee rights now, or at any time after the trustee has been assigned to the directory or file.

a From the trustee list, select the user you want to assign or modify rights for and press <Enter>.

The "Trustee Rights" list appears, showing the rights the trustee currently has to this directory or file.

b Press <Insert> to see a list of rights you can assign.

c Select a right you want to give the trustee and press <Enter>. To give the trustee more than one right, press <F5> to mark the rights, and then press <Enter>.

The "Trustee Rights" list reappears with the new rights added.

d Press <Esc>.

The new rights appear next to the trustee name.

9 Exit FILER by pressing <Esc> until you reach the Exit confirmation box and select "Yes."

Additional Information

For more information about	Refer to
Filesystem rights	"Trustee Rights" in this chapter
Trustees	"Trustee" in *Concepts*
Using FILER	"FILER" in *Utilities Reference*

Deleting a Trustee from a Directory or File

You can delete a trustee from a directory or file using NetWare Administrator or FILER. Both procedures are described in this section.

Deleting a Trustee Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Access Control right to the file or directory to which you want to delete the trustee

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select a directory or file from which you want to delete a trustee.

   For information on moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Details."

4 From the "Identication" page, choose "Trustees of This Directory."

5 From the "Trustees" list, select a trustee.

6 Choose "Delete Trustee."

7 To delete that object as a trustee, choose "Yes."

8 To return to the browser, choose "OK."

Additional Information

For more information about	Refer to
Trustees	"Trustee" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Deleting a Trustee Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available on the workstation

- The Access Control right to the file or directory to which you want to delete the

trustee

Procedure

1 At the DOS prompt, type

```
FILER <Enter>
```

A list of available options appears.

Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

The "Directory Contents" list appears.

3 Find and select the file or directory you want.

- If the item you want appears on the list, select it and press <F10>.

- If the item is not on the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <F10>.

- If you cannot find what you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 Select "View/Set File [or Directory] Information" and press <Enter>.

Information for that file or directory appears.

5 Use the arrow keys to move to the "Trustees" field and press <Enter>.

A list of trustees for that file or directory appear.

6 Select the trustee you want to delete, and then press <Delete>.

You are prompted to delete that trustee from the file or directory.

7 Select "Yes."

8 To exit, press <Esc> until the menu you want appears.

Additional Information

For more information about	Refer to
Trustees	"Trustee" in *Concepts*
Using FILER	"FILER" in *Utilities Reference*

Modifying a Trustee's Rights to a Directory or File

You can modify trustee rights to a directory or file using NetWare Administrator or FILER. Both procedures are described in this section.

Modifying a Trustee's Rights Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Access Control right to the file or directory to which you want to change the trustee rights

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select the file or directory for which you want to change trustee rights.

 For information about moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Details."

4 From the "Identification" page, choose "Trustees of This Directory."

5 From the "Trustees" list, select a trustee.

6 Grant or revoke rights by marking the check boxes below the trustee name.

7 Choose "OK" to save the trustee rights.

Additional Information

For more information about	Refer to
Filesystem rights	"Trustee Rights" in this chapter
	"Rights" in *Concepts*
Trustees	"Trustee" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Modifying a Trustee's Rights Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available on the workstation

- The Access Control right to the file or directory for which you want to change the trustee rights

Procedure

1 At the DOS prompt, type

   FILER <Enter>

   A list of available options appears.

   Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

   The "Directory Contents" list appears.

3 Find and select the file or directory you want.

   - If the item you want appears in the list, select it and press <F10>.

   - If the item is not on the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <F10>.

   - If you cannot find the item you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 Select "View/Set File [or Directory] Information" and press <Enter>.

5 Using the arrow keys, move to the "Trustee" field and press <Enter>.

6 Select the name of the trustee whose rights you want to modify and press <Enter>.

   A list of the trustee's current rights appears.

7 Press <Insert> to see a list of rights you can assign.

8 Select a right you want to give the trustee and press <Enter>. If you want to assign more than one right, press <F5> to mark the rights, then press <Enter>.

   The "Trustee Rights" list reappears, showing the new list of rights.

9   To exit, press <Esc>.

The new rights appear next to the trustee name.

Additional Information

For more information about	Refer to
Filesystem rights	"Rights" in *Concepts*
Trustees	"Trustee" in *Concepts*
Using FILER	"FILER" in *Utilities References*

Viewing or Modifying the Inherited Rights Filter for Directories and Files

You can view or modify the Inherited Rights Filter (IRF) for a directory or file using NetWare Administrator or FILER. Both procedures are described in this section.

Viewing or Modifying the IRF Using NetWare Administrator

Prerequisites

*   A 386 or later workstation and NetWare Administrator

*   The Access Control right to the file or directory to which you want to view or modify the IRF

Procedure

1   From the Windows Program Manager, click on the "NetWare Administrator" icon.

2   Using the browser, select a directory or file.

For information on moving around in the browser and selecting objects, choose "Help" from the menu bar.

3   From the "Object" menu, choose "Details."

4   From the "Identification" page, choose "Trustees of This Directory."

5   Under "Inheritance Filter," select the check boxes for the rights that you want to allow to be inherited for that directory or file.

6   Choose "OK."

The "Trustees" dialog box reappears.

7 To return to the browser, choose "OK."

Additional Information

For more information about	Refer to
Inherited rights	"Directory and File Attributes" in this chapter
	"Attributes,"Inherited Rights Filter," and "Rights" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Viewing or Modifying the IRF using FILER

Prerequisites

• A workstation running DOS 3.30 or later and FILER

• A minimum of 512 KB of memory available on the workstation

• The Access Control right to the file or directory for which you want to view or modify the filter

Procedure

1 At the DOS prompt, type

```
FILER <Enter>
```

A list of available options appears.

Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

The "Directory Contents" list appears.

3 Find and select the file or directory you want.

  • If the item you want appears in the list, select it and press <F10>.

  • If the item is not on the list, browse a directory by selecting it and pressing

<Enter> until you see the item you want. Select it and press <F10>.

- If you cannot find what you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 Select "View/Set File [or Directory] Information" and press <Enter>.

Information for that file or directory appears. The current inherited rights are shown in the "Inherited Rights Filter" field.

5 Use the arrow keys to move to the "Inherited Rights Filter" field and press <Enter>.

A list of the rights inherited by the file or directory appears.

6 Select a file or directory attribute you want to revoke and press <Delete>. To revoke more than one attribute, press <F5> to mark attributes, then press <Delete>.

7 Press <Esc>.

The "File [or Directory] Information" screen reappears with a listing of the rights that can be inherited.

8 To exit, press <Esc> until the menu you want appears.

Additional Information

For more information about	Refer to
Inherited rights	"Directory and File Attributes" in this chapter
	"Attributes," "Inherited Rights Filter," and "Rights" in *Concepts*
Using FILER	"FILER" in *Utilities Reference*

Changing Attributes of a Directory or File

You can change the attributes of a directory or file using NetWare Administrator or FILER. Both procedures are described in this section.

Changing Attributes Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Modify right to the file or directory whose attributes you want to change

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select a directory or file.

  For information on moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Details."

4 From the "Identification" page, choose "Attributes."

5 Select the check boxes for the attributes that you want to set or change for this directory or file.

6 To close the "Object" dialog box and save the new attributes, choose "OK."

Additional Information

For more information about	Refer to
File and directory attributes	"Directory and File Attributes" in this chapter
	"Attributes" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Changing Attributes Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available on the workstation

- The Modify right to the file or directory whose attributes you want to change

Procedure

1   At the DOS prompt, type

    FILER <Enter>

    A list of available options appears.

    Your current context, Volume object, and path are shown in the upper left corner of the screen.

2   Select "Manage Files and Directories."

    The "Directory Contents" list appears.

3   Find and select the file or directory you want.

    • If the item you want appears in the list, select it and press <F10>.

    • If the item is not on the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <F10>.

    • If you cannot find what you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4   Select "View/Set File [or Directory] Information" and press <Enter>.

    Information for the file or directory appears.

5   To modify an attribute, use the arrow keys to move to the "File [or Directory] Attributes" field and press <Enter>.

    The attributes for that file or directory appear.

6   Modify the attribute by completing one of the following steps:

    • To delete an attribute, select it and press <Delete>. Select "Yes" when you are prompted to delete the attribute.

    • To add an attribute, press <Insert>. Select the attribute you want to add and press <Enter>.

      To assign more than one right, press <F5> to mark the rights, and then press <Enter>.

7   To exit, press <Esc> until the menu you want appears.

Additional Information

For more information about	Refer to
File and directory attributes	"Directory and File Attributes" in this chapter
	"Attributes" in *Concepts*
Using FILER	"FILER" in *Utilities Reference*

Changing the Owner of a Directory or File

You can change the owner of a directory or file using NetWare Administrator or FILER. Both procedures are described in this section.

Changing the Owner Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Modify right to the file or directory whose attributes you want to change the owner

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select a directory or file for which you want to change the owner.

  For information on moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Details."

4 From the "Identification" page, choose "Facts."

5 To change the owner of this file or directory, click on the browser button to the right of the "Owner" field.

6 Choose the object that you want to make the new owner of this directory or file.

7 When the correct user is displayed in the "Object Name" field, choose "OK."

  The new owner appears in the "Owner" field of the "Object" dialog box.

8 To save changes, choose "OK."

Additional Information

For more information about	Refer to
Objects	Chapter 2, "Setting Up and Managing NetWare Directory Services Objects"
	"Objects" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Changing the Owner Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available on the workstation

- The Modify right to the file or directory for which you want to change the owner

Procedure

1 At the DOS prompt, type

   ```
   FILER <Enter>
   ```

   A list of available options appears.

   Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

   The "Directory Contents" list appears.

3 Find and select the file or directory you want.

   - If the item you want appears in the list, select it and press <F10>.

   - If the item is not on the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <F10>.

   - If you cannot find what you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 Select "View/Set File [or Directory] Information" and press <Enter>.

Information for the file or directory appears. The current owner of the file or
directory appears in the "Owner" field.

5   Use the arrow keys to move to the "Owner" field and press <Enter>.

6   Select the user that you want to be the owner of the file or directory and press
<Enter>.

For directories only, apply the change of ownership to either the entire
subdirectory structure or to the selected directory.

7   To exit, press <Esc> until the menu you want appears.

Additional Information

For more information about	Refer to
Objects	Chapter 2, "Setting Up and Managing NetWare Directory Services Objects" "Object" in *Concepts*
Using FILER	"FILER" in *Utilities Reference*

Viewing Effective Rights and Other Information

You can see the effective rights a trustee has to a directory or file using
NetWare Administrator or FILER. Both procedures are described in this
section.

Viewing a Trustee's Effective Rights Using NetWare Administrator

Prerequisites

*   A 386 or later workstation and NetWare Administrator

*   The Access Control right to the file or directory, and the Read property right to
    the trustee object's ACL property

Procedure

1   From the Windows Program Manage, click on the "NetWare Administrator"
    icon.

2   Using the browser, select a directory or file.

    For information on moving around in the browser and selecting objects, choose
    "Help" from the menu bar.

3   From the "Object" menu, choose "Details."

4   From the "Identification" page, choose "Trustees of This Directory."

5   Select the trustee whose effective rights you want to view.

6   Choose "Effective Rights."

    The selected trustee's effective rights are bolded in the "Effective Rights" box.

7   (Optional) To view a different object's rights to this directory or file, choose the
    browser button to the right of the "Trustee" text box and select an object from the
    browser.

8   To return to the browser, choose "Cancel."

Additional Information

For more information about	Refer to
Effective rights	"Effective rights" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Viewing a Trustee's Effective Rights Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available on the workstation

- The Access Control right to the file or directory, and the Read property right to the trustee object's ACL property

Procedure

1 At the DOS prompt, type

   ```
   FILER <Enter>
   ```

   A list of available options appears.

   Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

   The "Directory Contents" menu appears.

3 Find and select the file or directory you want.

   - If the item you want appears in the list, select it and press <F10>.

   - If the item is not on the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <F10>.

   - If you cannot find the item on the list, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 Select "View/Set File [or Directory] Information" and press <Enter>.

   Information for that file or directory appears.

5 Use the arrow keys to move to the "Trustees" field and press <Enter>.

A list of trustees for the file or directory appears, along with the object type of the trustee and the current rights the trustee has to the file or directory.

If the trustee list is empty, no effective rights exist for this file or directory. To assign trustee rights, see "Adding a Trustee Using FILER" in this chapter.

Additional Information

For more information about	Refer to
Effective rights	"Effective rights" in Concepts
Using FILER	"FILER" in Utilities Reference

Viewing Other Information about a Directory or File

You can view extended information about a directory or file using NetWare
Administrator or FILER or NDIR, such as

- Owner and trustees

- Attributes, effective rights, and IRF

- Name space

- File size (files only)

- Creation, access, archive, and modify dates (files only)

- Creation date and time (directories only)

- Disk-space limitations (directories only)

Procedures for using NetWare Administrator, FILER, and NDIR are
described in this section.

Viewing Other Information Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Access Control right to the file or directory about which you want to view
  information

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator"
icon.

2 Using the browser, select the file or directory about which you want to see
information.

For help moving around in the browser and selecting objects, choose "Help"
from the menu bar.

3 From the "Object" menu, choose "Details."

4 Select an "Information" page to view information for this file or directory.

5 If you have made any changes on any pages, choose "OK" to save changes and

return to the browser.

Additional Information

For more information about	Refer to
Using NetWare Administrator	"NetWare Administrator" in Utilities Reference

Viewing Other Information Using FILER

Prerequisites

- A workstation running DOS 3.30 or later and FILER

- A minimum of 512 KB of memory available on the workstation

- The Access Control right to the file or directory about which you want to view information

Procedure

1 At the DOS prompt, type

   FILER <Enter>

   A list of available options appears.

   Your current context, Volume object, and path are shown in the upper left corner of the screen.

2 Select "Manage Files and Directories."

   The "Directory Contents" list appears.

3 Find and select the file or directory you want.

   - If the item you want appears in the list, select it and press <F10>.

   - If the item is not on the list, browse a directory by selecting it and pressing <Enter> until you see the item you want. Select it and press <F10>.

   - If you cannot find what you want, check the Volume object name in the upper left corner of the screen. If you are in the wrong Volume, you can change it by returning to the "Available Options" menu and choosing "Select Current Directory."

4 Select "View/Set File [or Directory] Information."

Information for the file or directory appears.

5 To exit, press <Esc> until the menu you want appears.

Additional Information

For more information about	Refer to
Using FILER	"FILER" in Utilities Reference

Viewing Other Information Using NDIR

For online help with NDIR's features, type one of the following commands:

- For information on NDIR's sorting features, type

  ```
  NDIR /? SORT <Enter>
  ```
- For information on search filters (restrictions), type

  ```
  NDIR /? RES <Enter>
  ```
- For information on attribute filters, type

  ```
  NDIR /? AT <Enter>
  ```
- For information on other options, type

  ```
  NDIR /? OPT <Enter>
  ```
- For NDIR syntax information, type

  ```
  NDIR /? SYN <Enter>
  ```
- To view all the NDIR utility help screens, type

  ```
  NDIR /? ALL <Enter>
  ```

Prerequisites

- A workstation running DOS 3.30 or later

- A minimum of 512 KB of memory available on the workstation

- The Access Control right to the file or directory about which you want to view information

Procedure

Use the NDIR commands in Table 3-7 to find information about files, directories, volumes, etc.

Table 3-7   **Using NDIR to Get File and Directory Information**

To get information about	Use this NDIR command
Files only	NDIR path /FO
Directories only	NDIR path /DO
All subdirectories	NDIR path /S
Volumes	NDIR /VOL
Directory space	NDIR /SPA
File version	NDIR /VER
File details	NDIR filename /D

For more information about the NDIR utility, see "NDIR" in *Utilities Reference*.

4

**Managing the NetWare Directory
Services Tree**

Introduction

This chapter provides information on NetWare® Directory Services™ (NDS™), including the following:

• How to set up after NDS is installed

• How to work with NDS partitions and replicas

• How to remove or re-install NDS

• How to delete an NDS object from the NDS database

• How to import data into NDS

• How to repair the NDS database

• How to manage NDS synchronization

About NetWare Directory Services

NetWare Directory Services (NDS) is a distributed database that provides global access to all network resources regardless of where they are located physically. Users log in to a multiserver network and view the entire network as a single information system.

This single information system is the basis for increased productivity and reduced administrative costs. You can manage NDS by using the utilities and programs described in this chapter.

The following utilities and programs help you maintain the NDS database.

- The Partition Management utilities allow you to distribute your NDS database by placing replicas of partitions of the database on different servers.

  The PARTMGR text utility and NetWare Administrator are available to help you manage the database partitions and replicas. You can also remove NDS from a server using the DS Install utility.

- The UIMPORT utility allows you to import information from an existing database (any database capable of converting records to an ASCII file will work) to the NDS database. Use this utility and your database records to create, delete, and update User objects and their properties.

- The DS Repair utility checks and repairs local portions of the database, similar to the way VREPAIR fixes volumes on a server.

- *dsadmin* allows you to determine whether NDS synchronization processes are complete and to diagnose NDS errors.

General NetWare Directory Services Setup

You set up NetWare Directory Services from your server console.

Prerequisites

- Access to the server console

- Superuser permission to use the System Administration Manager (SAM)

Procedure

1 At the HP-UX prompt, type: `sam`

2 Double click *Networking and Communications* at the SAM main window.

3 Double click *NetWare* at the Networking and Communications window.

4 Double click *NetWare Directory Services* at the NetWare window.

5 Set the Bindery Context variable as appropriate, advancing the cursor with the `<Return>` (or `<Enter>`) key after each value is entered.

6 After you have updated your configuration, return to the NetWare menu in SAM.

Creating and Managing Directory Services Partitions

This section explains how to set up NDS partitions and replicas on your servers.

About Partitions and Replicas

A partition is a part of the total Directory tree and contains at least one container and its associated leaf objects.

When a partition is subordinate to another in the Directory tree, it is referred to as a child partition. The partition above it is referred to as the parent partition.

You can make copies of a partition, called replicas, and store them on different servers in your network. Distributing replicas reduces network traffic by making information accessible locally and enabling users to log in to the network even when a server is down.

Replicas also provide fault tolerance by ensuring that more than one copy of the partition information is available. If the partition becomes corrupted, you can use a replica to re-create it.

NOTE: Partitions contain only NDS database information, not file and directory data or information.

There are four types of replicas, which are explained in the following table:

Replica	Description
Master	Partition information can be read from and written to this replica. The master replica can also be used to change the logical structure of the Directory tree (by creating a new partition, for example).
	When you create a new partition, a master replica is created and stored on the same server as the parent partition.

Replica	Description
Read/Write	Partition information can be read from and written to this replica. For example, it can be used to log in, add or delete objects, and view directory information.
Read-Only	Partition information can be read from this replica, but it cannot be written to by anything other than a read/write or master replica.
	Users cannot authenticate to the network through a read-only replica because the login process changes the NDS database.
	You cannot set a bindery context when you log in to a read-only replica.
Subordinate	If you add a read/write or read-only replica of the child partition to the server, the subordinate replica is removed.
	This replica cannot be modified by any user. It is automatically placed on a server by NDS if the parent partition has a master, a read/write, or a read-only replica on the server and the child partition does not.

Planning and Creating Partitions and Replicas

You can create additional partitions and replicas using NetWare Administrator or PARTMGR in DOS or Windows. Instructions for using these utilities are included in this section.

What Happens during Installation

By default, the installation utility adds a replica of the partition that contains the server's context only if the total of existing replicas is fewer than three.

However, if the server is not a NetWare 4™ server and contains bindery files (SYS:SYSTEM\NET$*.SYS) a replica is added, regardless of the number of replicas.

These default settings ensure that bindery services will work correctly for networks running both NetWare 3™ and NetWare 4 software.

Additional Information

For more information about	Refer to
Bindery services	Introduction to NetWare Directory Services and "Bindery Services" in *Concepts*
Directory partitions	"Understanding Management Features" of *Introduction to NetWare Directory Services*
NetWare Directory partitions	"NetWare Directory partitions" in *Concepts*

Guidelines for Managing Partitions and Replicas

Use these guidelines for managing partitions and replicas:

* Make sure all the servers that contain replicas are up and running before you attempt any partition operation.

  If you attempt a partition operation while a server (that contains a replica) is down, NDS will not be able to synchronize, since it will not be able to communicate with the replica on the downed server.

* You can create partitions only at the container level of the Directory tree.

* NDS does not require you to have a replica of the complete database in any location; the database is designed to be divided into usable pieces.

* Operations to manage partitions or replicas take place in the background and take time to complete, since the replicas need to be synchronized with new information.

* You cannot store more than one replica of the same partition on a server. It is not necessary for all servers in your Directory tree to store partitions or replicas unless you want to be able to log in to every server in your tree using bindery services.

* You can create as many replicas of a partition as you need; however, we recommend that you create between three and six replicas of each partition in your Directory tree.

Having too many replicas may slow down your network because it will be busy synchronizing.

• You can have only one master replica.

Because partition and replica management is such a vital part of managing your network, you should read Chapter 9 , "Managing NetWare Directory Services," of Introduction to NetWare Directory Services before you use the Partition Manager utilities.

Additional Information

For more information about	Refer to
Bindery services	"Bindery services" in *Concepts*
Partition Manager utilities	"PARTMGR" and "NetWare Administrator" in *Utilities Reference*
Partitions	"Partition, Directory Services," "Partition management," and "Replica" in *Concepts*
Planning and using partitions	Chapter 5, "Planning NetWare Directory Services Implementation," of *Introduction to NetWare Directory Services*

Considerations Before Creating Partitions and Replicas

This section provides a list of items for you to consider. We strongly recommend that you fill out the checklist in Appendix A of Installation Handbook so that you or another network administrator will know what partitions and replicas are stored on your servers in case you should ever need to restore NDS.

Before you create your partitions and replicas, or immediately after they are all set up, ask yourself

• How many servers are on the network?

• What are the names of those servers?

• If you are creating partitions and replicas on more than one server, how are they

installed?

- Which server is Single Reference, which is Primary, and which servers are Secondary?

- How are the replicas set up? How many are there? On which servers do they exist? Which replicas are master? Read/write? Read-only? Subordinate?

- How are your partitions set up? Which partitions are the parents? Which partitions are the children?

After all of your partitions and replicas are set up, you can view your data and make a note of it. To do this, see "Viewing a List of Partitions Stored on a NetWare Server" in this chapter or "Viewing a List of Replicas in a Partition" or "Viewing a List of Partitions in a Directory Tree" in this chapter.

Make a note every time changes are made to the servers, partitions, or replicas. That way, if disaster occurs to your NDS tree, you or another system administrator can easily check the server configurations.

For information on how to restore NDS in case of failure, see "Backing Up and Restoring NetWare Directory Services™" in Chapter 7.

Restricting Access to Partition Manager

As administrator, you may want to limit which users in your network can access the Partition Manager that can be launched from NetWare Administrator.

There are two ways you can limit access to Partition Manager:

- Restrict rights to NWPAR.DLL (found in SYS:PUBLIC) by giving Read and File Scan rights only to those who you want to have access to Partition Manager.

- Remove NWPAR.DLL from SYS:PUBLIC and place it in your path or in a directory where you have a search drive mapped.

  This allows only you to see Partition Manager under the "Tools" menu in System Administrator.

NOTE: You can also limit rights to PARTMGR (in DOS) by restricting rights to PARTMGR.EXE or by removing it from SYS:PUBLIC and placing it in your path or in a directory to which you have a search drive mapped.

Creating a New Partition

A partition consists of one or more container objects and their associated leaf objects. It cannot contain only leaf objects. The container that is the first object in the partition is called the "root" of the partition.

To create a new partition, you split the parent partition to result in two partitions. The new partition becomes a child partition.

For example, if you select an Organizational Unit and choose to create it as a new partition, you are choosing to split the Organizational Unit from its parent partition (Root, for example, which is always a partition). The following things happen:

- The Organizational Unit you selected becomes the root of a new partition.

- The replicas of the parent partition remain on the same servers.

- Information for the new partition migrates from the parent partition's replicas to the new partition's replicas.

- The master replica of the new partition is stored on the same server as the master replica of the parent partition.

Creating a partition may take some time, since all the replicas need to be synchronized with the new partition information.

When you create a new partition, the utility you use will inform you that the partition is created successfully, but the actual creating is still completing on the servers. You will need to wait a while before performing another partition operation.

Partitions can be created using PARTMGR or NetWare Administrator in DOS or Windows. Both procedures are described in this section.

Creating a Partition Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- A minimum of 6 MB of memory available on the workstation

- The Supervisor object right to the container object you are partitioning

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Tools" menu, select "Partition Manager."

Partition Manager launches from the container you selected in NetWare Administrator.

3 To locate the container object that you want to create as a partition, browse the "Partition Manager" screen.

If the container object does not appear in the window, browse the Directory tree either by choosing an object to see its subordinates or by choosing the arrow to move toward the Root. Your current context appears in the upper left corner of the screen.

For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the container object.

5 Choose "Create as New Partition."

6 To confirm the creation of a new partition, choose "Yes."

The new partition is created when the process is completed on the servers. To see the partition icon that signifies that a container is a partition, you need to refresh the screen by choosing the up-arrow and then expanding the parent container again.

A master replica is stored on the server where the parent partition's master replica resides. An icon appears next to the Organization (O) or Organizational Unit (OU) to show that the container is the root of a partition.

To see where the master replica is stored, select the Organization (O) or Organizational Unit (OU) that you just partitioned, and then choose "Replicas." The server name appears in the "Servers" column and "Master" appears next to it in the "Type" column.

If you want to make additional replicas of this partition, see "Creating a Replica" in this chapter.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating a Partition Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR

- A minimum of 512 KB of memory available on the workstation

- The Supervisor object right to the container object you are partitioning

Procedure

1 At the DOS prompt, type

   PARTMGR <Enter>

2 From the "Partition Administration" menu, select "Manage Partitions."

   Your current context appears in the upper left corner of the screen.

3 Select the container object to partition.

   - If the container you want to partition appears in the list, select it and press <F10>.

   - If the container is not in the list, browse the directory by selecting containers and pressing <Enter> until you see the container you want. Select it and press <F10>.

4 Choose "Yes" to create the new partition.

   The new partition is created when the process is completed on the servers. To see the partition icon that signifies that a container is a partition, you need to refresh the screen by choosing the up-arrow and then expanding the parent container again.

A master replica is stored on the server where the parent partition's master replica resides. An icon appears next to the Organization (O) or Organizational Unit (OU) to show that the container is the root of a partition.

To see where the master replica is stored, select the Organization (O) or Organizational Unit (OU) that you just partitioned, and then choose "View/Edit Replicas." The server name appears in the "Replicas Stored on Server" column, and "Master" appears next to it in the "Type" column.

If you want to make additional replicas of this partition, see "Creating a Replica" in this chapter.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Merging Partitions

You might want to merge two partitions if the Directory information in the partitions is closely related. In other words, you would merge a partition with its parent partition when you want to delete the partition without deleting the objects in the partition.

Consider keeping partitions separate if the newly combined partitions would be large, because large partitions slow down response time.

The partitions are merged when the process is completed on the servers. To see that the icon of the partition you merged is gone (which signifies that the merge is complete), you need to refresh the screen by choosing the up-arrow and then expanding the container again.

Merging a partition with its parent partition might take some time, since the replicas need to be deleted and the parent replicas updated with the merging partition information.

You can merge a subordinate partition with its parent partition using either NetWare Administrator or PARTMGR. Both procedures are documented in this section.

Merging Partitions Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- A minimum of 6 MB of memory available on the workstation

- The Supervisor object right to the object and its parent partition

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Choose "Partition Manager" from the "Tools" menu.

3 To locate the container object that you want to merge with the parent partition, browse the "Partition Manager" screen.

    If the partition object does not appear in the window, browse the Directory tree by either selecting an object to see its subordinates or by choosing the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

    For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the partition you want to merge.

5 Choose "Merge Partition."

6 To merge the partition with its parent, choose "Yes."

    The partition is merged when the process is completed on the servers. To see that the icon of the partition you merged is gone (which signifies that the merge is complete), you need to refresh the screen by choosing the up arrow and then expanding the container again.

    Merging a partition with its parent partition might take some time, since the replicas need to be deleted and the parent replicas updated with the merging partition information.

    The replicas of the partitions are also merged.

    A partition with no parent merges with the Root partition.

Additional Information

For more information about	Refer to
Partitions	"Partition, Directory Services," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Merging Partitions Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR

- A minimum of 512 KB of memory available on the workstation

- The Supervisor object right to the object at the root of the parent partition

Procedure

1 At the DOS prompt, type

   PARTMGR <Enter>

2 From the "Partition Administration" menu, choose "Manage Partitions."

3 Select the partition to merge.

   - If the partition appears in the list, select it and press <F10>.

   - If the partition is not on the list, browse the directory by selecting objects and pressing <Enter> until you see the partition you want. Select it and press <F10>.

4 Choose "Merge with the Parent Partition."

5 Choose "Yes" to merge the selected partition with the parent.

   The partition is merged when the process is completed on the servers. To see that the icon of the partition you merged is gone (which signifies that the merge is complete), you need to refresh the screen by choosing the up arrow and then expanding the container again.

   Merging a partition with its parent partition might take some time, since the replicas need to be deleted and the parent replicas updated with the merging partition information.

Additional Information

For more information about	Refer to
Partitions	"Partition, Directory Services," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Moving a Partition

You can move a container object only if it is the root of a Directory partition that has no subordinate partitions. Moving a container is really moving a partition.

When you move a container object, NDS changes all references to the container. Although the object's common name remains unchanged, the context name of the container (and of all its subordinates) changes.

When you move a partition, you should create an Alias object that points to the partition you are moving. Doing so allows users to continue logging in to the network and finding objects in their original Directory tree location.

NOTE:

If you move a partition and do not create an alias, users who are unaware of the partition's new location will not easily find objects in the Directory tree, since they will look for them in their original Directory tree location.

This might also cause client workstations to fail at login if the NAME CONTEXT parameter in the NET.CFG file is set to the original location in the Directory tree.

Because the context of an object changes when you move it, users whose name context in their configuration file (NET.CFG file) references the moved object need to update their NET.CFG so that it references the object's new name.

To automatically update users' NET.CFG file with a new name context after moving an object, use the NCUPDATE utility. For instructions, see "NCUPDATE" in Utilities Reference.

You can use NetWare Administrator or NETADMIN to move partitions in the Directory tree. Both procedures are documented in this section.

Moving a Partition Using NetWare Administrator

Prerequisites

- A workstation running Windows 3.1 and NetWare Administrator

- The Supervisor right to the object you want to move

- The Create object right to the destination container

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Tools" menu, choose "Partition Manager."

3 From the "Partition Manager" browser, select the partition that you want to move.

You can move a container object only if it is the root of a partition and it contains no subordinate partitions.

In Partition Manager, the partition icon appears to the left of the object icon. If the container you want to move is not a partition, select the container and choose "Create as New Partition." Then refresh the screen so that the partition icon appears and go to the next step.

If there are subordinate partitions in the container you want to move, you can merge those partitions with their parent partition.

4 From the "Object" menu, choose "Move Partition."

5 Select the browser button to the right of the "Destination" box.

Use the browser in the "Directory Context" box to view the Directory tree's containers.

The "Objects" box that appears in the lower left corner shows the containers that you select in the "Directory Context" box.

6 From the "Objects" box, select a container object (an Organization or Organizational Unit) as the location to move the listed objects to; then choose "OK."

7 Choose "Create Alias in Place of Moved Container."

The Alias object will point to the partition's new location.

If you move an object and do not create an alias, users who are unaware of the object's new location will not easily find objects in the Directory tree, since they will look for them in their original Directory tree location.

This might also cause client workstations to fail at login if the NAME CONTEXT parameter in the NET.CFG file is set to the original location in the Directory tree.

Because the context of an object changes when you move it, users whose name context in their configuration file (NET.CFG file) references the moved object need to update their NET.CFG so that it references the object's new name.

To automatically update users' NET.CFG file with a new name context after moving an object, use the NCUPDATE utility. For instructions, see "NCUPDATE" in Utilities Reference.

8 In the "Move" dialog box, choose "OK."

If you chose to create an alias in place of the moved container, NetWare Administrator polls for the creation of the Alias object before it moves the selected partition.

Unless you want the partition you just moved to remain a partition, you should merge it with its parent partition to avoid having an unnecessary partition in the Directory tree. See "Merging Partitions" in this chapter.

You need to wait for processes throughout the Directory tree to be complete before you can perform another partition operation with this object.

Additional Information

For more information about	Refer to
Merging partitions	"Merging Partitions" in this chapter
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Alias objects	"Alias object" in *Concepts*
Directory tree	"Directory tree" in *Concepts*
NCUPDATE	"NCUPDATE" in *Utilities Reference*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Moving a Partition Using NETADMIN

Prerequisites

- A DOS workstation running DOS 3.30 or later and NETADMIN

- The Create object right to the destination container

Procedure

1 At the DOS prompt, type

   `NETADMIN <Enter>`

   For information on moving around in NETADMIN and selecting objects, press <F1> after starting the utility. To see which container objects in the Directory tree are partitions, exit NETADMIN and type "PARTMGR" at the command line. Then browse the tree.

2 From the NETADMIN options menu, choose "Manage Objects."

   Your current context appears in the upper left corner.

3 Select the object that you want to move.

   - If the object you want to move appears on the list, select it and press <F10>.

   - If the object is not on the list, browse the directory by selecting container objects and pressing <Enter> until you see the object you want. Select it and press <F10>.

4 From the "Actions" menu, choose "Move."

   You can move a container object only if it is the root of a Directory partition and it contains no subordinate partitions.

   In NETADMIN, when you select a container object that is a partition, the context-sensitive help at the bottom of the screen reads "This is a partition." Also, an asterisk (*) is displayed in front of the object name.

   If the container you want to move is not a partition, you must use a partition-management utility (PARTMGR or NetWare Administrator) to create the container as a new partition.

5 Use the down-arrow key and highlight the "New Context" field.

6 Assign a new context to the object you want to move.

   - If you know the new context that you want the object to be in, type the new context in the highlighted field.

   - If you do not know the new context that you want the object to be in, press

<Insert> twice to browse the Directory tree for the destination container; then select the destination container and press <F10>.

7 To accept the new context as the destination container, press <Enter>.

8 To confirm that you want to move the object listed in the "Old Context" field to the container listed in the "New Context" field, press the <F10> key.

9 To create an alias in place of the moved container, choose "Yes."

The Alias object will point to the partition's new location, and the selected object is moved to the destination container.

If you move an object and do not create an alias, users who are unaware of the object's new location will not easily find objects in the Directory tree, since they will look for them in their original Directory tree location.

This might also cause client workstations to fail at login if the NAME CONTEXT parameter in the NET.CFG file is set to the original location in the Directory tree.

Because the context of an object changes when you move it, users whose name context in their configuration file (NET.CFG file) references the moved object need to update their NET.CFG so that it references the object's new name.

To automatically update users' NET.CFG file with a new name context after moving an object, use the NCUPDATE utility. For instructions, see "NCUPDATE" in Utilities Reference.

You need to wait for processes throughout the Directory tree to be completed before you can perform another partition operation with this object.

Unless you want the partition you just moved to remain a partition, you should merge it with its parent partition to avoid having an unnecessary partition in the Directory tree. See "Merging Partitions" in this chapter.

Additional Information

For more information about	Refer to
Objects	"Object" in *Concepts*
Rights	"Rights" in *Concepts*
Directory tree	"Directory tree" in *Concepts*
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Aborting a Partition Operation

If you have begun the process of creating, merging, or moving a partition, or changing a replica type, you can often abort the process, because partition operations take time. You can abort a partition operation only before the operation is in its final stages.

You should use this feature if you begin a partition operation and find that your database will not synchronize.

If NDS cannot synchronize replica information in your database because the database or replica information is corrupted, or because a server in your Directory tree is down, you probably should abort any partition operation in progress.

If you choose to abort a partition operation when there is no operation in progress, no partitions are affected.

You can abort a partition operation using NetWare Administrator or PARTMGR. Both procedures are described in this section.

Aborting a Partition Operation Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- A minimum of 6 MB of memory available on the workstation

- The Supervisor object right to the object at the root of the partition

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Tools" menu, choose "Partition Manager."

3 To locate the partition that is executing a partition operation, browse the "Partition Manager" screen.

If the container object does not appear in the window, browse the tree by either selecting an object to see its subordinates or by selecting the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the partition that is executing a partition operation and choose "Abort Partition Operation."

As long as at least one of the replicas has not yet completed the operation (as shown in the "State" box), you can abort the operation.

5 To abort the partition operation, choose "Abort" and then choose "Yes."

The partition operation is aborted and any replicas that have been merged, created, or moved (depending on the operation you had begun) are returned to their original Directory tree locations.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Aborting a Partition Operation Using PARTMGR

Prerequisites

• A workstation running DOS 3.30 or later and PARTMGR

• A minimum of 512 KB of memory available on the workstation

• The Supervisor object right to the object at the root of the partition

Procedure

1 At the DOS prompt, type

    PARTMGR <Enter>

2 From the "Partition Administration" menu, choose "Manage Partitions."

Your current context appears in the upper left corner.

3 Select the parent partition that is involved in a partition operation.

    • If the partition appears in the list, select it and press <F10>.

    • If the partition is not on the list, browse the directory by selecting objects and pressing <Enter> until you see the partition you want. Select it and press <F10>.

4 Choose "Abort Partition Operation."

A list of the replicas of the selected partition appears. Each replica's type and state are also displayed.

As long as at least one of the replicas has not yet finished the operation you began, you can abort the operation. If the state of the replica is "On," all operations are complete and cannot be aborted.

5 To abort the partition operation, press <F10> and choose "Yes."

The partition operation is aborted, and any replicas that began to be merged or created (depending on the operation you had begun) are returned to their previous state.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," " Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Creating a Replica

When you create a partition, a master replica is created automatically and stored on the server where the parent partition's master replica resides. You can create additional replicas of the partition, within these guidelines:

• You can have only one master replica. Additional replicas must be read/write or read-only. For a description of replica types, see "Planning and Creating Partitions and Replicas" in this chapter.

• You can store only one replica of a partition on a server.

Replicas can be created using NetWare Administrator or PARTMGR. Both procedures are described in this section.

Creating a Replica Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- A minimum of 6 MB of memory available on the workstation

- The Supervisor object right to the object at the root of the partition

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Select "Partition Manager" from the "Tools" menu.

3 Browse the "Partition Manager" screen to locate the partition for which you want to create a replica.

   If the container object does not appear in the window, browse the Directory tree either by selecting an object to see its subordinates or by selecting the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

   For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the container object and choose "Replicas."

5 Choose "Add Replica."

6 Browse the objects in the "Server" box to locate the server on which you want to store the replica.

   The partition you are creating the replica for appears at the top of the screen. The context and server information changes as you move through the Directory tree structure.

7 Select the server you want the new replica to be stored on.

8 Choose the replica type you want to create.

9 To create the replica, choose "OK."

Additional Information

For more information about	Refer to
Partitions	"Partition, Directory Services," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating a Replica Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR

- A minimum of 512 KB of memory available on the workstation

- The Supervisor object right to the object at the root of the partition

Procedure

1 At the DOS prompt, type

   PARTMGR <Enter>

2 From the "Partition Administration" menu, select "Manage Partitions."

   Your current context appears in the upper left hand corner.

3 Select the partition to replicate.

   - If the partition appears in the list, select it and press <F10>.

   - If the partition is not on the list, browse the directory by selecting objects and pressing <Enter> until you see the partition you want. Select it and press <F10>.

4 Select "View/Edit Replicas."

   A list of the replicas stored on your current server appears. The replica type is also displayed.

5 To add a replica to the server, press <Insert>.

6 Enter the replica information.

   a At the "Replica Type" field, press <Enter>.

   b Choose the type of replica you want to create from the "Replica Type" menu

at the top of the screen.

c   At the "Store on Server" field, press <Enter>.

d   Type the name of the server to which you want to add the replica, or press <Insert> to select a server from the browser.

e   To create the replica, press <Esc> or <F10> and choose "Yes."

The new replica appears on the list of replicas for the server.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Deleting a Replica

When you delete replicas, keep the following guidelines in mind:

•   If a master replica becomes corrupted, change a read/write or read-only replica on another server to a master replica. This automatically changes the old master replica to a read/write replica.

•   For fault tolerance, you should maintain replicas of the master partition on different servers.

Replicas can be deleted using NetWare Administrator or PARTMGR. Both procedures are documented in this section.

Deleting a Replica Using NetWare Administrator

Prerequisites

•   A 386 or later workstation and NetWare Administrator

•   A minimum of 6 MB of memory available on the workstation

•   The Supervisor object right to the object at the root of the partition of the replica you want to delete

Procedure

1   From the Windows Program Manager, click on the "NetWare Administrator"

icon.

2   Select "Partition Manager" from the "Tools" menu.

3   Browse the "Partition Manager" screen to locate the partition whose replica you want to delete.

If the object where the container is stored does not appear in the window, browse the Directory tree either by selecting an object to see its subordinates or by choosing the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4   Select the partition and choose "Replicas."

5   Select the server you want to delete the replica from and choose "Delete Replica."

You cannot delete a master replica. If the replica you want to delete is a master, go to a server with another replica of the master and make it the new master replica. This automatically changes the old master replica to a read/write replica, which you can delete.

For instructions, see "Viewing a List of Partitions in a Directory Tree" in this chapter.

6   Choose "OK."

Additional Information

For more information about	Refer to
Partitions	"NetWare, Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in Utilities Reference

Deleting a Replica Using PARTMGR

Prerequisites

•   A workstation running DOS 3.30 or later and PARTMGR

•   A minimum of 512 KB of memory available on the workstation

•   The Supervisor object right to the object at the root of the partition for the replica you want to delete

Procedure

1 At the DOS prompt, type

   `PARTMGR <Enter>`

2 From the "Partition Administration" menu, choose "Manage Partitions."

   Your current context appears in the upper left corner of the screen.

3 Select the partition that has a replica you want to delete.

   • If the partition appears on the list, select it and press <Enter>.

   • If the partition is not on the list, browse the directory by selecting objects and pressing <Enter> until you see the partition you want. Select it and press <F10>.

4 Select "View/Edit Replicas."

   A list of the replicas stored on your selected partition appears. Each replica's type is also displayed.

5 Select the replica to delete and press <Delete>.

   You cannot delete a master replica. If the replica you want to delete is a master, go to a server with another replica of the master and make it the new master replica. This automatically changes the old master replica to a read/write replica, which you can delete.

   For instructions, see "Viewing a List of Partitions in a Directory Tree" in this chapter.

6 To delete a replica, choose "Yes."

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Sending Updates to Other Replicas

Although NDS automatically synchronizes the directory data of replicas (so that each replica contains the most recent data), you can manually start the process to synchronize (update) the directory data of replicas, if necessary.

You should use the Directory Services Repair utility to discover whether the data in some replicas is out of sync with the master replica. If the data is out of sync, you would want to send updates to those replicas manually. The data in the other replicas would be updated and the directory data of each replica would be synchronized.

You can send updates to other replicas using NetWare Administrator or PARTMGR. Both procedures are documented in this section.

Sending Updates Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- A minimum of 6 MB of memory available on the workstation

- The Supervisor object right to the object at the root of the partition for the replicas to which you want to send updates

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Tools" menu, choose "Partition Manager."

3 Browse the "Partition Manager" screen to locate the partition whose replicas you want to update.

If the container object does not appear in the window, browse the Directory tree either by selecting an object to see its subordinates or by selecting the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the partition and choose "Replicas."

5 From the "Replicas" screen, select which replica you want to send updates from (the one that contains updated data) and choose "Send Updates to Other

Replicas."

The updated data is sent to all existing replicas of the same partition.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Sending Updates Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR

- A minimum of 512 KB of memory available on the workstation

- The Supervisor object right to the object at the root of the partition for the replicas to which you want to send updates

Procedure

1 At the DOS prompt, type

```
PARTMGR <Enter>
```

2 From the "Partition Administration" menu, choose "Manage Partitions."

Your current context appears in the upper left corner.

3 Select the partition whose replicas you want to update.

- If the partition appears on the list, select it and press <F10>.

- If the partition is not on the list, browse the Directory tree by selecting objects and pressing <Enter> until you see the partition you want. Select it and press <F10>.

4 Choose "View/Edit Replicas."

A list of the replicas of the selected partition appears. Each replica's type is also displayed.

5 Select the replica you want to send updates from and press <F10>.

6 Choose "Send Updates to Other Replicas."

7 To send updates to all the other replicas, choose "Yes."

The replica information is sent to all other replicas of the partition (including the master replica).

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Receiving Updates from Other Replicas

Although NDS automatically synchronizes the directory data of replicas, (so that each replica contains the most recent data) you can manually synchronize (update) the directory data of replicas if they get out of sync.

You should use the Directory Services Repair utility to discover if the data in some replicas is out of sync with the master replica. If the data is out of sync, you would want those replicas to receive updates from the master replica manually.

You cannot choose "Receive Updates From Other Replicas" from a master replica. The master is assumed to be the most current and accurate copy of the partition. If it is not, you should assign one of the other replicas to be the master using the PARTMGR utility.

If you choose "Receive Updates From Other Replica" from any replica, that replica receives NDS information from the master.

You can receive updates from other replicas using NetWare Administrator or PARTMGR. Both procedures are documented in this section.

Receiving Updates Using NetWare Administrator

Prerequisites

• A 386 or later workstation and NetWare Administrator

• A minimum of 6 MB of memory available on the workstation

• The Supervisor object right to the object at the root of the partition for the replicas

to which you want to send updates

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Tools" menu, choose "Partition Manager."

3 Browse the "Partition Manager" screen to locate the partition whose replicas you want to update.

   If the container object does not appear in the window, browse the Directory tree either by selecting an object to see its subordinates or by choosing the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

   For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the partition and choose "Replicas."

5 From the "Partition Replicas" screen, select which replica you want to update and choose "Receive Updates."

   The replica you chose receives NDS information from the master replica.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Receiving Updates Using PARTMGR

Prerequisites • A workstation running DOS 3.30 or later and PARTMGR

• A minimum of 512 KB of memory available on the workstation

• The Supervisor object right to the object at the root of the partition whose replicas you want to update

Procedure

1 At the DOS prompt, type

```
PARTMGR <Enter>
```

2 From the "Partition Administration" menu, choose "Manage Partitions."

Your current context appears in the upper left corner of the screen.

3 Select the partition whose replicas you want to update.

- If the partition appears on the list, select it and press <F10>.

- If the partition is not on the list, browse the Directory tree by selecting objects and pressing <Enter> until you see the partition you want. Select it and press <F10>.

4 Choose "View/Edit Replicas."

A list of the replicas of the selected partition appears. Each replica's type is also displayed.

5 Select the replica you want to update and press <F10>.

6 Choose "Receive Updates from Other Replicas."

7 To receive updates from all the other replicas, choose "Yes."

The selected replica receives NDS information.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Viewing a List of Partitions Stored on a NetWare Server

When you view a list of partitions stored on a NetWare server, you are seeing all the partitions that have a replica stored on the selected server and the type of each replica.

You can see a list of partitions stored on a NetWare Server object using NetWare Administrator or PARTMGR. Both procedures are documented in this section.

Listing Partitions Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- A minimum of 6 MB of memory available on the workstation

- The Write property right to the ACL property of the NetWare server object for the partitions you want to view

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Tools" menu, select "Partition Manager."

3 Browse the "Partition Manager" screen to find the NetWare Server object for the partition list you want to view.

If the NetWare Server object does not appear in the window, browse the Directory tree either by choosing an object to see its subordinates or by choosing the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the NetWare Server object and choose "Server Partitions."

A list of the partitions stored on the server is displayed.

Additional Information

For more information about	Refer to
Partitions	"Partition, Directory Services," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Listing Partitions Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR

- A minimum of 512 KB of memory available on the workstation

- The Write property right to the ACL property of the NetWare Server object for the partitions you want to view

Procedure

1 At the DOS prompt, type

```
PARTMGR <Enter>
```

2 From the "Partition Administration" menu, select "Manage Partitions."

Your current context appears in the upper left corner of the screen.

3 Select the server whose partitions you want to list.

- If the server appears on the list, select it and press <F10>.

- If the server is not on the list, browse the directory by selecting partitions and pressing <Enter> until you see the server you want. Select it and press <F10>.

A list of the partitions stored on the server appears.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition Management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Viewing a List of Replicas in a Partition

You can see a list of a partition's replicas, the servers where the replicas are stored, and whether a replica is a master, read/write, or read-only type.

You can view a replica list using NetWare Administrator or PARTMGR. Both procedures are described in this section.

Listing Replicas Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- A minimum of 6 MB of memory available on the workstation

- The Write property right to the ACL property of the NetWare Server Object for the replicas you want to view

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Tools" menu, select "Partition Manager."

3 Browse the "Partition Manager" screen to locate the partition for the replica list you want to view.

If the partition does not appear in the window, browse the Directory tree either by choosing an object to see its subordinates or by choosing the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

4 Select the partition and choose "Replicas."

A list of replicas appears, including the server where each replica is stored, the replica type, and the time and date of the last time the replica was synchronized with the other replicas.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Listing Replicas Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR

- A minimum of 512 KB of memory available on the workstation

- The Write property right to the ACL property of the NetWare Server object for the replicas you want to view

Procedure

1 At the DOS prompt, type

```
PARTMGR <Enter>
```

2 From the "Partition Administration" menu, choose "Manage Partitions."

Your current context appears in the upper left corner of the screen.

3 Select the partition whose replicas you want to list.

- If the partition appears on the list, select it and press <F10>.

- If the partition is not on the list, browse the Directory tree by selecting partitions and pressing <Enter> until you see the server you want. Select it and press <F10>.

The "Partition Management" menu appears. Your current context appears in the title.

4 Select "View/Edit Replicas."

The "Replicas Stored on Server" screen appears, which lists the replicas of the selected partition, the server on which they reside, and the type of each replica.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Viewing a List of Partitions in a Directory Tree

You can see a list of all partitions to which you have Browse rights in an NDS tree using NetWare Administrator.

Prerequisites

* A 386 or later workstation and NetWare Administrator

* A minimum of 6 MB of memory available on the workstation

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 From the "Object" menu, choose "Search."

3 Choose the drop-down arrow button at the right of the "Search For" field.

4 Scroll through the drop-down list until you find "Partition."

5 Select "Partition" and choose "OK."

A list of the partitions in the Directory tree appears. Any partition for which you do not have the Browse right to the object at the root does not appear in the list.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Changing a Replica's Type

You can change replica types according to the following guidelines:

* You can have only one master replica of a partition. Creating a new master replica automatically changes the old master replica to a read/write replica.

* You can change read/write replicas to read-only, and vice versa, without affecting other replicas of the same partition.

You can change a replica's type using NetWare Administrator or
PARTMGR. Both procedures are documented in this section.

Changing a Replica's Type Using NetWare Administrator

Prerequisites

• A 386 or later workstation and NetWare Administrator

• A minimum of 6 MB of memory available on the workstation

• The Supervisor object right to the object at the root of the partition for the replica
  you want to change

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator"
icon.

2 From the "Tools" menu, select "Partition Manager."

3 Browse the "Partition Manager" screen to locate the Server object that contains
the replica type you want to change.

If the NetWare Server object does not appear in the window, browse the
Directory tree either by choosing an object to see its subordinates or by choosing
the arrow key to move toward the Root. Your current context appears in the
upper left corner of the screen.

For information about moving around in the "Partition Manager" screen and
selecting objects, choose "Help" from the main menu bar.

4 Select the partition whose replica you want to change and choose "Replicas."

5 From the list of replicas, select the replica you want to change.

Be careful to select the correct replica by noting the server where it is located as
well as its type.

6 Choose "Change Type."

7 Choose the type of replica you want the replica to become.

8 Choose "OK."

The new replica type appears on the "Partition Replicas" screen.

If you created a master replica and one already existed, the replica you just
created is now the master replica and the old master replica is changed
automatically to a read/write replica.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Changing a Replica's Type Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR

- A minimum of 512 KB of memory available on the workstation

- The Supervisor right to the object at the root of the partition

Procedure

1 At the DOS prompt, type

   PARTMGR <Enter>

2 From the "Partition Administration" menu, choose "Manage Partitions."

   Your current context appears in the upper left corner of the screen.

3 Select the partition whose replica you want to change.

   - If the partition is on the list, select it and press <F10>.

   - If the partition is not on the list, browse the Directory tree by selecting partitions and pressing <Enter> until you see the partition you want. Select it and press <F10>.

4 Choose "View/Edit Replicas."

   A list of the replicas of the selected partition appears. The replica type is also displayed.

5 Select the replica you want to change and press <F10>.

6 Choose "Change Replica Type."

7 Press <Enter> and choose the replica type you want the replica to become.

8 Press <F10> to save the replica as the new type.

The new replica type appears on the list and on the "Partition Replicas" screen.

If you changed a replica type to a master and a master replica already existed, the replica you just changed to master is now the master replica and the old master replica is changed automatically to a read/write replica.

Additional Information

For more information about	Refer to
Partitions	"NetWare Directory partition," "Partition management," and "Replica" in *Concepts*
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Removing NetWare Directory Services from a Server

You may want to remove NDS from an existing server if you mistakenly installed it into the wrong Directory tree or into the wrong Organization or Organizational Unit in the tree. This section discusses how to safely remove NDS.

Considerations Before Removing NDS

Removing NDS from a server may corrupt your NDS database. In most cases, this procedure is not necessary to correct a NetWare 4 problem. Before removing NDS, ask these questions:

- Do other servers get Directory information (such as partition replicas) from this server?

- Could a bad LAN driver (one that does not communicate properly with NDS) be causing the problem?

- Could routers, network boards, or other hardware components be causing the problem?

If you answered "yes" to any of these questions, remove NDS only as a last resort after resolving all other problem areas.

By removing NDS from a server, you remove the NetWare Server object from the Directory tree and downgrade the server's volumes to bindery volumes. Trustee assignments and all NDS information, such as links to subordinate partitions, are lost.

If you installed this server into the wrong container, it is not necessary to remove NDS. Use the Partition Manager tool in NETADMIN to move the Server object to the correct container.

WARNING: **Removing NDS may corrupt your Directory database. You must remove NDS if you are reformatting this server's hard drive. Do not remove NDS unless Technical Support advises you to remove NDS from the server.**

Removing NDS from a Server

Prerequisites

- Access to the server console and superuser privileges.

- The Supervisor object right to the NetWare Server object and its associated Volume objects.

- Make sure all the server's volumes are mounted. Unmounted volumes will not get their Volume objects removed from the Directory database.

Procedure

1 Run the *dsinstall* utility.

2 From the "Directory Services Install" window, select "Remove Directory Services from this Server" and press <Enter>.

3 At the confirmation prompt, choose "Yes."

The "Directory Services Login/Authentication" screen appears.

4 Type the password for User ADMIN in the "Password" field and press <Enter>.

After you enter the password, the server's mounted volumes are downgraded and a message displays the number of volumes affected. Then the system checks for Directory connections to other servers.

5 (Conditional) If this server contains a master replica, you must designate another server to hold the replica. Choose one of the following and press <Enter>:

- Designate the server automatically.

Directory Services Install finds the first server with a replica of this partition and changes its type to "master."

- Designate the server yourself.

Highlight the server where you want the master replica located.

Press <F10> to save and continue.

A message notifies you that the master replica has moved.

6 To continue, press <Enter>.

Directory Services Install removes NDS and deletes the Server object and Volume objects associated with it from the Directory database.

If a Directory link is down (such as another server containing objects from this server), you must use Partition Manager to delete the Server and Volume objects from the Directory database.

7 To exit Directory Services Install, return to the Directory Services Install main menu and select Exit.

8 Reset your time servers.

Since you have removed NDS, you must update your time servers. See the next section for more information.

Updating Your Time Servers

Now that directory services has been removed from your Single Reference time server, if other servers exist in this Directory tree, you must select the next Secondary time server that is polled to become the Single Reference time server so that your time servers will be synchronized.

To do this, change the "Server Type" variable in SAM.

Re-installing NDS on a Server

This procedure re-installs NDS on a server. It does not preserve the trustee assignments from the first time NDS was installed on the server; you must make those assignments again.

Prerequisites

• Access to the server console. You must also be a superuser.

• The Supervisor object right to the container in which you want to install the server

Procedure

1 Run the DS Install utility.

2 From the "Directory Services Install" menu, select "Install Directory Services onto this Server" and press <Enter>.

3 Install NetWare Directory Services on the server.

To select a Directory tree and install NDS on the server, follow the instructions in chapter 5 of the *NetWare 4.1/9000 Installation and Administration Guide*.

4 To exit Directory Services Install, return to the *dsinstall* main menu and select "Exit."

Deleting a NetWare Server Object from the NDS Database

The following sections show you how to delete NetWare Server objects from NDS using either NetWare Administrator in Windows or PARTMGR in DOS. Both procedures are described in this section.

Considerations Before Deleting NetWare Server Objects

WARNING:

Deleting a NetWare Server object permanently removes it from your network! It also permanently removes its data and resources from the network.

Deleting a NetWare Server object may corrupt your NDS database, especially if the Server object provides NDS database services (such as storing partition replicas).

Before deleting the Server object with the Partition Manager tool, consider these alternatives:

- Change the master replicas stored on this server to read/write replicas and then delete all replicas on the server. Once all the processes are complete, you can delete the server.

- Remove NDS from the server with the DS Install utility (described in "Removing NDS from a Server" in this chapter). This procedure protects your NDS database from lost services.

- To move the NetWare Server object to another context, use the "Move Server Object" option in the Partition Manager tool. (You do not need to delete the NetWare Server object and re-create it in another context.)

- If the NetWare Server object you are deleting does not contain any NDS database partitions or replicas, follow the procedures in "Moving Container Objects Using NETADMIN" in chapter 2.

4-46

Deleting a NetWare Server Object Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator.

- A minimum of 6 MB of memory available on the workstation.

- The Supervisor object right to the container of the server object you want to delete.

- Create a new master replica (if a master replica is stored on the NetWare Server object). See "Viewing a List of Partitions in a Directory Tree" in this chapter.

Procedure

1 Bring down the HP-UX server by typing:

```
stopnw
stopnps
```

2 From the Windows Program Manager at your workstation, click on the "NetWare Administrator" icon.

3 Select "Partition Manager" from the "Tools" menu.

4 Browse the "Partition Manager" screen to locate the NetWare Server object that you want to delete.

   If the NetWare Server object does not appear in the window, browse the Directory tree either by choosing an object to see its subordinates or by choosing the arrow key to move toward the Root. Your current context appears in the upper left corner of the screen.

   For information about moving around in the "Partition Manager" screen and selecting objects, choose the "Help" button.

5 Select the NetWare Server object and choose "Delete Server."

   The server is deleted from the NDS database.

Additional Information

For more information about	Refer to
Deleting objects from the NDS database	"Deleting Objects from the Directory Tree" in chapter 2

For more information about	Refer to
Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Deleting a NetWare Server Object Using PARTMGR

Prerequisites

- A workstation running DOS 3.30 or later and PARTMGR.

- A minimum of 512 KB of memory available on the workstation.

- The Supervisor right to the container of the Server object you want to delete.

- Create a new master replica (if a master replica is stored on the NetWare Server object). See "Viewing a List of Partitions in a Directory Tree" in this chapter.

Procedure

1 Bring down the HP-UX server by typing:

   stopnw
   stopnps

2 At the workstation DOS prompt, type

   PARTMGR <Enter>

3 From the "Partition Administration" menu, select "Manage Partitions."

   Your current context appears in the upper left corner of the screen.

4 Select the NetWare Server you want to delete.

   - If the server appears on the list, select it and press <Delete>.

   - If the server is not on the list, browse the directory by selecting objects and pressing <Enter> until you see the server you want. Select it and press <Delete>.

   The NetWare Server object is deleted from the NDS database.

NOTE: It may take a long time for all the other servers to know that a server is down. You should wait several minutes after downing a server before deleting it.

Additional Information

For more information about	Refer to
Deleting objects from the NDS database	"Deleting Objects from the Directory Tree" in chapter 2
Using PARTMGR	"PARTMGR" in *Utilities Reference*

Importing User Information into the NDS Database

The UIMPORT utility allows you to import data from an existing database
into the NDS database. This utility is particularly valuable if you have
hundreds or thousands of user records that you want to record in NDS
without having to re-create each user manually.

Any application capable of converting records to a comma-separated ASCII
file will work with UIMPORT.

You can use UIMPORT to automate the maintenance of your NDS database
when you want to

- Create User objects in the NDS database using records from another database.

- Update User properties in the NDS database when records are changed in your
  original database program.

- Delete User objects when their accounts on the network are no longer needed.

Understanding the Import Process

The process for importing records from your database into the NDS database
is as follows:

1 Generate a data file—a delimited ASCII text file—from your existing database
   records.

   Most applications let you save data as a comma-separated ASCII text file with
   quotation marks as delimiters.

2 Create an import control file to interpret the data file.

   You can create the import control file using any text editor under DOS. This file
   defines how records in the data file are imported into NDS and which fields
   (properties) the data will be placed in.

3 Create User objects using UIMPORT to transfer data from your database to the
   NDS database.

Figure 4-2 gives you a general overview of the import process.
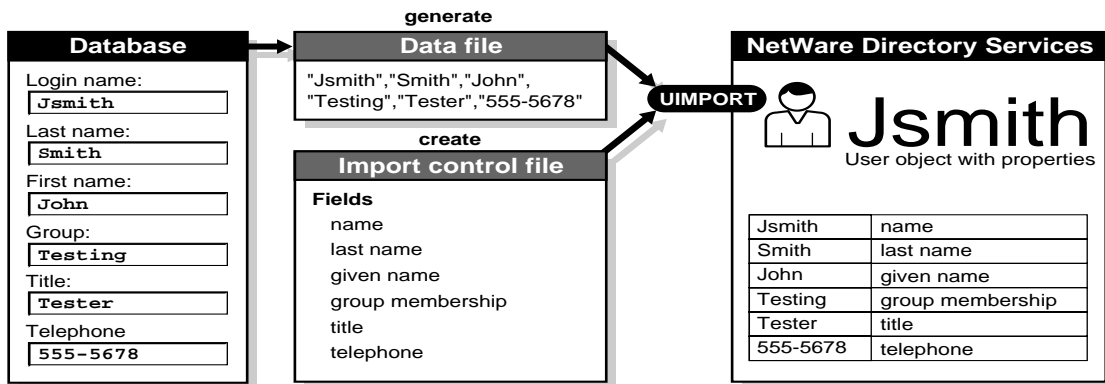
Figure 4-7   **Import Process**

Preparing to Import User Information into the NDS Database

This section gives some background information you should be familiar with before performing the import.

Generating the Data File

You generate a data file from within your database application, or any other application, by saving the data as a delimited ASCII text file. Most applications use commas as the default field separator and quotation marks as the default delimiter.

The following figure shows a sample database table created using Borland*'s Paradox* for Windows, and the data file generated from it.
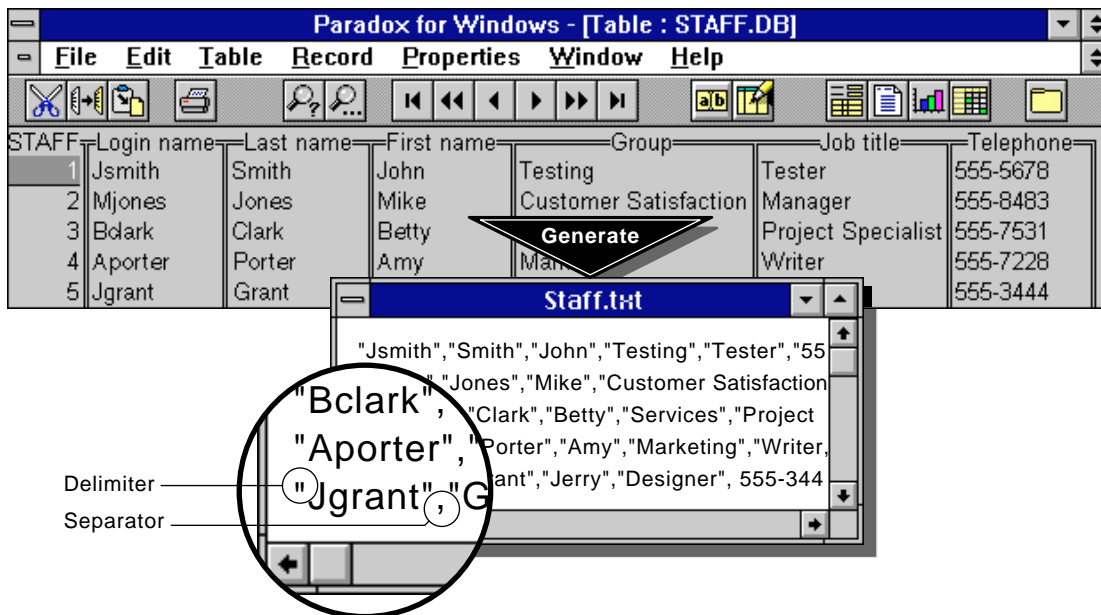
Figure 4-8   **Generate a Data File**

If you need instructions on how to save your data as a delimited ASCII file, see the documentation accompanying your application.

Embedded Punctuation

Before you generate a data file from within your database application, look for embedded punctuation in the data fields.

If the fields in your database have embedded punctuation (for example, quotation marks or commas), you should not use that same punctuation as field separators or delimiters when you export the data.

If you do, UIMPORT will not be able to distinguish between new fields and embedded punctuation.

Since embedded quotation marks and commas are the most commonly
found punctuation in database fields, here are some guidelines, grouped
according to four situations you might encounter, to help you avoid
problems in generating a data file:

- You have both embedded quotation marks and embedded commas that you do
  not want to delete.

  We recommend that you export the data using a different character for the
  comma separator, and that you not use quotation marks as delimiters.

  For example, you could export data with carets (^) in place of comma
  separators. As a result, carets would separate the fields in the data file you
  generate. You must specify in the import control file the replacement character
  you use. (See Table 4-1.)

  You should also export data without using quotation marks to delimit the fields.
  If your application uses quotation marks as the default delimiter, you must
  change the delimiter to a different character or choose to use no delimiter.

  If you use a different character, you must specify in the import control file the
  replacement character you use. (See Table 4-1.)

- You have neither embedded quotation marks nor embedded commas.

  We recommend that you export the data using commas to separate the fields.

  If your application inserts quotation marks as delimiters around each field, you
  can either accept this default or choose to use no delimiter.

- You have embedded commas, but no embedded quotation marks.

  We recommend that you export the data using a different character for the
  comma separator.

  For example, you could export data with carets (^) in place of comma
  separators. As a result, carets would separate the fields in the data file you
  generate. You must specify in the import control file the replacement character
  you use. (See Table 4-1.)

  If your application inserts quotation marks as delimiters around each field, you
  can either accept this default or choose to use no delimiter.

- You have embedded quotation marks, but no embedded commas.

  We recommend that you export data using commas to separate the fields and
  without using quotation marks to delimit the fields.

However, if your application uses quotation marks as the default delimiter, you must change the delimiter to a different character or tell your application to use no delimiter.

If you use a different character, you must specify in the import control file the replacement character you use. (See Table 4-1.)

Required "Name" Field

One of the fields required to create new user objects in the NDS database is name. If you do not have a field in your database that records each individual's login name, you have a few options:

- You can create a login name field within your application (and assign each individual a unique eight-character login name) before generating the data file. This option is recommended.

- You can generate the data file and then add a unique login name field to each string of user information in the data file.

- You can use an existing field in your application to represent the login name field. For example, you may have a field of employee or ID numbers. You can generate the data file and import the unique numbers into NDS as user login names. (Keep in mind that numbers are not as easy to recognize or manage as names.)

Creating the Import Control File

You can create the import control file using any text editor under DOS.

This file controls how the information in the data file will be imported into the NDS database and determines which fields (called properties in NDS) the data will be placed in. The import control file contains two types of information:

- Control parameters define characters used in the data file and specify how data is updated.

  Control parameters are explained in Table 4-1. Field definitions are explained in Table 4-2.

- Field definitions determine where data is put in the NDS database (which properties the fields are imported into).

Use these guidelines to create the control file:

- Enter control parameters first, followed by field definitions, as follows:

Import control

Separator=^

User template=y

Fields

Last name

Name

Telephone

Title

- Control and field parameters are not case-sensitive. The headings "Import Control" and "Fields" must be left aligned (you do not have to specify import control parameters if you use the defaults).

- Entries under the headings must be preceded by at least one space or a tab.

- To create a new user, two field definitions are required: "Name" (the user's login name) and "Last name."

- To update records for users who have already been created, only the "name" field is required. These fields are explained in Table 4-2.

- All fields in the data file must have a corresponding field definition in the import control file. To see a sample data file and its corresponding import control file, see "Data File Created from Exported Database Fields" in this chapter.

Although you do not have to save the import control file in the same directory in which you saved the data file, doing so makes locating the files and running UIMPORT easier. If you do not, you will have to specify the path to each of the files when you run UIMPORT.

After generating the data file and creating the import control file, see "Creating User Objects with the UIMPORT Utility" in this chapter to start the import process.

Additional Information

For more information about	Refer to
Creating a comma-separated ASCII file	Your database application documentation

For more information about	Refer to
Creating and managing User objects	Chapter 2, "Setting Up and Managing NetWare Directory Services Objects"
Starting the import process	"Creating User Objects with the UIMPORT Utility" in this chapter
NetWare Directory Services	"NetWare Directory Services" in *Concepts*, and *Introduction to NetWare Directory Services*

Control Parameters Use the application control parameters in Table 4-2 to create the "Import control" section of the import control file. These can be changed by adding the control parameter in the data file. When doing so, add an exclamation point (!) before the control parameter in the data file. (See "Data File Edited to Update User Objects" in this chapter .)

Table 4-1   **UIMPORT Control Parameters**

Control Parameter	Explanation
Create home directory	Note: If you don't set this parameter to Y, you can still import Home Directory values through the control section of the import control file or through the data file. These values will be put into the object's Home Directory property, but the directory on the file system will not be created.
	Allows you to create a home directory for User objects.
	If you create a home directory, users automatically receive filesystem rights to work in that directory. This option will not work unless you set the "Home directory path" and "Home directory volume" control parameters.
	(Also, this option will not work if you define a data field for "Home Directory," because that field will override Create home directory.)
	For example, if you want the users you are importing to have a home directory, type CREATE HOME DIRECTORY=Y.
	The default setting is "N", so if you don't want to create home directories, no parameter is needed.

Table 4-1   **UIMPORT Control Parameters**

Control Parameter	Explanation
Delete Mailbox Dirs	To delete the mailbox directories, type DELETE MAILBOX DIRS=Y.
	Allows you to delete the mailbox directories when moving a user's mailbox from one messaging server to another or changing the mailbox ID of a user.
	The default is "N"; so if you don't want to delete the mailbox directories, no parameter is needed.
Delete property	There is no default for this property, so if you don't want to delete properties, no parameter is needed.
	Volume restrictions. To delete volume restrictions, enter the volume name and a negative integer such as –1 for the restrictions. For example: VOL1:–1
	You cannot delete the following properties with the Delete property parameter:
	Allows you to delete values for a property of a User object.
	For example, to delete all titles from a User object's Title property, type DELETE PROPERTY=#DEL, and then edit the data file by putting "#DEL" in the Title field.
	If you delete a group membership, you also delete the security equivalents for the group.
	Password. To delete the password, enter "" (a null field) for the password field.
	Home directory. You can delete the Home directory property, but the home directory path will not be deleted by UIMPORT. You must go manually to this directory and delete it.
	For more information, see "Creating User Objects with the UIMPORT Utility" in this chapter.

Table 4-1   **UIMPORT Control Parameters**

Control Parameter	Explanation
Home directory path	If you create a home directory for User objects, you must specify a path in the file system where you want the directories to be created. This and the Home directory volume must be entered as a pair. If you specify a Home directory volume, the path will be assumed to be null unless this field is also specified. If you want home directories created in the Users directory, type HOME DIRECTORY PATH="USERS". Do not include the volume name in the path.
Home directory volume	For example, if the file specified in "Home directory path" is on volume SYS:, enter the Volume object's complete DS name. For example: HOME DIRECTORY VOLUME="SYS.STUDENT RECORDS.UNIVERSITY". If you create a home directory for User objects, you must specify the name and context of the Volume object associated with the file system where the home directories are created. When creating users, the Home directory volume is set in the following order: **1** Information in the data file. If the data file has a home directory specified, its value will be used. **2** If there is no home directory specified in the data file, the home directory from the User Template object will be used. This happens regardless of whether or not you select to copy the user template properties when creating users. **3** If the home directory is not found in the data file or the User Template, this control parameter (Home directory volume) will be used.

Table 4-1   **UIMPORT Control Parameters**

Control Parameter	Explanation
Import mode	Controls how the User objects will be created or updated. Options are C (create new objects only), U (update data for existing objects only), B (both create and update), and R (remove objects).
	The default is "B", so if you want new objects to be created and existing users updated, no parameter is needed.
	Note: You can use the same import control file for adding and deleting users by just changing the Import mode to R (Remove objects). This can be especially useful if you have just created some users with incorrect information and need to restart the entire process. Change the Import mode to R, run UIMPORT to delete the users, then change the Import mode back to C or B and rerun UIMPORT.
Maximum directory retries	Initially this option is set to 5; but you should increase the number if you get the message "991: An error occurred in NWDSMapNameToID…"
	Allows you to specify how many times UIMPORT should attempt to get the object ID of the user you have just added in order to create home directories and mailbox directories.
	For example, type MAXIMUM DIRECTORY RETRIES=5.
	If NDS creates your user on one server's replica and you create the home or mailbox directory on another server, the second server may not know about the user immediately. This option allows time for the network to catch up with the request to add the user on the other server.
Name context	Specifies the NDS context where user objects will be created. You should always use this parameter.
	For example, if you are in the Organization Development.ACME and you want to create user objects in a different Organizational Unit (Engineering), type NAME CONTEXT=.ENGINEERING.ACME.
	The default is your current context (the context displayed when you type CX from the command line).

Table 4-1   **UIMPORT Control Parameters**

Control Parameter	Explanation
Quote	The default characters for delimiters are quotation marks (" "). If you don't have embedded quotation marks in fields in your database and you generate the data file with quote delimiters, no parameter is needed.
	Specifies the character used to delimit fields when exporting data to the data file. You might want to change the delimiter from quotation marks to different characters if your data has embedded quotation marks and you don't want to delete them.
	For example, if you have any embedded quotation marks in fields in your database, you could export data using carets (^) as the delimiter. You would enter QUOTE=^ as the quote parameter.
Replace value	Allows you to overwrite or add data to multivalue properties.
	For example, to import new telephone numbers to User properties without saving the existing numbers, type REPLACE VALUE=Y.
	The default is "N," so if you don't want data to be added to multivalued properties, no parameter is needed. You do not need to set this parameter for single-value fields, because the new value automatically overwrites the existing value.
Separator	The default separator is a comma. If you have no embedded commas in fields in your database and you generate the data file with comma separators, no parameter is needed.
	If the fields in your database have embedded punctuation, (such as commas), you should not use the same punctuation as field separators when you export the data to the data file. If you do, UIMPORT won't be able to distinguish between new fields and embedded punctuation. Instead, use a different character as the separator.
	Specifies the character used to separate fields when exporting data to the data file.
	For example, if you have any embedded commas in fields in your database, you could export the data using a semicolon (;) as the field separator. You would enter SEPARATOR=; as a control parameter.

Table 4-1   **UIMPORT Control Parameters**

Control Parameter	Explanation
User template	Specifies whether you want user template defaults to be applied to the User objects being created. (User template defaults are explained in "Managing User Templates" in chapter 2.)
	To apply template properties to User objects, type USER TEMPLATE=Y. Template properties are applied first, and then properties from the data file are imported.
	The default is "N", so if you do not want the user template defaults applied to the new User objects, no parameter is needed.
	The following fields are copied from the user template:
	Account balance, Account has expiration date, Allow unlimited credit, Allow user to change password, City, Days between forced changes, Default server, Department, Description, Fax number, Foreign Email address, Foreign Email alias, Full name, Generational qualifier, Given name, Grace logins allowed, Group membership, Home directory, Language, Location, Login allowed time, Login script, Low balance limit, Mailbox location, Mailing label information, Maximum connections, Minimum password length, Network address restriction, Postal (ZIP) code, Postal office box, Profile, Remaining grace logins, Require a password, Require unique passwords, Security equal to, See also, State or province, Street address, Telephone, Title

Field Definitions

Use the applicable field definitions in the following table to create the import control file.

A single-value property can contain only one entry (property). If you put more than one entry for a single-value property in the control file, only the last one is saved.

A multiple-value property can contain more than one entry. If you want to replace existing values in existing users, make sure to set the Replace Value control parameter to Y. By default, all values are added to those already in the user object.

Table 4-2 **UIMPORT Field Definitions**

Property	Property description
Account balance	Single-value property. In the data file, enter the beginning account balance for the user. If accounting is not turned on, this field has no use.
Account disabled	Single-value property. In the data file, enter Y if you want to disable this account. If you enter Y, you can't modify Password or Login script. The default is N; so if you don't want the account disabled, no field is required.
Account has expiration date	Single-value property. In the data file, enter the date in the form MM/DD/YY. It will expire at 12:01 a.m. on that date.
Allow unlimited credit	The default is N. Single-value property. In the data file, enter Y to allow unlimited credit. Enter N to not allow unlimited credit. If accounting is not turned on, this field has no use.
Allow user to change password	Single-value property. If you don't want the user to be able to change his or her password, enter N in the data file. The default is Y, so if you want to allow the user to change the password, no parameter is needed.
City	Single-value property. In the data file, enter the name of the city.
Date password expires	Single-value property. In the data file, enter the date the password expires in the form MM/DD/YY. It will expire at 12:01 am on that date.
Days between forced changes	Single-value property. In the data file, enter the number of days before requiring the user to change the password. The default is 40. The possible values for this field are numbers 1 through 365. Do not set this value to 0.
Default server	Single-value property. In the data file, enter the name of the server from which the user gets messages when they are sent with the SEND utility. In the data file, enter the NDS name of the server, including the context if the server is not in the same context as the user.

Table 4-2   **UIMPORT Field Definitions**

Property	Property description
Department	Multivalue property. In the data file, enter the department name, code, number, or other type of information.
Description	This field is a string; all data from the opening to the closing quotation mark is considered part of the field.
	Single-value property. In the data file, enter any type of information about the user that you want to import. The field must be enclosed in quotation marks (or the delimiter defined in the control file) if it contains commas or new-line characters.
Fax number	Multiple-value property. In the data file, enter the fax number for each user you want to import.
Foreign Email address	Single-value property. In the data file, enter the foreign E-mail address of the user, which specifies a mailbox that resides in a foreign E-mail system. This information is used by NetWare MHS Services.
	The format for this value is Type:Value, where Type is the type of messaging protocol and Value is the user's address (in the format required by the foreign E-mail system).
	For example, in your data file you could enter a field such as SMTP:Jjones@Acme.com.
Foreign Email alias	For example, an MHS user (a user whose mailbox is located on an MHS Messaging Server) can have an X.400 alias—with an X.400 native name— so that X.400 users can use this alias to send mail to the MHS user.
	Multiple-value property. In the data file, enter the foreign E-mail aliases of the user, which specify an object's aliases as known in a foreign messaging system. This information is used by NetWare MHS Services™.
	The format for this value is Type:Value, where Type is the type of messaging protocol and Value is the user's name (in the format required by the foreign E-mail system).
	For example, in your data file you could enter a field such as X400:g=joe;s=jones;ou=sales;o=acme;p=acmemd;a=att;c=us

Table 4-2   **UIMPORT Field Definitions**

Property	Property description
Full name	Single-value property. In the data file, enter the user's full name.
	For example: in your data file you could enter a field such as Roland D Bruns.
Generational qualifier	Single-value property. In the data file, enter the generational qualifier for the user's name. Usually this is Jr., Sr., II or III.
	For example, if the user's name is Bob Wilson III, enter III in the data file.
Given name	Single-value property. In the data file, enter the given name of the user. For example, for John Doe, enter John.
Grace logins allowed	Single-value property. In the data file, enter the number of grace logins allowed before the account is locked. 0 implies no limit.
Group membership	Multiple-value property. This field allows you to organize groups of users who need similar rights and access to network resources. In the data file, enter the names of the groups to which this user belongs. If the group object is in a different context from the user, enter the complete NDS name of the group, including its context.
Home directory	Single-value property. In the data file, enter the volume and path of the home directory in the following format:
	Volume Name:path
	If the volume is in a different context from the user, enter the complete NDS name. Separate the volume name and the path by a colon (:). Include the full path, including the final directory.
	For example, for user ABC1, create the home directory on Volume object VOL1. VOL1 is in the same context as the user:
	VOL1:USERS\ABC1
	This field in the data file will override the Home Directory field in the control section.
Initials	Single-value property. In the data file, enter the middle initial of the user. For John I. Doe, enter I here.

Table 4-2   **UIMPORT Field Definitions**

Property	Property description
Language	Multiple-value property. In the data file, enter the language directories to be searched to find the message files for NetWare utilities for this user.
	If more than one language directory should be searched, enter multiple language fields. The order is important. The first entry is the first language directory to be searched, the second is the second language directory to be searched, etc.
Last name	Single-value property. In the data file, enter the user's last name. A value is required for this field when you are creating new User objects.
Location	Multiple-value property. In the data file, enter any information about a user's work, department, or division location.
Login script	The value of the login script is the name of a file containing the ASCII text for the login script. You can use the same file for all users or have a separate file for each user. In the data file, enter the path to the file as a DOS path. For example,
	C:\DIR1\MYLOGIN.SCR
	The maximum size of the login script is 16,384 bytes. If the file is larger than this, only the first 16,384 bytes are copied to the login script.
Low balance limit	Single-value property. If unlimited credit is not allowed, in the data file enter the lowest balance the user can have and still receive services that are chargeable.
	If accounting is not turned on, this field has no effect. Also, if Allow unlimited credit is set to Yes, this field has no effect.
Mailbox ID	Single-value property. This is a unique name that specifies the directory in which all the object's inbound mail is placed. This information is used by NetWare MHS Services.
	In the data file, assign the user a mailbox ID using the user's login name. If the user's name has spaces in it or uses non-DOS characters, assign the user a mailbox ID using the user's login name, but eliminate the spaces and other illegal characters to form a legal DOS name.
	If you do not assign a user a mailbox ID, UIMPORT does so automatically.

Table 4-2　　　　　　　**UIMPORT Field Definitions**

Property	Property description
Mailbox location	Single-value property. In the data file, enter the name of the messaging server on which the user's mailbox is located. If the messaging server is not in the same context as the user, enter the complete NDS name of the messaging server.
	For example, if the user's mailbox is located on a messaging server named SERVMAN_MSG and the context of SERVMAN_MSG is Publications.ACME, enter SERVMAN_MSG.Publications.ACME.
Mailing label information	Multiple-value property. This is a single property with up to six lines of information. If you want a user's entire address imported as a single property, use Mailing label information for each field that contains a part of the address. The first field will be the first line of the postal address, the second field will be the second line, etc.
	If you are going to define only four lines of the postal address in the data file, you need to include only four Mailing label information fields. Each line of the postal address in the data file must be a separate data string (that is, separated by a comma or other separator).
	To import four lines of the postal address, you would type the following in the Fields section in the Control file:
	Fields
	…(other fields) 　　Mailing label information 　　Mailing label information 　　Mailing label information 　　…(other fields)
	In the data file, you might enter a line similar to the following:
	…,"1234 Any Street","Torrance","CA","98550",…
	You can use the Mailing label information field in place of Postal code, Post office box, State or province, and City.
Maximum connections	Single-value property. In the data file, enter the number of workstations the user can login from. For no limit, enter 0.
Minimum password length	Single-value property. In the data file, enter the minimum password length.

Table 4-2   **UIMPORT Field Definitions**

Property	Property description
Name	Single-value property. A value is required for this field. In the data file, enter any unique username. For example, you can use a student or employee identification number as the login name. This field is the user's login name in NDS.
Other names	Multiple-value property. For example, if a user has two additional names that you want to import, enter both of them in the data file and enter two field definitions in the import control file called "Other names."
Password	Single-value property. In the data file, enter a unique password for the user. Numbers, letters, and special characters may be used.
Post office box	Single-value property. In the data file, enter the user's post office box.
Postal (ZIP) code	Single-value property. Enter in the data file the five- or ten-digit ZIP code. (84111 or 84111-1111). For a Canadian address, this is the postal code.
Profile	Single-value property. In the data file, enter the name of the profile object to which this user belongs. This must include the complete NDS name of the Profile object if the profile is in a different context than the user.
Remaining grace logins	Single-value property. Normally this field is not imported. This is the number of grace logins still remaining. It is set to the same value as in "Grace logins allowed." If you want this number to be different from the "Grace logins allowed" number, you must use the modify option in UIMPORT. For those users whose Remaining grace logins should be the same as the Limit grace logins, either don't import this field or set it to the same number you entered for Limit grace logins.
Require a password	Single-value property. In the data file, type "Y" if a password is required. If no password is required for this user, type "N."
Require unique passwords	Single-value property. If unique passwords are required, type "Y" in the data file. If unique passwords are not required (in other words the user can reuse passwords), type "N."
Security equal to	Multiple-value property. In the data file, enter the name of the objects to which this user is security equivalent. This name must include the complete NDS name of the object if the object is in a different context than the user.

Table 4-2   **UIMPORT Field Definitions**

Property	Property description
See also	Multiple-value property. Enter in the data file any other related objects. Enter the complete NDS name of the object if it is not in the same context as the User object.

Skip	This is a unique processing option for UIMPORT. The values in the data file that correspond to Skip fields are ignored by UIMPORT.
	
	For example, if you exported into the data file users' birthdays and you do not want this information imported into NDS, enter "Skip" as the field definition. So if you export data that you don't want to import, rather than re-exporting the entire data file, you can simply specify "Skip" for the column that contains the information.
	
	Suppose you export to the data file a work and a home phone number, but you don't want to import the home phone number. Your data file may have a string like this:
	
	…,"801-555-4141","801-555-8677",…
	
	Your import control file would correspond like this:
	
	Fields
	    …
	    Telephone
	    Skip
	    …
	
	The 801-555-8677 field in the data file is ignored.

State or province	Single-value property. In the data file, enter the State or province of the user.
Telephone	Multiple-value property. For example, if a user has three telephone numbers that you want to import, enter in the data file each of the three numbers. In the control file, you would need three "Telephone" field entries.
Title	Multiple-value property. In the data file, enter the user's title.

Table 4-2   **UIMPORT Field Definitions**

Property	Property description
Volume restrictions	Single-value property. In the data file, enter the name of the Volume object and the space restrictions on that volume in the following format: Volume object name:Restriction amount To remove volume restrictions, enter –1 (or any other negative number) for the restriction amount.

UIMPORT Field Name Changes

UIMPORT data field names have changed in NetWare 4.1. Field names used in NetWare Services are listed in the left column of the following table and new NetWare 4.1 names are listed in the right column.

NetWare Services UIMPORT Field Name	4.1 UIMPORT Field Name
Facsimile telephone number	FAX number
Login disabled	Account disabled
Login expiration time	Account has expiration date
Login grace limit	Grace logins allowed
Login maximum simultaneous	Maximum connections
Minimum account balance	Low balance limit
Password allow change	Allow user to change password
Password expiration interval	Days between forced changes
Password expiration time	Date password expires
Password minimum length	Minimum password length
Password required	Require a password
Password unique required	Require a unique password
Postal address	Mailing label information

NetWare Services UIMPORT Field Name	4.1 UIMPORT Field Name
Security equals	Security equal to
Telephone number	Telephone
New field	Foreign Email address
New field	Foreign Email alias
New field	Full name
New field	Generational qualifier
New field	Initials
New field	Mailbox ID
New field	Mailbox location

Examples of Files Used by UIMPORT

The following examples are based on records taken from a database sample that uses these fields:

Last name:

First name:

Middle initial:

Local address

    Street:

    City:

    State or province:

    Zip code:

Student number:

Year:

Major:

Cumulative grade point average:

Department:

Data File Created from Exported Database Fields

When you export your database records to a comma-separated ASCII file, the records appear in the data file as shown here:

"Jones","Adam","J","111 South 8th East","Salt Lake City","Utah","84007","2345","Sophomore","Environmental Engineering","2.8","Engineering Sciences"

"Smith","John","D","222 North Cerillos","Los Angeles","California","96000","2875","Senior","Accounting", "3.0","Business Administration"

Corresponding Import Control File

Using the data file as a guide, you could set up the import control file to import the data file fields as shown here. This example assumes that you are creating new users in the NDS database:

Import control

  Name context=.administration.student_accts

  User template=y

  Create home directory=y

  Home directory path="Students/Home"

  Home directory volume=".SYSVOL.Student Records"

Fields

  Last name

  Given name

  Middle initial

  Mailing label information

  Mailing label information

  Mailing label information

Mailing label information

Name

Skip

Skip

Skip

Department

Note how the Name field corresponds to a student ID number. When the ID number is imported into NDS, it will become the user's login name—which is the User object name.

An alternative to managing numbers is to create a field of unique login names in your data file.

Data File Edited to Update User Objects

Suppose that later you wanted to update User object information and add properties that were not imported when the users were created.

For example, if you wanted to delete values from the "Middle initial" field, import new values from the "Year," "Major," and "Grade point average" fields, and change the separator used for all user information after Adam Jones, you would edit the data file as shown here:

"Jones","Adam","#DEL","111 South 8th East","Salt Lake City","Utah","84007","2345","Sophomore","Environmental Engineering","2.8","Engineering Sciences"

!Separator=/

"Smith"/"John"/"#DEL"/"222 North Cerillos"/"Los Angeles"/"California"/ "96000"/"2875"/"Senior"/"Accounting"/"3.0"/"Business Administration"

NOTE:	Import control parameters are initially set in the control file, but can be included in the data file. If you include control parameters in the data file, each parameter should be preceded by an exclamation point (!).

For example, to place the users in the Engineering.Acme context, and to change the separator to a semicolon (;), you would add the following lines to the data file:

!Name context=.ENGINEERING.ACME.
!Separator=;

Corresponding Changes to the Import Control File

After editing the data file, you must change the import control file to reflect the changes you made.

In the following example, the "delete property" and "replace value" control parameters have been added to delete the marked properties and specify that you want properties in both single- and multiple-value fields to be replaced by new properties. Fields marked "Skip" are replaced by "See also," so the properties are imported to the "See also" field for the users.

Import control

Name context=.administration.student_accts

> User template=y
>
> Create home directory=y
>
> Home directory path=students/home
>
> Home directory volume=.SYSVOL.Student Records
>
> Delete property=#DEL
>
> Replace value=y

Fields

> Last name
>
> Given name
>
> Middle initial
>
> Postal address
>
> Postal address
>
> Postal address
>
> Postal address
>
> Name
>
> See also

See also

See also

Department

Creating User Objects with the UIMPORT Utility

Prerequisites

- A workstation logged in to the network, running DOS 3.30 or above and using NetWare 4.1 client software

- A minimum of 512 KB of memory available on the workstation

- The Create or Supervisor object right to the container object where the User objects will be created

- The Create or Supervisor file system right to the directory where user home directories will be created (if applicable)

Procedure

1 Generate a data file within your database application.

For general instructions, see "Generating the Data File" in this chapter. For specific instructions, see the documentation accompanying your application.

2 Create an import control file.

If you have enough disk space, save this file in the same directory in which you saved the data file. Otherwise, you will need to specify the path to both the data file and the import control file when you run UIMPORT.

3 Run UIMPORT from the directory in which you saved the data file and the import control file.

At the DOS command line, type

```
UIMPORT [control_file] [data_file] [/C] <Enter>
```

Replace control_file with the name of the import control file you created. Replace data_file with the name of the data file you generated from your database application. Use /C to run UIMPORT with continuous output.

If you do not run UIMPORT from a directory that contains both the import control file and the data file, you must specify the path to each file.

Importing hundreds or thousands of users may take several hours. Therefore, you might want to run UIMPORT at night.

4   (Optional) Route import errors to a file.

If errors occur during the import process, messages appear on your workstation screen. If you want the messages sent to a file, add the DOS ">filename" option to the command.

For example, to route the messages to a file called UIMPORT.LOG in your home directory, use a command similar to the following:

```
UIMPORT [control_file] [data_file]
>HOME\PAUL\UIMPORT.LOG <Enter>
```

NOTE: When importing large groups of users, the performance of your server might begin to slow down. The reduction in performance is related to the amount of disk space available for NDS and TTS to use with UIMPORT's numerous transactions and is also related to the size of UIMPORT batches and the amount of available server memory.Procedure

If you will be importing large groups of users or experience decreased server performance while running UIMPORT, you can add server memory, process smaller batches of users, or process UIMPORT batches during periods of low server utilization.

Additional Information

For more information about	Refer to
Control parameters	Table 4-1
Creating import files	"Repairing the NetWare Directory Database" in this chapter.
Field definitions	Table 4-2

Repairing the NetWare Directory Database

The Directory Services Repair (*dsrepair*) utility is provided with NetWare 4
software to repair problems with NetWare Directory Services on a single-
server basis. It does not correct problems on servers from a single,
centralized location. It must be run on each server on which you want to
correct Directory database errors.

Directory Services Repair Overview

The Directory Services Repair utility allows you to maintain and repair the
local NetWare Directory database of a tree. This utility performs the
following operations:

- Repairs the local database

  You are provided with tools to repair replicas, replica rings, and Server objects.
  You can also view the purge time of each replica to ensure that data in each
  replica is the same.

- Analyzes each server in each local partition for synchronization errors

  You can view errors and list the partition name, server name, synchronization
  time, and error code for each error.

- Writes replica information to a log file

  The log file contains detailed information about local partitions and servers. This
  information helps you diagnose damage to the database.

- Creates a dump file of a damaged database

  The dump file is saved in a compressed format. You can use Directory Services
  Repair to diagnose and repair the damaged database.

- Checks the remote server ID list

  You can access a list of the identification numbers for remote servers. You can
  use this list to verify the identification numbers of remote servers and modify the
  numbers if you need to.

- Searches for local database objects

  A browser allows you to locate and synchronize objects in the local database.

4-76

Some NDS database problems are not fatal and NDS continues to operate. But if the database becomes corrupted, you get a message on the console that the server could not open the local database. In this case, run Directory Services Repair or re-install the NDS database to fix the problem so that the database can be opened.

The Directory Services Repair utility affects only the parts of the database that are stored on the server where you run it. To fix the entire database, you must run the utility on each server that contains a part of the database.

The Directory Services Repair utility changes inconsistent objects to Unknown objects when they do not have mandatory properties or are invalid in other respects (for example, their properties do not meet minimum requirements for an object type). Unknown objects can be deleted but cannot be changed back to their original object type.

In NetWare 4.1, Unknown objects are represented by question mark icons in NetWare Administrator.

Directory Services Repair Options

After you have installed NetWare Services and loaded Directory Services Repair, you can use the following options at the server console:

Option	Use to
Unattended Full Repair	Automatically perform all possible repair operations to the Directory database that do not require operator assistance.
Time Synchronization	Contact all servers within this server's local database to request information about NDS and time synchronization.
	If a replica of the root partition is contained on this server, then all servers in the Directory tree are contacted.
Report Synchronization Status	Determine the status of synchronization for every replica in the replica table for the Directory tree.
	The status of synchronization informs you of the current condition of the Directory tree.

Option	Use to
View/Edit Repair Log File	Track all operations of the Directory Services Repair utility to a single file. The default log file is SYS:SYSTEM\DS Repair.LOG. You can configure options for the log file by accessing "Log File And Login Configuration" in the "Advanced Options" menu.
Advanced Options Menu	The "Advanced Options" menu allows you to manually perform individual or global repair operations on the Directory tree. You can also access diagnostic information about the Directory tree database to analyze the status of the tree. See "Using the Advanced Options" in this chapter for more information.

Running an Unattended Full Repair

Use this procedure to perform an automatic repair of the Directory database. Any operation requiring an operator's assistance, such as managing partition replicas or editing remote server ID numbers, is not performed.

If you want to manually repair the Directory database, use options available in the "Advanced Options" menu. See "Usi ng the Advanced Options" on in this chapter for more information.

Prerequisites

- Access to the server console.
- All servers in a tree using the same time source
- Administer NetWare Server permission for NetWare 4.1/9000.

Procedure

1 Run the *dsrepair* utility.

The "Directory Services Repair" window appears.
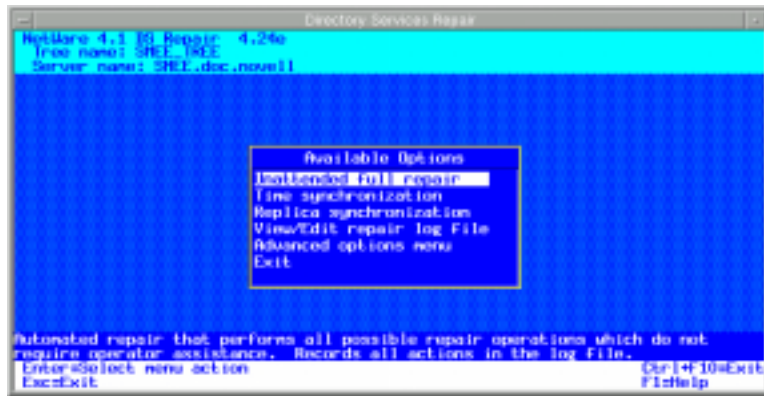
Figure 4-9   **Directory Services Repair**

2   Choose "Unattended full repair."

A window is available to allow you to observe the repairs in process.

Following the automatic repair, a message window appears that informs you of the repair status, the total number of errors corrected, and the amount of time used to complete the repair operation.

3   Press <Enter> to display the error log file.

The error log is displayed within a full-screen text editor. You can annotate or modify the Directory Services Repair log if you want to.

Checking Time Synchronization (Directory Services Repair)

Use this procedure on the server before or after performing a repair. It allows you to contact all servers within this server's local database to request information about NDS and time synchronization.

If a replica of the root partition is contained on this server, then all servers in the Directory tree are contacted.

Time synchronization is very important to NetWare Directory Services. All servers in a tree must be synchronized to the same time source. If they are not, collision will occur when objects in replicas are synchronized.

Prerequisites

- Access to the server console

- All servers in a Directory tree using the same time source

- Administer NetWare Server permission in NetWare 4.1/9000

Procedure

1 Run the *dsrepair* utility.

2 Choose "Time synchronization."

A window is available to allow you to observe the operations in process.

Following the operation, the Directory Services Repair log is displayed within a full-screen text editor. You can annotate or modify the Directory Services Repair log if you want to.

The Directory Services Repair log contains the following fields:

Field	Indicates
Server Name	All the server names known to the local Directory database. If this server contains a replica of the root partition, then this list contains all the servers in the tree.
Version	The version of NDS running on the server.
Replica Depth	The replica depth field reports "-1" if no replicas are stored on the server or "0" if the server contains a replica of the root partition. A positive integer indicates how many objects down from the root the first replica is on that server.
Time Source	The time server type. This information helps you determine whether time synchronization for all the trees in the server is configured properly. All servers in a tree must be using the same time source. For example, if there are two Single time servers, you know that all servers in the tree cannot be polling the same time source and there is a configuration problem.
Time in Sync	The local time synchronization status on the server. The status should be Yes. If it is No, then the server is not able to contact its time source.

Field	Indicates
Time +/–	The difference in time between the local server and the selected server in the list. All servers should be within one second of each other; if they are not, they have not been configured properly.
	This field reports up to 999 minutes and 59 seconds (approximately 16 hours and 30 minutes) in the form minutes:seconds. If the time difference is greater than 16 hours and 30 minutes, then the maximum value is displayed as –999:59.
	A difference in time of more than a few minutes can indicate that the servers are using different time-source servers.

Viewing Synchronization Status

Use this procedure on the server to get a report of the synchronization of partitions and replicas for the Directory tree.

Prerequisite

• Access to the server console

Procedure

1 Run the *dsrepair* utility.

2 Choose "Report synchronization status."

The "Collecting Replica Synchronization And Server Status" screen appears. A window is available to allow you to observe the operations in process.

Following this operation, the Directory Services Repair log is displayed within a full text editor. You can annotate or modify the Directory Services Repair log if you want to. This file contains information about your partitions and replicas.

Viewing and Editing the Repair Log File

Use this procedure on the server to view and edit repair information on partitions and replicas for the local Directory tree.

The default log file is SYS:SYSTEM\DSREPAIR.LOG. You can change the filename with the "Log File and Login Configuration" option in the "Advanced Options" menu. See "Using the Advanced Options" in this chapter for more information.

Prerequisites

• Access to NetWare 4.1/9000

• Administer NetWare Server permission to NetWare 4.1

Procedure

1 Run the *dsrepair* utility.

2 Choose "View/edit repair file log."

Using the Advanced Options

Use this procedure to access the "Advanced Options" for manual repair of the Directory database.

If you want the Directory database to be repaired automatically, use the options available from the "Unattended Full Repair" option in the main menu. See "Running an Unattended Full Repair" in this chapter for more information.

Prerequisites

• Access to NetWare 4.1/9000

• Administer NetWare Server permission to NetWare 4.1/9000

Procedure

1 Run the *dsrepair* command.

2 Choose "Advanced options menu."

The "Advanced Options" menu appears.

3 From the menu, select the repair operation you want to perform.

The "Advanced Options" menu includes the following options:

Log file and login configuration
Repair local DS database
Servers known to this database

View remote server ID list
Replica and partition operations
Check external references
Security equivalence synchronization
Global schema update
View/Edit repair log file
Create a database dump file
Return to main menu

Refer to the online help in Directory Services Repair for more information and instructions on how to use these options in the Directory Services Repair utility.

Additional Information

For more information about	Refer to
Directory Services database	"NetWare Directory Services" in *Concepts*
Using Directory Services Repair	"DS Repair" in *Utilities Reference*

Merging NDS Trees

NetWare Services does not support DSMERGE. For information on how to merge two trees, see your native NetWare documentation and software.

Viewing and Managing NDS Synchronization Status

This section explains the NDS Trace feature that you can use from the server console. You should use this feature to do the following:

- Determine whether NDS synchronization processes are complete.

- Diagnose NDS errors. These errors may appear when you are manipulating NDS objects with the administration utilities.

  You can identify NDS-related system messages by their numbering: –601 through –699 and F966 through F9FE.

NOTE:
As with all NetWare system messages, an NDS system message does not necessarily indicate an error condition, but may simply indicate general NDS status. For more information, see the specific message in System Messages.

Prerequisite

- Access to a "Terminal" window

Procedure

1 Turn on the NDS Trace screen by typing the following at the server:

```
dsadmin -d on
```

The messages are displayed to the console. Two types of messages are particularly important:

- "All processed = YES" indicates that all pending NDS synchronization actions have been processed.

- Messages numbered –601 through –699 and F966 through F9FE indicate NDS status or errors. For explanations and suggested actions, see System Messages.

```
dsadmin -d on
```

```
dsadmin -f on
```

By default, the messages are copied to the file DSTRACE.DBG in the SYS:SYSTEM directory when you execute both commands.

Copying NDS Trace messages to a file may be helpful if you need to ask someone else for diagnostic help. You must activiate *dsadmin -d on* prior to executing *dsadmin -f on*.

2 To disable tracing, type

```
dsadmin -d off
```

```
dsadmin -f off
```

Additional Information

For more information about	Refer to
NDS Trace options	*dsadmin* utility in the *Utilities Reference*
NDS system messages	*System Messages*

5

Customizing the User Environment

Introduction

This chapter provides steps on how to create login scripts to customize
NetWare® users' workstations and includes the following:

- How to create, modify, copy, and print a login script

- Common login script commands

- Sample login scripts

About Login Scripts

You can use login scripts to automatically set up your users' workstation environments whenever they log in to the network. Login scripts are similar to configurable batch files and are executed by the LOGIN utility. You can use login scripts to

- Map drives and search drives to directories.

- Display messages.

- Set environment variables.

- Execute programs or menus.

Login scripts work the same way for DOS and Windows workstations.

Types of Login Scripts

When a user logs in, the LOGIN utility executes the appropriate login scripts. Four types of login scripts are available, and they can be used separately or together to tailor a custom environment for your users. All four types of login scripts are optional. They are described here in the order they are executed:

- A container login script sets the general environments for all users in that container. The LOGIN utility executes container login scripts first. A user can use only one container login script.

NOTE: The container login script replaces the system login script that was in NetWare 3™.

- A profile login script sets environments for several users at the same time. The LOGIN utility executes a profile login script after the container login script.

  A user can be assigned only one profile login script, but can specify other profile login scripts on the command line. Several users can use the same profile login script.

- A user login script sets environments specific to a single user, such as printing options or a username for electronic mail.

The LOGIN utility executes the user login script after any container and profile login scripts have executed. A user can have only one user login script.

- The default login script is precoded into the LOGIN.EXE command and is not editable. It executes if a user doesn't have his or her own user login script, even if a container or profile login script exists.

  The default login script is executed for all users (including user ADMIN) unless you create a user login script. The default login script contains only essential commands, such as drive mappings to the NetWare utilities.

  To see the commands in the default login script, see "Default Login Script" in this chapter.

If you do not want to create any user login scripts and you don't want the default login script to execute for any users, you can disable the default login script by including the NO_DEFAULT command in the container or profile login script.

To use the login script from an Organization, Organizational Unit, or Profile object, users must have the Browse right to the object and the Read right to the object's Login Script property.

NOTE: For more information on Browse or Read rights for a file, object, or property, see "Browsing" and "Rights" in Concepts.

Deciding Which Login Scripts to Create

Maintaining many user login scripts can be time consuming. Therefore, you should try to include as much customizing information as possible in the container and profile login scripts.

Here are some suggestions:

- If all users need access to the NetWare utilities in the same volume, for example, put the search drive mapping to that volume in a single container login script rather than in every user login script.

- Create profile login scripts if there are several users with identical login script needs.

- In user login scripts, include only those items that cannot be included in profile or container login scripts.

Since up to three login scripts can execute whenever a user logs in, conflicts can occur. If this happens, the last login script to execute (usually the user login script) overrides any conflicting commands in a previous login script.

Login scripts are properties of objects. Table 5-1 shows which objects can contain which login scripts.

Table 5-1   **Objects that Contain Login Scripts**

Object	Type of Login Script
Organization	Container
Organizational Unit	Container
Profile	Profile
User	User

Figure 5-1 shows where the different types of login scripts can reside in a Directory tree.

Figure 5-1   **Where Login Scripts Are Located**

In the previous figure, there are three users: ESAYERS, SWILLIAMS, and MRICHARD. The following table shows which login scripts execute when each of these users logs in.

When this user logs in	Login scripts execute in this order	
ESAYERS	**1**	Sales_PV's container login script
	2	ESAYERS' user login script
SWILLIAMS	**1**	Sales _PV's container login script
	2	Default login script
MRICHARD	**1**	Accounting's container login script
	2	CLERKS' profile login script
	3	MRICHARD's user login script

Container login scripts only affect users in the Organization or Organizational Unit that contains the login script.

For example, in Figure 5-1, although there are two levels of container objects above users ESAYERS and SWILLIAMS, only the container login script for the container they are in (OU=SALES_PV) executes.

If the SALES_PV Organizational Unit had no container login script defined, no container login script would execute for ESAYERS and SWILLIAMS, even though a container login script exists at a higher level.

Because user SWILLIAMS has no user login script defined, the default login script executes after the container login script.

Since user MRICHARD belongs to the profile CLERKS, the CLERKS profile login script executes before MRICHARD's user login script. Users can be assigned to only one Profile object, but other profile login scripts can be specified at the command line, for example,

```
LOGIN username /p profile_object
```

You can, however, assign users to more than one Group object. Then use the MEMBER OF "group" identifier variable to specify that different parts of a login script execute, depending on the Group objects to which the user belongs.

For more information about using the MEMBER OF "group" identifier variable in login scripts, see "IF…THEN" and "Identifier Variables" in this chapter.

Creating, Modifying, Copying, and Printing Login Scripts

To create or modify login scripts and to copy one object's login script into another's, you can use either NetWare Administrator or NETADMIN. Both procedures are described in this section.

If you are logged in to a server running NetWare 2 or NetWare 3 and that server is in a Directory tree, do not create or edit a login script using the SYSCON utility. If you do, the changes to that login script will not appear in your NetWare Directory Services login script.

The reason is that your NetWare Directory Services login script is a property of your User object, while your bindery-based login script is a file in your MAIL directory.

The main difference in creating container, profile, and user login scripts is the object you select to contain the login scripts:

- Container login scripts are assigned to container objects (Organization or Organizational Unit objects).

- Profile login scripts are assigned to Profile objects. For a User object to use a profile login script, you must select that User object and assign it to the Profile.

- User login scripts are assigned to User objects.

All types of login scripts use the same conventions, commands, and variables.

Hints for Planning Login Scripts

The following hints can help you plan effective login scripts. For a description of the commands you can use in a login script, see "Login Script Commands and Variables" in this chapter.

For login script examples, see "Examples of Login Scripts" in this chapter.

Table 5-2   **Login Script Conventions**

Subject	Convention
Minimum login script	No minimum. All four types of login scripts are optional. Login scripts can have only one line or they can have many. There are no required commands for login scripts.
Case	Either uppercase or lowercase is accepted, except that identifier variables enclosed in quotation marks and preceded by a percent sign (%) must be uppercase. See "Identifier Variables" in this chapter.
Characters per line	150 characters per line is maximum; 78 characters per line (common screen width) is recommended for readability.
Punctuation and symbols	Type all symbols (#, %, ", _) and punctuation exactly as shown in examples and syntax.
Commands per line	Use only one command per line. Start each command on a new line; press <Enter> to end each command and start a new command. Lines that wrap automatically are considered one command. The WRITE command output displays better if WRITE is repeated at the beginning of each wrapped line.
Sequence of commands	Generally, enter commands in the order you want them to execute, with the following restrictions: • ATTACH commands must precede related MAP commands to avoid prompting the user for a username/password during login. • If you use "#" to execute an external program, this command must follow any necessary MAP commands. • If sequence is not important, you should group similar commands, such as MAP and WRITE commands, together to make the login script easier to read.
Blank lines	Blank lines don't affect login script execution. Use them to visually separate groups of commands.
Remarks (REMARK, REM, asterisks, and semicolons)	Lines beginning with REMARK, REM, an asterisk, or a semicolon are comments that do not display when the login script executes. Use remarks to record the purpose of each command or group of commands. (For examples, see "REMARK" in this chapter).

Table 5-2   **Login Script Conventions**

Subject	Convention
Identifier variables	Type identifier variables exactly as shown. For the value of an identifier variable to be displayed on the workstation's screen as part of a WRITE command, you must enclose the identifier in quotation marks and precede it by a percent sign (%). See "Identifier Variables" in this chapter.

Creating or Modifying a Login Script Using NetWare Administrator

Use the following instructions to create any of the three user-created types of login scripts (container, profile, or user).

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Write property to the object that will contain the login script

- The object to which you are going to assign the login script must already exist (Organization, Organizational Unit, Profile, or User Object)

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select the object whose login script you are creating or modifying.

   For information about moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Details."

4 Choose the "Login Script" page.

5 Enter the login script commands and information into the login script text box.

   For a description of all login script commands, see "Login Script Commands and Variables" in this chapter. For login script examples, see "Examples of Login Scripts" in this chapter.

6 Choose "OK" to save the login script and close the "Details" dialog box.

If the login script you created was a container or user login script, you are finished.

If the login script you created was for a Profile object, continue with Step 7.

7 (Profile login scripts only) Using the browser, select the User object that needs to use the profile login script.

8 From the "Object" menu, choose "Details."

9 Choose the "Login Script" page.

10 Enter the name of the Profile object in the "Default Profile" field located under the login script text box.

You can type in the complete name of the Profile object, or you can choose the browser button next to the "Default Profile" field to select the Profile object.

11 To save the Profile object name and close the "Details" dialog box, choose "OK."

Now you must add the User object as a trustee of the Profile object.

12 Using the browser, select the Profile object.

13 From the "Object" menu, choose "Trustees of This Object."

14 Choose "Add Trustee."

15 Enter the name of the User object who is using this Profile object.

You can type in the complete name of the User object, or you can choose the browser button to select the Profile object.

16 Make sure the Browse object right and the Read property right are checked and then choose "OK" to assign these rights to the User object.

The User object is now a trustee of the Profile object and has the rights necessary to run the profile login script.

Additional Information

For more information about	Refer to
Creating a Profile object	"Managing Profile Objects" in this chapter
Examples of login scripts	"Examples of Login Scripts" in this chapter
Login script commands and variables	"Login Script Commands and Variables" in this chapter

Using NetWare Administrator	"NetWare Administrator" in *Utilities Reference*

Creating or Modifying a Login Script Using NETADMIN

Use the following instructions to create any of the three user-created types of login script (container, profile, or user).

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Write property to the object that will contain the login script

- The object to which you are going to assign the login script must already exist (Organization, Organizational Unit, Profile, or User Object)

Procedure

1 At the DOS Prompt, type

   NETADMIN <Enter>

2 From the "NetAdmin Options" menu, choose "Manage Objects."

3 Select the object whose login script you want to create.

   - If the object you want appears in the list, select it and press <F10>.

   - If the object is not in the list, browse the directory by selecting container objects and pressing <Enter> until you see the object you want. Select it and press <F10>.

4 Select "View or Edit Properties of This Object."

5 Select "Login Script."

   If you are editing an existing login script that already contains some commands, continue with Step 3.

   If this login script is empty, a message appears asking if you want to copy a login script from another object.

   a If you do not want to copy the login script from another object, answer "No" and continue with Step 3.

   b To copy a login script from another object, answer "Yes" and select the name of the object whose script you want to copy. Then continue with Step 3.

6 Enter the login script commands and information in the login script text box.

For a description of all login script commands, see "Login Script Commands and Variables" in this chapter. For login script examples, see "Examples of Login Scripts" in this chapter.

7 To save the login script, press <F10>.

If the login script you created was a container or a user login script, you are finished.

If the login script you created was for a Profile object, continue with Step 5.

8 (Profile login scripts only) Press <Esc> repeatedly until you return to the browser.

9 Select the User object that needs to use the profile login script.

You can either type the object's complete name and press <F10> or press <Insert> to browse through the Directory tree and choose the name.

10 Select "View or Edit Properties of This Object."

11 Select "Memberships."

12 Select the "Profile" field and press <Insert>.

13 Enter the name of the Profile object in the box that appears.

You can either type the object's complete name and press <F10> or press <Insert> to browse through the Directory tree and select the name.

14 Press <F10> to save the changes.

Now you must add the User object as a trustee of the Profile object.

15 Return to the "Manage Objects" menu.

16 Through the browser, select the Profile object.

Press <Insert> to browse through the Directory tree and choose the name.

17 Select "View or Edit the Trustees of This Object."

18 Select "Trustees."

19 To add the User object as a trustee of this Profile object, press <Insert>.

20 Enter the name of the User object that needs to be a trustee of this Profile object.

You can either type the object's complete name and press <F10> or press <Insert> to browse through the Directory tree and choose the name.

21 Select "All Properties Rights."

22 To add the user as a trustee and grant the default property right, press <Enter>.

The User object is added as a trustee of the Profile object and is given the Read right to all of the Profile's properties.

Now you must assign the Browse object right to the User object.

23 Enter the name of the User object.

You can either type the object's complete name and press <F10> or press <Insert> to browse through the Directory tree and choose the name.

24 Choose "Object Right."

25 To grant the default object right, press <Enter>.

The User object is given the Browse object right. The User object now has all rights necessary to use the Profile object's login script.

26 To exit NETADMIN, press <Esc> until you get to the confirmation prompt and select "Yes."

Additional Information

For more information about	Refer to
Creating a Profile object	"Managing Profile Objects" in this chapter
Examples of login scripts	"Examples of Login Scripts" in this chapter
Login script commands and variables	"Login Script Commands and Variables" in this chapter
Using NETADMIN	"NETADMIN" in *Utilities Reference*

Copying a Login Script Using NetWare Administrator

Use the following instructions to copy all or part of a login script and paste it into another object's login script.

Prerequisities

- A 386 or later workstation and NetWare Administrator

- The Write property to the object that will contain the login script

- The object whose login script you will be working with must already exist (Organization, Organizational Unit, Profile, or User Object)

Procedure

1 From the Windows Program Manager, click on the "NetWare Administrator" icon.

2 Using the browser, select the object whose login script you want to copy.

   For information about moving around in the browser and selecting objects, choose "Help" from the menu bar.

3 From the "Object" menu, choose "Details."

4 Choose the "Login Script" page.

5 In the login script text box, highlight the text you want to copy.

6 Press <Ctrl>+<Insert> to copy the highlighted text.

   The highlighted text has been placed in clipboard memory and can be pasted into another login script.

7 To save the login script and close the "Details" dialog box, choose "OK."

8 Using the browser, select the object whose login script you want to paste the copied text into.

9 From the "Object" menu, choose "Details."

10 Choose the "Login Script" page.

11 In the login script text box, place the cursor where you want the copied text to appear.

12 Press <Shift>+<Insert> to paste the copied text into the login script.

13 To save the login script and close the "Details" dialog box, choose "OK."

Copying a Login Script Using NETADMIN

Use the following instructions to copy all or part of a login script and paste it into another object's login script.

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN

- The Write property to the object that will contain the login script

- The object whose login script you will be working with must already exist (Organization, Organizational Unit, Profile, or User Object)

Procedure

1 At the DOS prompt, type

    NETADMIN <Enter>

2 From the "NetAdmin Options" menu, choose "Manage Objects."

3 Select the object whose login script you want to copy.

  - If the object you want appears in the list, select it and press <F10>.

  - If the object is not in the list, browse the Directory by selecting container objects and pressing <Enter> until you see the object you want. Select it and press <F10>.

4 Select "View or Edit Properties of This Object."

5 Select "Login Script."

6 In the login script text box, place the cursor at the beginning of the text you want to copy and press <F5> to mark the beginning of the text.

7 Use the arrow keys to move to the end of the text you want to copy.

As you move the cursor, the text in the login script is highlighted. You will copy this highlighted text by first deleting it, and re-inserting it. Then you will insert it into the new login script.

8 To delete the text from the login script, press <Delete>.

Although you have deleted the text, the text has been placed in a clipboard memory and can be retrieved.

9 To insert the text from the login script, press <Insert>.

The deleted text has now been restored to the login script. A copy of the text still resides in the clipboard memory, so you can paste it into another object's memory.

10 To exit the login script, press <Esc>, and select "No" when asked if you want to save the changes you made.

11 Return to the browser screen.

12 Select the object whose login script you want to paste the copied text into.

You can either type the object's complete name and press <F10> or press <Insert> to browse through the Directory tree and choose the name.

13 Select "View or Edit Properties of This Object."

14 Select "Login Script."

15 In the login script text box, place the cursor where you want the copied text to appear.

16 To paste the copied text into the login script, press <Insert>.

17 To save the changes, press <F10>.

Printing Login Scripts

Use the following instructions to print a login script.

Prerequisites

- A workstation running DOS 3.30 or later

- The Read and File Scan property right to the object to be printed

Procedure

To print a login script from the command line, use the NLIST command and redirect the output to a file or a printer. You must be in an object's parent container to see and print the login script of that object.

To print a user's login script, use the following format:

```
NLIST user <username> show "login script" >LPT1
```

To print a container's login script, use the following format:

```
NLIST "organizational unit" = "ou name" show "login script"
>LPT1
```

Any parameter of the NLIST command that includes a space in its name must be enclosed in quotation marks.

Login Script Commands and Variables

This section describes the commands you can use in a login script. The commands are presented in alphabetical order.

Syntax conventions for login script commands, as shown in Table 5-3, are the same as those for workstation text utilities, with one exception: some login script commands must be preceded by the # symbol.

Following is an example of the syntax for the MAP login script command:

```
MAP [option] drive:=drive:|path
```

The command syntax is described in Table 5-3.

Table 5-3   **Command Syntax Conventions**

Convention	Explanation
MAP	Words in uppercase letters are keywords that must be included in the command and spelled exactly as shown. However, it doesn't matter if you type them in uppercase or lowercase letters.
[ ]	Square brackets indicate that the enclosed item is optional.
		A vertical bar means you can use either the item to the left of the bar or the item to the right, but not both. In the previous MAP example, you can enter either the drive letter or a complete path.
drive	Words in italics are variables. Replace variables with information specific to your task.
[option]	Options or parameters for each command are listed with the command. Options and parameters can often be abbreviated.
<Enter>	Angle brackets indicate a key you should press.
[[ ]]	Nested square brackets indicate that all enclosed items are optional. However, if you use the items within the innermost brackets, you must also use the items within the outer brackets.

(Execute External Program)

Use the # symbol to execute a program that is external to the login script.

Command Format

```
# [path] filename [parameter]
```

Replace path with a drive letter; or, if you have specified NOSWAP on the command line or in the login script, you may replace path with a full directory path beginning with the NetWare volume name.

Replace filename with an executable file (files that end in .EXE, .COM, or .BAT, for example). Do not include the extension.

Replace parameter with any parameters that must accompany the executable file.

Using

If you want the LOGIN utility to execute a program that is external to the login script, enter the # command (symbol) followed by the name of the file you want to execute.

This command fails when

- The given directory is invalid.

- Proper security rights are lacking.

- The executable file cannot be found.

- Insufficient workstation memory is available to load the file.

NOTE: LOGIN swaps to extended or expanded memory or to disk unless NOSWAP is specified on the command line or in the login script.

NOSWAP prevents LOGIN from being swapped out of conventional memory. Then, if the station does not have enough memory to handle both LOGIN and the #

command, the # command fails but the rest of the login script executes normally.

For more information, see "SWAP" in this chapter.

Examples

When you want to define a default print queue and printer, you can make the login script execute the NetWare CAPTURE utility. This allows you to send print jobs to a network print queue (named QUEUE_FOR_LASERJET in this example).

If you have a search drive mapped to SYS:PUBLIC where the NetWare utilities are stored, you could enter the following command in the login script:

```
#CAPTURE Q=QUEUE_FOR_LASERJET NB TI=10 NFF
```

You do not need to enter a path in this case because CAPTURE is located in a search drive.

If you do not have a search drive mapped to a directory, include the path to that directory in the command. For example, to run a batch file named BATCH.BAT in the ACCOUNTS directory, use the following command:

#Z:\ACCOUNTS\BATCH

Additional Information

For more information about	Refer to
Using the NOSWAP command	"NOSWAP" in this chapter
Using the SWAP command	"SWAP" in this chapter

ATTACH

Use ATTACH to connect to a NetWare 2 or NetWare 3 server or to a NetWare 4 server using bindery services while the login script is running.

Command Format
```
ATTACH [server[/username[;password]]]
```

Using ATTACH

Replace server with the name of the NetWare server to which you want to attach.

Replace username with the login name. If you do not include the username, the user is prompted for a login name when the ATTACH command is executed from the login script.

You can replace password with the correct password for that user and server. If the username and password are the same as the primary login username and password, you can omit the password and not be prompted for it.

Use caution when including passwords in a login script, however. It is more secure to eliminate the password. Then, at the point in the login script where the ATTACH command is executed, the user is prompted for the password.

Example

To attach user MRICHARD (whose password is "GOLFING") to a server named REPORTS (which is a bindery-based server running NetWare 3), add the following line to the login script:

```
ATTACH REPORTS/MRICHARD;GOLFING
```

BREAK

Use BREAK ON to allow the user to terminate execution of the login script. The default is BREAK OFF.

Command Format
```
BREAK ON|OFF
```

Using BREAK

If BREAK ON is included in a login script, you can press <Ctrl>+<C> or <Ctrl>+<Break> to abort the normal execution of your login script.

Including BREAK ON in a login script does not affect the DOS <Ctrl>+<Break> check. For more details, see "DOS BREAK" in this chapter.

When the BREAK option is ON, type-ahead keyboard input is not saved in the buffer.

CLS

Use CLS to clear the display from the workstation's screen during the login process.

Command Format

```
CLS
```

Using CLS

When a user logs in, a login script may display messages on the user's workstation screen.

If the CLS command is added to the login script, any messages generated by commands earlier in the login script are cleared from the screen.

COMSPEC

Use COMSPEC in the login script to execute DOS commands from the network. Specify the directory where DOS and the DOS command processor (COMMAND.COM) are loaded.

COMSPEC is originally set when DOS is booted. It must be reset after you log in to change the location that COMMAND.COM loads from while you are logged in to the network.

Command Format

```
COMSPEC=[path]COMMAND.COM
```

Replace path with either a drive letter or a full directory path beginning with the NetWare volume name.

Using COMSPEC

Follow these guidelines for using COMSPEC:

* If users are running DOS from a network directory, first map a search drive in the login script to that directory and then add the COMSPEC command to the login script.

   (You may want to map a fake root to the DOS directory. For information about mapping a fake root, see "MAP" in this chapter.)

* If all users use the same version of DOS from the network, you can add the

COMSPEC command to the container login script.

- If more than one version of DOS is available on your network, a network directory should exist for each DOS version. In this case, you can put COMSPEC commands in either profile or user login scripts, to make sure each workstation accesses the version of DOS it needs.

- If users are running DOS from their local drives, do not add COMSPEC to login scripts.

- To use an environment variable as the value in a COMSPEC command, precede it with the percent sign (%), as follows:

```
COMSPEC=%environment variable
```

CONTEXT

Use CONTEXT to set a user's current context in the Directory tree.

Command Format
```
CONTEXT context
```

Using CONTEXT

Replace context with the context you want the user to see after login.

As with the workstation CX utility, you can enter a complete name to move down through the context, or you can use periods to move up toward the Root of the Directory tree.

NOTE: CONTEXT does not support all options that the CX workstation utility does. It only sets the context.

Example

To change the context to the Organizational Unit SALES, under the Organization ACME_US, add the following line to the login script:

```
CONTEXT .SALES.ACME_US
```

You can type a single period instead of a container name to indicate that you want to move up one level.

For example, if you are in the context SALES.ACME_US and you want to move up one level to the context ACME_US, add the following line to the login script.

CONTEXT .

To move up two levels, enter two periods, and so on.

Additional Information

For more information about	Refer to
Context	"Context" in *Concepts*
Using the CX utility	"CX" in *Utilities Reference*

DISPLAY

Use DISPLAY to show the contents of a text file on a workstation's screen when the user logs in.

This command works best with an ASCII file. If you use DISPLAY with a word-processing file, printer and word-processing codes are displayed with the text.

Command Format
DISPLAY [path] filename

Replace path with either a drive letter or a full directory path beginning with the NetWare volume name.

Replace filename with the complete name (including the extension) of the file you want to display.

Using DISPLAY

When you use DISPLAY to display the contents of a file on the screen, the exact characters in the file, including any printer and word-processing codes, appear on the workstation screen. (To display only the text and suppress codes, use FDISPLAY. See "Using FDISPLAY" in this chapter.)

If the given directory does not exist or the file is not found, no error message appears on the screen when the user logs in.

Example

Suppose you put messages in a file called SYSNEWS.TXT, in the directory SYS:PUBLIC\MESSAGES, and you want your users to see this file on their screens when they log in on Mondays. Add the following lines to the container login script:

```
IF DAY_OF_WEEK="Monday" THEN
DISPLAY SYS:PUBLIC\MESSAGES\SYSNEWS.TXT
END
```

DOS BREAK

Use DOS BREAK to set the <Ctrl>+<Break> checking level for DOS.

If DOS BREAK is set to ON, you can terminate a program (other than the login script) by pressing <Ctrl>+<Break>.

NOTE: This command is different from the BREAK command that terminates a login script. For more details, see "BREAK" in this chapter.

Command Format

```
DOS BREAK [ON|OFF]
```

Using DOS BREAK

Enter the following command in the login script:

```
DOS BREAK ON
```

The default is DOS BREAK OFF.

Additional Information

For more information about	Refer to
Using the DOS BREAK command	Your DOS manual
Using the BREAK login script command	"BREAK" in this chapter

DOS SET

See "SET" in this chapter.

DOS VERIFY

Use DOS VERIFY to verify that data written to a local drive is not written to a bad sector and can be read without an error.

Command Format

```
DOS VERIFY [ON|OFF]
```

Using DOS VERIFY

The DOS COPY and NCOPY commands do not automatically verify that data copied to a local drive can be read after the copy.

To assure verification of each copy operation after login, add the VERIFY ON and DOS VERIFY ON commands (for network and DOS copies respectively) to the login script.

Another option, since VERIFY ON can affect performance by slowing down write operations, is to use the /V option at the command line with each COPY or NCOPY operation.

The default in the login script is DOS VERIFY OFF.

These commands may not work with some software that is copy-protected.

DRIVE

Use DRIVE to change the default drive while the login script is executing.

Command Format

```
DRIVE [drive:|*n:]
```

Replace drive with a local or network drive letter, or replace n with a drive number. Which one you use depends on what is being assigned within the login script.

Using DRIVE

Unless this command is in your login script, the default drive is set to the first network drive, which is often assigned to your home directory when you log in.

If you don't want the default drive to be the first network drive, map a drive in the login script to the directory you want to be the default; then use the DRIVE command to change the default drive.

Instead of specifying a drive letter, such as F: or G:, you can use an asterisk followed by a number n to represent the nth network drive (for example, *3). This allows drive letters to reorder themselves automatically if previous drive mappings are deleted or added.

Example

Suppose you expect to work on only one project for several days and the files for that project are located on drive S:. You can use the DRIVE command to set your default drive to S: so you won't have to change your default drive manually every time you log in.

First, make sure you have mapped drive S: to the correct directory in your login script. Then enter the following command in the login script:

```
DRIVE S:
```

EXIT

Use EXIT to terminate execution of the login script and execute an external program.

Command Format
```
EXIT ["filename [parameters]"]
```

Using EXIT

The length of information between quotation marks cannot exceed your keyboard buffer length minus 1 (commonly 15 - 1 = 14 characters).

You can use the EXIT command in a login script to stop the login script and execute a program, such as a word-processing or menu program.

Because EXIT stops the login script, make sure you put this command at the end of the login script.

You can also use EXIT in an IF…THEN statement so that the login script stops and exits to an external program only if a certain condition exists. If the condition doesn't exist, the login script skips the EXIT command and continues executing.

If the program you are executing with the EXIT command requires any DOS paths or NetWare search drives to be set, make sure they are specified in the login script ahead of the EXIT command.

Adding EXIT to a container login script prevents other profile or user login scripts from running. Putting EXIT in a profile login script prevents the user login script from running.

The EXIT command works only on IBM*-compatible workstations running DOS. Therefore, if your DOS workstation has a machine name different from IBM_PC specified in its NET.CFG file, you must add the PCCOMPATIBLE login script command to the login script.

For more information about the PCCOMPATIBLE command, see "PCCOMPATIBLE" in this chapter.

Examples

- Suppose the workstation's long machine name is IBM_PC. To execute a menu program called TRAINING when the login script is finished, add the following line at the end of the login script:

  ```
  EXIT "NMENU TRAINING"
  ```

- If you are using a Hewlett Packard* computer and you have changed the long machine name to HE_PAC in the NET.CFG file, add the following lines at the end of the login script:

  ```
  PCCOMPATIBLE
  ```

  ```
  EXIT "NMENU TRAINING"
  ```

- Suppose you want the login script to exit to a word-processing program when the user logs in on Mondays, but not on other days. You could add the following IF…THEN statement to the login script:

  ```
  IF DAY_OF_WEEK="MONDAY" THEN EXIT "WP"
  ```

Additional Information

For more information about	Refer to
Changing the machine name in NET.CFG	*NetWare Client for DOS/Windows User Guide*
Creating a menu	Chapter 6, "Creating Menus"

FDISPLAY

Use FDISPLAY to show the text of a word-processing file on a workstation's screen when the user logs in.

To display both the text and the printer and word-processing codes of a file, or to display an ASCII file, see "DISPLAY" in this chapter.

Command Format

```
FDISPLAY [path] filename
```

Replace path with either a drive letter or a full directory path beginning with the NetWare volume name.

Replace filename with the complete name (including the extension) of the file you want to display.

Using FDISPLAY

When you use FDISPLAY to display the contents of a word-processing file on the screen, the text in the file is filtered and formatted so that only the text itself is displayed. FDISPLAY does not display tabs.

If the given directory does not exist or if the file is not found, no error message appears on the screen when the user logs in.

Example

Suppose you put messages in a file called SYSNEWS.TXT, in the directory SYS:PUBLIC\MESSAGES, and you want your users to see this file on their screens when they log in on Mondays.

Add the following lines to the container login script:

```
IF DAY_OF_WEEK="Monday" THEN
```

```
FDISPLAY SYS:PUBLIC\MESSAGES\SYSNEWS.TXT
END
```

FIRE PHASERS

Use FIRE PHASERS to signal the workstation to emit a phaser sound.

Command Format

```
FIRE n
```

Replace n with the number of times you want this sound to occur.

Using FIRE PHASERS

Use this command alone to generate the phaser sound whenever a user logs in. Use FIRE PHASERS with the IF…THEN command to make the sound execute a different number of times depending on the circumstances of the login.

Examples

The following line executes the phaser sound four times upon login:

```
FIRE 4
```

To use an environment variable as the number of times to fire, use % before the variable, as follows:

```
FIRE %environment variable
```

Either of the following lines fires the phaser five times on Thursdays:

```
IF DAY_OF_WEEK="Thursday" THEN FIRE 5
```

or

```
FIRE %NDAY_OF_WEEK
```

The identifier variable %NDAY_OF_WEEK indicates a number that corresponds to the day of the week. Since Thursday is the fifth day of the week, phasers fire five times on Thursdays.

For more information about using identifier variables, see "Identifier Variables" on in this chapter.

GOTO

Use GOTO to execute a portion of the login script out of the regular sequence.

Command Format

```
GOTO label
```

Use label to indicate where the login script should continue executing.

Using GOTO

Set BREAK ON in your login script before experimenting with GOTO loops so that you can break out of a login script if necessary.

For more information about the BREAK login script command, see "BREAK" in this chapter.

Do not use GOTO to enter or exit a nested IF…THEN statement. This usage confuses the program.

Example

To execute a loop of commands, you could include the following lines in your login script. In this case, the commands to be executed are labeled AGAIN (as indicated in the second line).

```
SET X="1"
AGAIN:
SET X=<X> + "1"
;see compound strings for this
WRITE <X>
IF <X> < "9" THEN GOTO AGAIN
```

The GOTO command looks at the value of <X> (a DOS environment variable). If the value of <X> is less than 9, then <X> increments by 1 and GOTO loops back to the AGAIN label. When <X> gains the value of 9, the IF…THEN test becomes false, the GOTO is ignored, and the script continues normally. See the IF…THEN command next.

IF…THEN

Use IF…THEN when you want the login script to perform an action only under certain conditions.

Command Format

```
IF conditional [AND|OR [conditional]] THEN
commands
```

```
[ELSE
command]
```

```
[END]
```

Replace conditional with identifier variables. For more information about identifier variables, see "Identifier Variables" in this chapter.

Replace commands with any login script commands that you want to be executed if the specified condition is true.

Using IF…THEN

Follow these guidelines for using IF...THEN:

• Use IF…THEN statements to execute commands only under certain conditions.

  An example of a conditional statement is

```
IF MEMBER OF "CLERKS"
```

  In this statement, some action is performed if the user who logged in belongs to the Group object named CLERKS.

  The following is a different type of conditional statement:

```
IF DAY_OF_WEEK="MONDAY"
```

  In this statement, the equals sign (=) indicates the relationship between the variable (DAY_OF_WEEK) and its value (Monday). Note that the value (Monday) is inside quotation marks.

• When using IF…THEN statements, be aware of the following syntax rules:

  • Use AND or OR to include two or more conditionals in an IF…THEN statement.

  • Values of conditional statements must be enclosed in quotation marks.

  • The ELSE statement is optional.

  • IF, ELSE, and END must be on separate lines. THEN does not need to be on

a separate line.

- If you include a WRITE command as part of the IF…THEN command, the WRITE command must be on a separate line.

- IF…THEN statements can be nested (up to 10 levels). However, GOTO should not be used in a nested IF…THEN statement to enter or exit from the body of an IF…THEN statement.

- If your IF…THEN statement consists of only one line, even if that line wraps, you do not need to include END. If your IF…THEN statement must be on more than one line (for example, you used ELSE or WRITE, which must be on separate lines), you must include END.

Six relationships are possible between the elements of an IF…THEN statement. Represent these relationships with the following symbols:

Symbol	Definition
=	Equals
<>	Does not equal
>	Is greater than
>=	Is greater than or equal to
<	Is less than
<=	Is less than or equal to

Examples

- If you place the following command in a login script, the message "Status report is due today" appears when the user logs in on Monday and "Have a nice day!" on other days.

```
IF DAY_OF_WEEK="MONDAY" THEN
WRITE "Status report is due today"

ELSE
WRITE "Have a nice day!"

END
```

- The following line means "If the hour (on a 24-hour scale) is greater than or equal to 12, then write 'afternoon'."

```
IF HOUR24>="12" THEN
WRITE "afternoon"
```

```
END
```

• The following command executes the CAPTURE utility on the fourth day of the week (Wednesday):

```
IF NDAY_OF_WEEK="4" THEN
#CAPTURE Q=FAST_Q NB TI=10 NFF

END
```

• The following example shows nested IF…THEN statements. Notice that there are two IF statements, so each one must have its own END statement.

```
IF DAY_OF_WEEK="MONDAY" THEN
MAP *6:=VOL1:APPL\WP

IF MEMBER OF CLERKS THEN
    WRITE "Your report is due immediately!"

END

END
```

• Conditionals can be joined with commas, the word AND, or the word OR to form compound conditionals.

The first line of the following IF…THEN statement is a compound conditional that means "If it is the evening of the first day of the month":

```
IF GREETING_TIME="EVENING" AND DAY="01" THEN
WRITE "The system will be backed up tonight."

END
```

The following line is a compound conditional that means "If it is 11:59:59 p.m.":

```
IF HOUR24="23" AND MINUTE="59" AND SECOND="59"
```

• An IF…THEN statement can include several commands that must be executed if the conditional is true.

The following example shows two commands that are executed on Tuesdays: a WRITE command that displays a message about a staff meeting, and an INCLUDE command that tells the login script to process any commands or messages contained in the file SYS:PUBLIC\UPDATE.

```
IF DAY_OF_WEEK="TUESDAY" THEN
WRITE "Staff meeting today at 10 a.m."
INCLUDE SYS:PUBLIC\UPDATE

END
```

Additional Information

For more information about	Refer to
Using identifier variables	"Identifier Variables" in this chapter
Using the WRITE login script command to display messages	"WRITE" in this chapter

INCLUDE

Use INCLUDE to execute independent files or another object's login script as a part of the login script currently being processed.

These subscripts can be text files that contain valid login script commands (any of the commands explained in this section) or login scripts that belong to a different object you have rights to.

Command Format

```
INCLUDE [path]filename
```

or

```
INCLUDE object_name
```

To use a text file as a subscript, replace path with either a drive letter or a full directory path beginning with the NetWare volume name.

Replace filename with the complete name (including the extension) of the text file.

To execute another object's login script as part of a login script, replace object_name with the name of the object whose login script you want to use.

Using INCLUDE

Text files that contain login script commands and other object's login scripts can be used as subscripts. Use these subscripts to supplement the main login script.

You can create and edit text file subscripts using any text editor. Subscripts do not have to have any particular filenames or extensions.

The INCLUDE command executes the login script commands contained in the subscript. It does not display the text of the subscripts.

5-35

INCLUDE nesting is limited only by available memory. This means that one subscript file can include another subscript file, which can include yet another subscript file, and so on.

If the subscript is a text file, users must have at least File Scan and Read rights to the directory containing the subscript.

If you are using another object's login script as a subscript, users must have the Browse right to the object whose script you are including and the Read right to the object's Login Script property.

Examples

- To execute a text file called SCRIPT.NEW (located in the VOL1: volume) as a subscript, add the following line to your main login script:

  ```
  INCLUDE VOL1:ADMIN\USERS\SCRIPT.NEW
  ```

- Suppose you are creating a container login script for all users under the Organizational Unit object SALES_LA. You recently created a container login script for users under the Organizational Unit object SALES_PV.

  Now you've decided that the login scripts for the two different groups of users are very similar. In fact, you decide that the SALES_LA users could use the same login script as the SALES_PV users, but with a few more drive mappings.

  In the SALES_LA login script, you could add the additional drive mappings, and then use the INCLUDE command to execute the entire SALES_PV login script as a part of the SALES_LA login script, as follows:

  - Create an alias for the SALES_PV Organizational Unit in the SALES_LA Organizational Unit.

  - Add this line to the SALES_LA Organizational Unit's login script.

    ```
    INCLUDE .SALES_PV_ALIAS.SALES.ACME_US
    ```

Figure 5-2 illustrates how the INCLUDE command executes the SALES_PV login script as part of the SALES_LA login script.
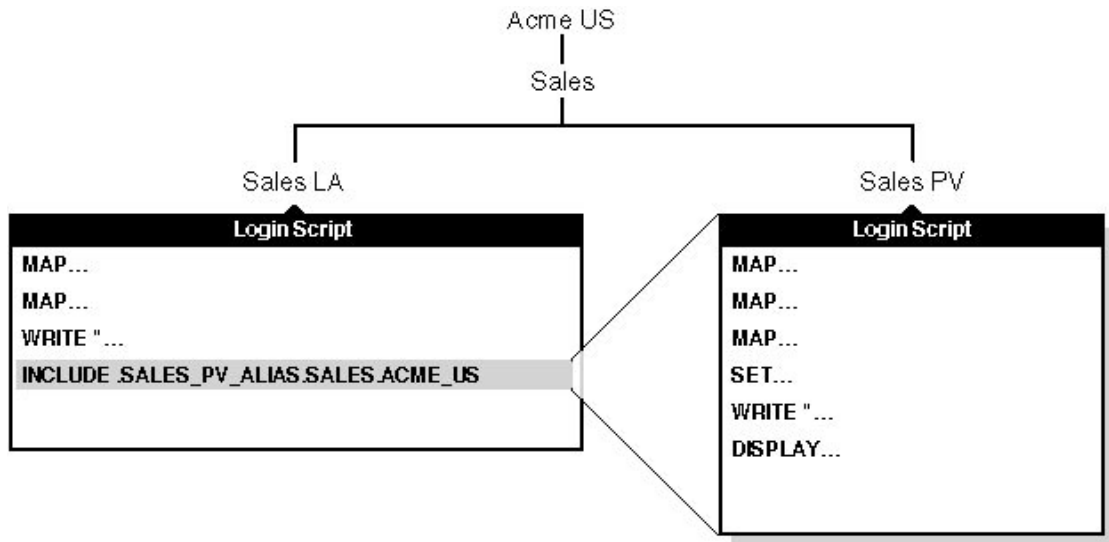
Figure 5-2   **Using INCLUDE in a Login Script**

LASTLOGINTIME

Use LASTLOGINTIME to display the last time the user logged in.

Command Format
```
LASTLOGINTIME
```

Using LASTLOGINTIME

If you include this command in your login script, the time of the last login is displayed on the user's workstation screen.

MACHINE

Use MACHINE to set the DOS machine name (such as IBM or EDIT_ROOM) of the workstation. The MACHINE command is necessary for some programs (such as NETBIOS) written to run under PC DOS.

Do not confuse the MACHINE command with the identifier of the same name. The identifier is used with a preceding percent (%) sign in MAP and WRITE statements. The identifier reads its value from the NET.CFG file.

It is unlikely that you will need to use this command. However, it is provided in case you come upon a program that requires it.

Command Format

```
MACHINE=name
```

Using MACHINE

The machine name can be up to 15 characters. (Longer machine names are truncated to 15 characters.)

For example, to specify that the machine name is IBM_PS2, add the following line to the login script:

```
MACHINE=IBM_PS2
```

Additional Information

For more information about	Refer to
Setting machine names in the NET.CFG file	*NetWare Client for DOS/Windows User Guide*
Using identifier variables	"Identifier Variables" in this chapter

MAP

Use MAP to map drives and search drives to network directories.

Command Format

```
MAP [option] [drive:=path]
```

Replace drive with any valid network drive letter, local drive letter, or search drive number.

Replace path with a drive letter, a full directory path, or a Directory Map object.

More than one command can be on the map line if the commands are separated by a semicolon (;), as shown in the following example:

```
MAP *1:=SYS:PUBLIC;*2:=SYS:PUBLIC\DOS
```

When mapping a drive to a directory on an NDS server, begin the path with either the Volume object name or server/volume.

When mapping to a directory on a bindery-based server or to an NDS server that isn't your current server, begin the path with the server's name.

Replace option with one of the following:

- DISPLAY ON/OFF: Determines whether drive mappings are displayed on the screen when the user logs in. The default setting is ON. This option is valid only in login scripts.

- ERRORS ON/OFF: Determines whether MAP error messages are displayed when the user logs in. MAP ERROR OFF must be placed before MAP commands in the login script. The default setting is ON. This option is valid only in login scripts.

- INS: Inserts a drive mapping between existing search mappings. This option is valid in login scripts and at the DOS command line.

- DEL: Deletes a drive mapping, making that drive letter available for other mapping assignments. This option is valid in login scripts and at the command line.

- ROOT: Maps a fake root. Some applications require their executable files to be located in a root directory.

  Since you may not want users to have rights at the root directory, you can map a fake root to a subdirectory instead. This option is valid in login scripts and at the command line.

- C (CHANGE): Changes a search drive mapping to a regular mapping and a regular mapping to a search drive mapping. This option is valid in login scripts and at the command line.

- NP (No prompt): When a MAP command conflicts with an existing drive mapping, MAP NP eliminates the prompt that asks the user if the new drive mapping should overwrite the old mapping.

  This option is valid only at the command line.

- P (Physical): Maps a drive to the physical volume of a server rather than to the Volume object's name.

  It is possible to have a Volume object name that conflicts with a physical volume name. (For example, object ACCT is an Accounting volume, but there is also an ACCT which is a physical volume.)

  Therefore, if you prefer to map a drive to the physical volume name, use MAP P. This option is valid in login scripts and at the command line.

- N (Next): When used without specifying a drive number or letter, maps the next

available drive. This option is valid in login scripts and at the command line.

Using MAP

Follow these guidelines when using MAP:

- If you use MAP to automate drive map assignments during execution of the login script, users don't have to map drives manually every time they log in.

- Specify drive mappings in a login script by entering the same commands that you would enter if you were using MAP at the command line.

- To avoid having the result of each mapping displayed as it is executed, you can put the MAP DISPLAY OFF command at the beginning of your login script. When all drive map assignments have been completed, add the line MAP DISPLAY ON and MAP to your login script. This sequence provides a cleaner display for the users as they log in.

- Instead of specifying drive letters such as F: or G:, you could use an asterisk followed by a number n to represent the nth network drive. For example, if your first network drive is F: then using MAP *3:= would assign H:, or if your first network drive is D: then using MAP *4:= would assign G:.

  This allows drive letters to reorder themselves automatically when local drives are removed or added or when the first network drive is changed.

  This also allows users to log in from workstations that have a different number of local drives than their regular workstation.

- You can map a local drive (usually A: through C:) to a network directory, but you cannot access the local drive until you remove the network drive mapping.

- You must not map a redirected drive, such as a CD-ROM drive, to a network drive.

- In many cases, you might find it useful to map network drives in the following order:

  - Map the first network drive to the user's home directory.

  - If users are running Windows from the network, map a drive to each user's directory that contains user-specific files.

  - Map remaining drives to any directories in which users frequently work, such as project directories.

Mapping Search Drives

For DOS and Windows workstations, you can map search drives to directories that contain applications, executable files, and so forth. Then users can execute those applications regardless of the directory in which they are currently working.

A maximum of 16 NetWare search drives is allowed.

NOTE: Any object names in the login script should either be in the user's context or should have an alias point to the real object in another context. Any object referenced by a name outside the user's context will not work when that object is moved or renamed or the context is renamed. See "Alias object" in Concepts.

When you map a search drive, use a search drive number (an S followed by a number). This search drive number assigns the next available drive letter to the mapping, starting with Z and working backwards through the English alphabet.

The letter assigned to the search drive is put into the DOS path statement. If you already have search drives in the path statement, the command MAP S1:= will overwrite the first one in the path. To prevent search drive assignments from overriding existing DOS PATH letters, use the INSERT option when assigning search drives. For example, type

```
MAP INS S16:=path
```

To ensure that users can access NetWare utilities, DOS directories, and applications, we recommend you map search drives to these directories in the following order:

- Map the first search drive (S1:) to the SYS:PUBLIC directory, which contains the NetWare utilities for DOS and Windows workstations.

- Map the second search drive (S2:) to the DOS directory if users access DOS from the network.

- Map the third and subsequent search drives (S3:, S4:, etc.) to directories containing applications and the electronic NetWare documentation.

- If your users are running Windows from the network, map a search drive to the Windows directory for the Windows group.

To avoid inadvertently changing the order of any search drives that must be mapped to a specific drive letter, you can map all remaining search drives with the number S16:, which assigns the next lowest search number each time it is used.

This command assigns the next available drive letter to the search drive without displacing the previous search drives.

If you have an application that requires a particular drive letter, you can use the following command to map the search drive, replacing drive with the drive letter:

```
MAP S16:=drive:=path
```

If you map a search drive using a number already assigned to a search drive, NetWare makes the old search drive a network drive. The letter assigned to the old search drive remains assigned as the converted drive mapping. The new search drive takes the next unused letter of the alphabet.

Mapping Drives to Directory Map Objects

Another way to map a drive to a directory is to create a Directory Map object that points to the directory. Then, if you move the directory, you only need to change the Directory Map object rather than all of the login scripts that may include that mapping.

NOTE: It is best to use Directory Map objects in the user's current context. Do not use complete names that point to other contexts. If the map is in another context, you should create an alias that points to the real Directory Map object.

See "Alias object" in Concepts.

For example, to map a search drive to a Directory Map object whose complete name is APPL.SALES_LA.ACME_US, add the following line to the login script:

```
MAP S2:=.APPL.SALES_LA.ACME_US
```

In the previous example, the Directory Map object's name begins with a period, which indicates that the drive is mapped to the drive Root.

If the user whose login script this line appears in is also located in the SALES_LA.ACME_US context, the MAP command does not have to specify the Directory Map object's complete name. Instead, the line would be

```
MAP S2:=APPL
```

For more information about using Directory Map objects, see "Loading Operating Systems and Applications onto the Network" in chapter 3.

Examples

- To map the first search drive to the SYS:PUBLIC directory (which contains the NetWare utilities for DOS and Windows workstations) add the following line to the login script:

```
MAP S1:=SYS:PUBLIC
```

The second search drive should be mapped to the DOS directory if users run DOS from the network.

- If your network has more than one DOS directory, use variables to indicate the directory path. These variables are replaced by the correct information from the workstation software when each user logs in.

To use variables for the DOS directory path, enter the following command in the login script:

```
MAP S2:=SYS:PUBLIC\%MACHINE\%OS\%OS_VERSION
```

- If all users have the same types of computers and are using the same version of DOS, you probably have only one DOS directory. In this case, add a line similar to the following, substituting the correct directory names:

```
MAP S2:=SYS:PUBLIC\IBM_PC\MSDOS\50
```

You can also create a Directory Map object that points to the DOS directory, then map the search drive to the Directory Map object.

For more information about creating DOS directories, see "Loading Operating Systems and Applications onto the Network" in chapter 3.

- To map the next available search drive to the SYS:APPL\WORDPROC directory, add the following line to the login script:

```
MAP S16:=SYS:APPL\WORDPROC
```

If you have mapped a Directory Map object to this directory, you can substitute the Directory Map object's name for the directory path.

For example, suppose you created a Directory Map object called WPROC, which is located in the context SALES.ACME_US, and mapped that object to the SYS:APPL\WORDPROC directory.

Following the rule of no complete names in a login script, you would create an alias in your own context to the object in .SALES.ACME_US. Then use the following line in your login script:

```
MAP S16:=WPROC
```

• Suppose an application in the FORM directory requires that it reside in the Root directory of drive P:, but you don't want to put the application in the Root directory for security reasons.

You can map a fake root to the directory and map a search drive to it at the same time by adding the following line to the login script:

```
MAP ROOT S16:=P:=SYS:APPL\FORM
```

• To map Richard's first four regular drive mappings to his home directory, the SYS:PUBLIC\OS2 directory (which contains the NetWare utilities for OS/2), the REPORTS directory, and the PROJECTS directory, add the following four lines to Richard's user login script:

```
MAP *1:=VOL1:HOME\RICHARD
```

```
MAP *2:=SYS:PUBLIC\OS2
```

```
MAP *3:=VOL1:ACCOUNTS\REPORTS
```

```
MAP *4:=VOL1:UPDATES\PROJECTS
```

To map Richard's fifth drive to the PUBLIC directory on a NetWare 3.11 server named FS1, you need to include the server name in the MAP command. Use the following line in your login script:

```
MAP *5:=FS1\SYS:PUBLIC
```

• If you are mapping a drive to a directory that is located on a volume within your current context, include the volume's common name in the MAP command, as demonstrated in the previous examples.

If you are mapping a drive to a volume that is not in your current context, first create an alias to that volume; then include the volume's common name in the MAP command.

For example, if the complete name of a volume not in your current context is VOL1.SALES.ACME_US, then create an alias named VOL1: to that volume. The MAP command would include only this common name.

To map a drive to the APPL directory in this volume, the line in the login script would be

```
MAP *6:=VOL1:APPL
```

Additional Information

For more information about	Refer to
Drive mappings	"Drive mapping" in *Concepts*
Enabling users to run DOS from the network	"Loading DOS onto the Network" in chapter 3
Using Directory Map objects	"Loading Operating Systems and Applications onto the Network" in chapter 3

NO_DEFAULT

Use NO_DEFAULT in a container or profile login script if you do not want
the default user login script to run.

Command Format

```
NO_DEFAULT
```

Using NO_DEFAULT

If you do not want to create any user login scripts, and you do not want the
default user login script to run, add this command to either the container or
the profile login script.

If you have created a user login script for someone, that login script executes
whether or not the NO_DEFAULT command is in the container or profile
login script.

NOSWAP

Use NOSWAP to prevent the LOGIN utility from being moved out of
conventional memory into higher memory (if available) or onto the disk to
execute a # command and LOGIN at the same time.

Command Format

```
NOSWAP
```

Using NOSWAP

LOGIN always swaps to extended or expanded memory unless NOSWAP is specified on the command line or in the login script.

If you do not want LOGIN to be temporarily stored in higher memory or on the workstation's disk, use the NOSWAP command. NOSWAP prevents LOGIN from being swapped out of conventional memory.

Then, if the workstation does not have enough memory to handle both LOGIN and the # command, the # command fails but the rest of the login script executes as usual.

If you want LOGIN to be swapped out of conventional memory immediately every time a # command is executed, place the SWAP command in the login script before the # command.

Additional Information

For more information about	Refer to
Using the # command	"# (Execute External Program)" in this chapter
Using the SWAP command	"SWAP" in this chapter

PAUSE

Use PAUSE to create a pause in the execution of the login script.

Command Format
```
PAUSE
```

Using PAUSE

Enter this command in your login script at any point you want a pause to occur.

You can add PAUSE to the login script following a message so that the user has time to read the message before it scrolls off the screen.

If you include PAUSE, the message "Strike any key when ready…" appears on the workstation screen. The LOGIN utility then waits for a key to be pressed before it executes the rest of the login script.

PCCOMPATIBLE

Use PCCOMPATIBLE to enable the EXIT "command" login script command to work if your workstation's LONG MACHINE NAME is not IBM_PC.

Command Format

```
PCCOMPATIBLE
```

Using PCCOMPATIBLE

If your computer is an IBM PC compatible machine and not an IBM PC, use PCCOMPATIBLE in your login script to inform the LOGIN utility that your machine's long name is something other than IBM_PC. The LONG MACHINE NAME (AT&T, COMPAQ, or others) must be included in the NET.CFG file.

Place the following anywhere before EXIT in the login script:

```
PCCOMPATIBLE
```

Example

If you have a Hewlett Packard computer and you have changed the LONG MACHINE NAME to HE_PAC in the NET.CFG file, and you want to exit to NETADMIN from within your login script, put the following commands in your login script:

```
PCCOMPATIBLE
EXIT "NETADMIN"
```

Additional Information

For more information about	Refer to
Setting the machine name in NET.CFG	*NetWare Client for DOS/Windows User Guide*
Using the EXIT command	"EXIT" in this chapter

PROFILE

Use PROFILE in a container script to set or override a user's assigned or command-line-specified profile script. It is useful when defining a group profile.

Command Format

```
PROFILE profile_object_name
```

Example

To override the profile script assigned to a user or specified at the command line and cause the user to execute a PROFILE script called team_profile, use the following command:

```
PROFILE team_profile
```

REMARK

Use REMARK to insert explanatory text into your login script. This text does not display on the screen.

Command Format

```
REM[ARK] [text]
```

or

```
* [text]
```

or

```
; [text]
```

Replace text with the comment you want to include in the login script.

Using REMARK

Follow these guidelines for using REMARK:

- To include explanatory text in your login script, begin a line with REMARK, REM, an asterisk (*), or a semicolon (;).

- Any text that follows these symbols is ignored when the LOGIN command executes your login script. Remarks do not appear on the screen.

- Using remarks in your login script can make the script much easier for you or

other users to read and understand.

- The REMARK command and its associated text must be the only entry on a line. Placing remarks on the same line as other login script commands can cause errors.

- If a remark is several lines long, begin each line with the remark keyword (REMARK, REM, an asterisk, or a semicolon).

Example

The following are examples of explanatory text that you might use with the REMARK command and its variants:

```
* This is Richard's login script
; Mapped network drives follow:
REM The next mapping is a fake root.
REMARK This login script is for new users.
```

SCRIPT_SERVER

Use SCRIPT_SERVER to set a home server from where the bindery login script is read.

NOTE:　The SCRIPT_SERVER command is for NetWare 2 and NetWare 3 users and has no effect on NetWare 4 users.

Command Format
```
SCRIPT_SERVER server_name
```

Using SCRIPT_SERVER

This command has no effect on NetWare Directory Services™. See your NetWare 2 or NetWare 3 documentation for information about SCRIPT_SERVER.

SET

Use SET to set a DOS environment variable to a specified value.

Command Format
```
[TEMP] SET name="value"
```

Replace name with an environment parameter that identifies the environment you want to change.

Replace value with identifier variable substitutions. Values must be enclosed in quotation marks.

To change the environment for the login script, but not for the workstation after the login script has finished executing, use the optional keyword TEMP.

Using SET

Use the SET login script command the same way you use the DOS command SET. However, when you use SET in a login script, you must enter quotation marks (" ") around values.

NOTE: If a variable is set to a path that ends in a \", these two characters are interpreted as an embedded quotation mark preceded by an escape character. To avoid this problem, use two backslashes before the ending double quotation marks (\\").

The SET commands do not have to be included in login scripts.

For example, you may decide that it is easier to put some SET commands in the workstation's AUTOEXEC.BAT file. Where you use SET commands depends upon your individual needs.

NOTE: This command does not work in a login script if the DOS workstation's environment is too small. In this case, you should set the environment size in the CONFIG.SYS file.

See the SHELL command in your DOS manual for more information about the environment size.

After you use the SET command to set a value for an environment variable, you can use that variable in other login script commands.

To include an environment variable as an identifier variable in a command, enclose the name of the variable in angle brackets, for example, <emailuser>.

Examples

• You can use SET to make a prompt display the current directory path, such as F:\HOME\MARY>, rather than just the drive letter. To do this, add the following

line to the login script:

```
SET PROMPT="$P$G"
```

"$P" lists the current directory path; "$G" displays a ">" (greater than) character. See your DOS manual for more information.

- To set a path for a program called DAILY, which is in the REPORTS subdirectory beneath drive G:, you would add the following line:

```
SET PATH="G:\REPORTS\DAILY"
```

This sets the variable PATH to G:\REPORTS\DAILY.

NOTE: Setting the variable PATH in the login script removes any search drives previously assigned. Use SET PATH only before you map search drives. SET PATH also overwrites any paths set in the user's AUTOEXEC.BAT file.

To display this path, you can include PATH as an identifier variable in a WRITE command by enclosing the variable (not the value) in angle brackets. For example, the following line displays "My path is G:\REPORTS\DAILY."

```
WRITE "My path is "%<path>
```

- To include an environment variable in a MAP command, precede the variable with a percent sign (%).

For example, you could include the following lines in a login script to set and map a drive to the variable NWS:

```
SET NWS="C:\XYZ"
MAP S16:=%<NWS>
```

Additional Information

For more information about	Refer to
Using environment variables as identifier variables in other login script commands	"Identifier Variables" in this chapter
Using the SET command	Your DOS manual

SET_TIME

Use SET_TIME to set the workstation time equal to the time on the NetWare server to which the workstation first connects.

Command Format

```
SET_TIME ON|OFF
```

Using SET TIME

The default value is SET_TIME ON, which means the workstation time is set to the NetWare server time whenever the user logs in. If you include SET_TIME OFF in the login script, the workstation time does not update to the server's time.

SHIFT

Use SHIFT to change the order in which %n identifier variables are interpreted in the login script. The SHIFT command allows users to enter LOGIN parameters in any order.

Command Format

```
SHIFT [n]
```

Replace n with the number of places you want the variable to shift. The default is SHIFT 1.

Using SHIFT

You can shift up to 10 arguments.

When users execute LOGIN, they can include additional parameters. Each of these parameters is assigned a %n variable; in this way, the parameter's real value can be substituted for the %n variable that appears in the login script.

In the login script, you can add SHIFT with a positive or negative number to move the variables in either direction. For example, SHIFT –3 moves each %n variable three positions to the left.

Example

When Mary logs in, she wants to access her word-processing program, change the way it is set up, and map a drive to her work directory called ACCNTS.

Mary also has a command in her login script to map a drive to her LOTUS directory, but she does not need it today. The commands in Mary's login script are shown here.

```
LOOP
IF "%2"="WP" THEN
SET WP="\U-CML\B-10\D"
MAP S16:=SYS:APPL\WP\SETUP
IF "%2"="ACCNTS" THEN
MAP G:=SYS:ACCNTS
IF "%2"="LOTUS" THEN
MAP S16:=SYS:APPL\LOTUS
SHIFT
IF "%2"<>"" THEN GOTO LOOP
```

(In the last line, "IF "%2" < >" is followed by closed quotation marks, which means "If %2 isn't blank".)

With these commands in her login script, Mary can log in to the primary file server (named FS1) using her username, MARY, as follows:

```
LOGIN FS1\MARY WP ACCNTS
```

The parameters in Mary's LOGIN command are given the following values:

%0=FS1

%1=MARY

%2=WP

%3=ACCNTS

Mary's login script looks for %2, which is WP, and sets the word-processing environment. Then the login script shifts the variables one to the right so that %2 now becomes ACCNTS. Upon executing the loop, the login script maps a drive to the ACCNTS directory.

Mary could also change the order of her LOGIN command without affecting the way her work environment is set up, as follows:

```
LOGIN MARY ACCNTS WP
```

The parameters in this LOGIN command are given the following values:

%0=FS1

%1=MARY

%2=ACCNTS

%3=WP

In this case, Mary's login script looks for %2, which is now ACCNTS.

The login script maps a drive to the ACCNTS directory. Then the login script shifts the variables to the right so that %2 now becomes WP.

Upon executing the loop, the login script sets the word-processing environment.

Additional Information

For more information about	Refer to
Using %n variables in login scripts	"Using LOGIN Parameters with %n Variables" in this chapter.

SWAP

Use SWAP to move the LOGIN utility out of conventional memory into higher memory (if available) or onto the disk. This allows execution of a # command and LOGIN at the same time.

Command Format

```
SWAP [path]
```

You can replace path with either a drive letter or a full directory path beginning with the NetWare volume name.

Using SWAP

By default, the LOGIN utility always swaps to extended or expanded memory, unless NOSWAP is specified on the command line or in the login script.

NOTE: The SWAP option does not work with the DR DOS 6.0 EMM386 Memory Manager option unless upper memory is disabled.

If you specify a path in the SWAP command, LOGIN swaps into the directory you specified. If the directory specified in that path does not exist or if you do not have rights there, LOGIN prompts you for another path.

If you do not specify a path, LOGIN swaps either into higher memory (if available) or to the current drive. If LOGIN tries to swap to the current drive and you don't have rights to the current drive, LOGIN prompts you for a path to use. If you specify a valid path, LOGIN always swaps to the specified path.

Then, if the workstation does not have enough memory to handle both LOGIN and the # command, the # command fails but the rest of the login script executes as usual.

Additional Information

For more information about	Refer to
Using the # command	"# (Execute External Program)" in this chapter
Using the NOSWAP command	"NOSWAP" in this chapter

TEMP SET

Use TEMP SET to change the environment for the login script, but not for the workstation after the login script has finished executing.

See "SET" in this chapter.

WRITE

Use WRITE to display messages on the workstation screen when a user logs in.

Command Format
```
WRITE "[text][%identifier]" [;][identifier]
```
Replace text with the words you want to display on the screen.

Replace identifier with a variable you want to display, such as a user's login name. (See "Using Identifier Variables" in this chapter for a complete list of variables.)

Using WRITE

Text you want to display must be enclosed in quotation marks (" ").

There are several ways to display variables in the text message. The way you enter the variable in the WRITE command determines the display format, as follows:

- If you type the identifier variable exactly as shown, with no special punctuation, only the variable is displayed on the screen. (See "Login Script Identifier Variables" in Table 5-6.)

- If you enclose the identifier variable inside quotation marks, then precede the variable by typing a percent sign (%) and type the text in uppercase letters, both the variable and the text are displayed on the screen.

  This method is often used to combine regular text with an identifier variable because both the text and the variable can be enclosed in the same quotation marks.

To join several text strings and identifier variables into a single display without enclosing the variables in quotation marks, use a semicolon between the text and the variables.

If you have several WRITE commands, each one appears on a separate line on your workstation. However, if you put a semicolon at the end of all but the last WRITE command, the commands appear as one continuous sentence or paragraph (although they may wrap onto additional lines on the workstation's screen).

Text strings can include the special characters in Table 5-4:

Table 5-4   **Text String Characters**

Character	Meaning
\r	Makes a carriage return occur
\n	Starts a new line of the text
\"	Displays a quotation mark on the screen
\7	Makes a beep sound

In addition to the semicolon, there are other operators you can use to form compound strings (in other words, to join text and identifier variables into one command). These operators are listed in Table 5-5 in order of precedence.

Table 5-5 **Text and Identifier String Operators**

Operator	Meaning
* / %	Multiply, divide, modulos
+ −	Add, subtract
>> <<	Shift left or right (1000 >> 3 becomes 1)

Examples

- To display the message "Hello," add the following line to the login script:

  ```
  WRITE "Hello"
  ```

- To display the user's last name (surname) along with a greeting, add the identifier LAST_NAME to the command. To do this, either join the text and the identifier with a semicolon or include the variable in the quotation marks with the text.

  Either of the following lines displays "Hello, Smith" when user Bob Smith logs in:

  ```
  WRITE "Hello, ";%LAST_NAME

  WRITE "Hello, %LAST_NAME"
  ```

- To make a beep sound occur while the phrase "Good morning" appears on the screen, add the following line to the login script:

  ```
  WRITE "Good %GREETING_TIME \7"
  ```

Identifier Variables

With many login script commands, you can take advantage of identifier variables to make your login script more efficient and flexible.

Identifier variables allow you to enter a variable (such as LAST_NAME), rather than a specific name (such as Smith) in a login script command. When the login script executes, it substitutes real values for the identifier variables.

By using the variable, you can make the login script command applicable to many users instead of limiting it to one user.

For example, the command

```
WRITE "Hello, "%LAST_NAME
```

displays the following message on Bob's Smith's workstation screen when he logs in:

Hello, SMITH

Similarly, when Mary Jones logs in, the message she sees is

Hello, JONES

In the previous example, when the user logged in, the user's actual last name was substituted for the LAST_NAME variable in the command.

Table 5-6 lists all the available identifier variables.

Table 5-6   **Login Script Identifier Variables**

Category	Identifier Variable	Function
Date	DAY	Day number (01 through 31)
	DAY_OF_WEEK	Day of week (Monday, Tuesday, etc.)
	MONTH	Month number (01 through 12)
	MONTH_NAME	Month name (January, February, etc.)
	NDAY_OF_WEEK	Weekday number (1 through 7; 1=Sunday)
	SHORT_YEAR	Last two digits of year (94, 95, 96, etc.)
	YEAR	All four digits of year (1994, 1995, 1996, etc.)
Time	AM_PM	Day or night (am or pm)
	GREETING_TIME	Time of day (morning, afternoon, or evening)
	HOUR	Hour (12-hour scale; 1 through 12)
	HOUR24	Hour (24-hour scale; 00 through 23; 00=midnight)
	MINUTE	Minute (00 through 59)
	SECOND	Second (00 through 59)
User	%CN	User's full login name as it exists in NDS™.
	ALIAS_CONTEXT	"Y" IF REQUESTER_CONTEXT is an alias.
	FULL_NAME	User's unique username. It is the value of the FULL_NAME property for both NDS and bindery-based NetWare. Spaces are replaced with underscores.
	LAST_NAME	User's last name (surname) in NDS or full login name in bindery-based NetWare.
	LOGIN_CONTEXT	Context where user exists.
	LOGIN_NAME	User's unique login name (long names are truncated to eight characters).
	MEMBER OF "group"	Group object to which the user is assigned.
	NOT MEMBER OF "group"	Group object to which the user is not assigned.

Table 5-6　　　　　　　**Login Script Identifier Variables**

Category	Identifier Variable	Function
Network	PASSWORD_EXPIRES	Number of days before password expires.
	REQUESTER_CONTEXT	Context when login started.
	USER_ID	Number assigned to each user.
	FILE_SERVER	NetWare server name.
	NETWORK_ADDRESS	IPX external network number of the cabling system (8-digit hexadecimal number).
Workstation	MACHINE	Type of computer (IBM_PC, etc.).
	NETWARE_REQUESTER	Version of the NetWare Requester for VLM users.
	OS	Type of DOS on the workstation (MSDOS, etc.).
	OS_VERSION	Operating-system version on the workstation (3.30, etc.).
	P_STATION	Workstation's node address (12-digit hexadecimal).
	SHELL_TYPE	Version of the workstation's DOS shell (1.02, etc.); supports NetWare 2 and 3 shells and NetWare 4 Requester for DOS.
	SMACHINE	Short machine name (IBM, etc.).
	STATION	Workstation's connection number.
DOS environment	<variable>	Any DOS environment variable can be used in angle brackets (<path>, etc.). To use a DOS environment variable in MAP, COMSPEC, and FIRE PHASERS commands, add a percent sign (%) in front of the variable. For example, MAP S16:=%<path>

Table 5-6   **Login Script Identifier Variables**

Category	Identifier Variable	Function
Miscellaneous	ACCESS_SERVER	Shows whether the access server is functional (TRUE=functional, FALSE=not functional).
	ERROR_LEVEL	An error number (0=no errors).
	%n	Replaced by parameters the user enters at the command line with the LOGIN utility. For more information, see "Using LOGIN Parameters with %n Variables" in this chapter.
Object properties	property name	You can use property values of NDS objects as variables. Use the property values just as you do any other identifier variable. If the property value includes a space, enclose the name in quotation marks.
		To use a property name with a space within a WRITE statement, you must place it at the end of the quoted string:
		WRITE "Given name=%GIVEN_NAME"
		IF "%MESSAGE SERVER"="MS1" THEN MAP INS S16:=MS1\SYS:EMAIL
		To see a list of object properties, see Appendix A, "NDS and Bindery Objects and Properties," of *Utilities Reference*. Not all properties are supported.

Using Identifier Variables

When using identifier variables in login script commands, observe the following conventions:

• Identifier variables are used most often with commands such as IF...THEN, MAP, and WRITE. They can also be used with commands for which you can

specify a path, such as COMSPEC.

- Type the variable exactly as shown.

- To use DOS environment variables as identifiers, enclose them in angle brackets.

- Identifier variables can be placed within literal text strings in a WRITE statement. However, the identifier variable must be in uppercase letters and preceded by a percent sign. (Literal text is the text that is displayed on the screen, such as "Sales report is due today." Literal text must be enclosed in quotation marks.)

Examples

- If user Smith logs in during the morning, both of the following lines display the same message on his screen ("Good morning, SMITH"):

```
WRITE "Good "; GREETING_TIME; ", "; LAST_NAME
WRITE "Good %GREETING_TIME, %LAST_NAME"
```

- To use DOS environment variables as identifiers, enclose them in angle brackets. The following example uses the DOS environment variable "path":

```
WRITE "my path is "%<path>
```

The text displayed on the screen is similar to this:

```
my path is z:.;y:.;c:\WINDOWS
```

Using LOGIN Parameters with %n Variables

Some variables in a login script can be indicated by a percent sign (%) followed by a number from 0 to 9.

When a user logs in, he or she can type additional parameters that the LOGIN utility passes to the login script. The login script then substitutes these parameters for any %n variables in the login script. These variables are replaced in order by the parameters the user typed when executing the LOGIN utility.

The %0 variable is replaced by the name of the NetWare server the user typed at the command line, and %1 is replaced by the user's login name. The remaining variables change, depending on what the user types when executing LOGIN. The %n variables must precede all command line options.

The SHIFT login script command allows you to change the order in which these %n variables are substituted. For more information about the SHIFT command, see "SHIFT" in this chapter.

The %n variables can be used in WRITE statements if they are included within the quotation marks:

```
WRITE "My login name is %1."
```

Example

Suppose a login script contains the following commands:

```
IF "%2"="SALES" THEN
WRITE "Meeting today"
END
IF "%3"="LEGAL" THEN
WRITE "Report is due tomorrow"
END
```

If user RON logged in by typing the following command:

```
LOGIN COUNT\RON SALES MARKETING
```

then the login script would substitute the values Ron entered at the keyboard for the %n variables in the login script, as shown here:

%0=COUNT

%1=RON

%2=SALES

%3=MARKETING

Since %2 is replaced by "SALES," the message "Meeting today" is displayed on Ron's screen. However, since %3 is replaced by "Marketing," Ron doesn't see "Report is due tomorrow."

Examples of Login Scripts

The following examples of login scripts may help you plan your own container, profile, and user login scripts. Each example login script is shown in a table.

The left column of each table shows the commands in the login script. The right column explains the command's purpose.

For instructions on creating login scripts, see "Creating or Modifying a Login Script Using NetWare Administrator" or "Creating or Modifying a Login Script Using NETADMIN" in this chapter.

Default Login Script

The default login script executes the first time User object ADMIN logs in. It also executes for any users who do not have user login scripts.

You can't modify the default login script because it is coded into the LOGIN utility. Instead, you can create container, profile, or user login scripts.

Table 5-7 lists the content of the default login script.

Table 5-7   **Default Login Script**

Login Script Command	Purpose
MAP DISPLAY OFF	Prevents map commands from displaying on the screen.
MAP ERRORS OFF	Prevents mapping errors from displaying on the screen.
MAP *1:=SYS:	Maps the first drive to volume SYS:.
MAP *1:=SYS:%LOGIN_NAME	Maps the first drive to the user's home directory if LOGIN_NAME is the same as the user's home directory. If the user has no home directory, the first drive is still mapped to SYS:.

Table 5-7   **Default Login Script**

Login Script Command	Purpose
IF "%1"="ADMIN" THEN MAP *1:=SYS:SYSTEM	If the login name is ADMIN, the first drive is mapped to SYS:SYSTEM instead of the user's home directory.
MAP P:=SYS:PUBLIC	If the user logs in from an OS/2 workstation, drive P: is mapped to SYS:PUBLIC.
	If the user is not using an OS/2 workstation, this drive mapping is not included in the default login script.
MAP INS S1:=SYS:PUBLIC MAP INS S2:=SYS:PUBLIC\ %MACHINE\%OS\%OS_VERSION	If the user is using a DOS or Windows workstation, the first search drive is mapped to SYS:PUBLIC, where DOS-based NetWare utilities are stored.
	Then the second search drive is mapped to the directory where DOS is stored. (The two MAP commands are joined by a semicolon.)
	If the user logs in from an OS/2 workstation, these drive mappings are not included in the default login script.
MAP DISPLAY ON	Allows MAP commands to display.
MAP	Displays a list of all drive mappings on the user's screen.

Container Login Script

The container login script should contain as much information as possible that applies to all users. An example is shown in Table 5-8.

Table 5-8   **Sample Container Login Script**

Login script command	Purpose
MAP DISPLAY OFF	Prevents MAP commands from displaying on the screen as they are assigned.
MAP ERRORS OFF	Prevents mapping errors from displaying on the screen.
MAP *1:=SYS:	Maps the first drive to volume SYS:.
MAP *1:=SYS:%LOGIN_NAME	Maps the first drive to the user's home directory if LOGIN_NAME is the same as the user's home directory. If the user has no home directory, the first drive is still mapped to SYS:.
IF "%1"="ADMIN" THEN MAP *1:=SYS:SYSTEM	If the login name is ADMIN, the first drive is mapped to SYS:SYSTEM instead of the user's home directory.
IF MEMBER OF "WIN31" THEN MAP INS *2:=SYS:USERS\%LOGIN_NAME\WIN31 MAP INS S16:=SYS:APPS\WINAPPS\WIN31\ SET TEMP ="P:\USERS\%LOGIN_NAME\ WIN31\ TEMP" END	If the user who logs in is a member of the Group object WIN31, the next available drive is mapped to that user's Windows directory. Then the next available search drive is mapped to the Windows directory for the WIN31 group. Finally, the Windows TEMP directory is set to a subdirectory of the user's Windows directory.
MAP INS S16:=VOL1:APPL\WP	Maps the next available search drive to the directory that contains WordPerfect.
MAP INS S16:=VOL1:APPL\LOTUS	Maps the next available search drive to the directory that contains Lotus.
MAP INS S16:=SYS:EMAIL	Maps the next available search drive to the EMAIL directory.

Table 5-8   **Sample Container Login Script**

Login script command	Purpose
IF MEMBER OF "MANAGERS" THEN MAP *3:=VOL1:PROJECTS\REPORTS END	If the user belongs to the Group object MANAGERS, the login script maps the third network drive to the REPORTS directory.
IF MEMBER OF "TESTERS" THEN MAP *4:=INPUT:STATUS\UPDATES END	If the user belongs to the Group object TESTERS, the login script maps the fourth network drive to the UPDATES directory.
COMSPEC=S2:COMMAND.COM	Sets COMSPEC to the DOS command processor, located in the DOS directory (in the second search drive).
SET PROMPT="PG"	Sets the prompt to display the user's current directory path followed by the ">" symbol.
MAP DISPLAY ON	Allows MAP commands to display.
MAP	Displays a list of all drive mappings.
WRITE	Displays a blank line between the list of mappings and following lines.
WRITE "Good %GREETING_TIME, %LAST_NAME."	Displays a greeting to the user. Example: "Good morning, SMITH."
WRITE "Your password expires in %PASSWORD_EXPIRES days."	Displays a message indicating the number of days before the user's password expires.
FIRE 3	Makes the phaser sound occur three times to tell the user that the login process is complete.

Profile Login Script

If you have groups of users with identical login script needs, you can create a Profile object, then create a login script for it. Then you can assign each user to be a member of that Profile object.

Table 5-9 shows an example of a profile login script you might create for users in the Profile object ACCOUNTING. This profile login script would execute after the container login script had executed.

Table 5-9   **Sample Profile Login Script**

Login script command	Purpose
MAP DISPLAY OFF	Prevents MAP commands from displaying on the screen as they are assigned.
MAP ERRORS OFF	Prevents mapping errors from displaying on the screen.
MAP INS S16:=VOL1:APPL\DB	Maps the first available search drive (after those assigned in the container login script) to the directory that contains the database program.
MAP *5:=VOL1:ACCOUNTS\NEW	Maps the fifth network drive (after those assigned in the container login script) to the NEW subdirectory.
MAP *6:=VOL1:ACCOUNTS\RECORDS	Maps the sixth network drive (after those assigned in the container login script) to the RECORDS subdirectory.
#WSUPDATE S1:IPXODI.COM /LOCAL	Executes WSUPDATE which updates the IPXODI.COM file on the user's workstation with a new version of the file located in the first search drive.
MAP DISPLAY ON	Allows MAP commands to display.
MAP	Displays a list of all drive mappings.
WRITE	Displays a blank line between the list of mappings and following lines.
IF DAY_OF_WEEK="FRIDAY" THEN WRITE "Weekly progress report is due today" FIRE 2 END	On Fridays, the phaser sound occurs twice to alert the user while the message "Weekly progress report is due today" displays on the screen.

Table 5-9 **Sample Profile Login Script**

Login script command	Purpose
PCCOMPATIBLE EXIT "NMENU WORK"	Stops the profile login script and sends the user into a menu program called WORK.
	EXIT also prevents any user login scripts from executing.
	If you want a user login script to execute after the profile login script, put these lines at the end of the user login script instead.
	(DOS workstations with the machine name IBM_PC do not need the PCCOMPATIBLE line.)

User Login Script

Table 5-10 shows an example of a user login script for user Mary. The user login script executes after the container and profile login scripts have executed.

Table 5-10 **Sample User Login Script**

Login script command	Purpose
MAP DISPLAY OFF	Prevents MAP commands from displaying on the screen as they are assigned.
MAP ERRORS OFF	Prevents mapping errors from displaying on the screen.
MAP *7:=VOL1:MARY\PROJECTS\RESEARCH	Maps Mary's seventh network drive (after those assigned in the container and profile login scripts) to the RESEARCH subdirectory in her home directory.
MAP *8:=VOL1:FORMS	Maps Mary's eighth network drive (after those assigned in the container and profile login scripts) to the FORMS directory.

Table 5-10   **Sample User Login Script**

Login script command	Purpose
REM Mary needs access to FORMS while she's on the REM troubleshooting team. Remove the driver mapping REM when Mary is reassigned.	This remark is intended as a reminder to the person who created the login script. This remark isn't displayed on the user's screen. (Because the remark is several lines long, each line starts with REM.)
SET WP="/u-mjr/b-5"	Sets Mary's environment variables for her word-processing application.
SET USR="mrichard"	Sets Mary's username (mrichard) for the electronic mail program.
#CAPTURE Q=FAST_Q NB TI=10 NFF	Executes the CAPTURE utility so Mary can print from non-network applications.
PCCOMPATIBLE EXIT "NMENU TRAINING"	Stops the user login script and sends the user into a menu program called TRAINING. (DOS stations with the machine name IBM_PC don't need the PCCOMPATIBLE line.)

6

Creating Menus

Introduction

This chapter provides steps on how to create and use menus in NetWare®
and includes information about the following:

- How to create, convert, or modify menus

- How to use the NMENU program

- NMENU commands

- How to create new menu files and convert old menu files

Creating, Converting, and Modifying Menu Files

Menus create a simple front end to the users' working environment. They make it easy to access network resources by presenting a list of options instead of requiring the user to enter cryptic DOS commands.

Menus can be shared by multiple users, requiring the creation of fewer menus. Or, for the unique requirements of some users, custom menus can be easily created as needed.

In NetWare 4™, NMENU.BAT replaces the MENU.EXE utility included in earlier versions of NetWare. The NMENU files are easy to script, require less memory, and run faster than did the old MENU utility files.

Existing menu files from earlier NetWare versions can be easily converted for use by the newer NMENU program (see "Converting Old Menu Files" in this chapter). The NMENU utility works on all versions of NetWare 2, NetWare 3™, and NetWare 4.

Because NMENU relies on special files to execute, (and those files that are dependent upon a few special commands) this chapter focuses on use of the scripting commands that make up a menu file.

This chapter is organized as follows:

- Guidelines for planning your menus are located in "Planning Your Menus" in this chapter.

- Commands and their usage are explained in "Using the NMENU Commands" in this chapter.

- Several example programs are given in "Creating a Menu File" in this chapter.

- Making menus available to users is explained in "Setting Up the User Environment" in this chapter.

- Converting old menu files is explained in "Converting Old Menu Files" in this chapter.

Getting Acquainted with NMENU

Since the sole function of NMENU is to cause a scripted file to execute, there is little to learn about NMENU.BAT except its syntax. The command is followed by the menu filename.

NMENU Syntax

```
nmenu filename
```

Replace filename with the menu filename.

What Menus Look Like

Figure 6-1 shows the display created by a single-window menu with only three options. Whether a menu displays one or more windows, the top and bottom bars of the screen remain the same.

The top bar always displays the NMENU version number on the left and the day, date, and time on the right. The bottom bar displays the available options.

```
Novell Menu System  V4.02              Monday  August  8, 1994  10:26am
┌──────────────────────────────────────────────────────────────────────┐
│                                                                        │
│                                                                        │
│        ┌────────────────┐                                              │
│        │  Title Bar     │                                              │
│        ├────────────────┤                                              │
│        │║A. One         │                                              │
│        │║B. Two         │                                              │
│        │║X. Exit        │                                              │
│        └────────────────┘                                              │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
├────────────────────────────────────────────────────────────────────────┤
│F2=Session Information                                         F1=Help  │
└──────────────────────────────────────────────────────────────────────┘
```
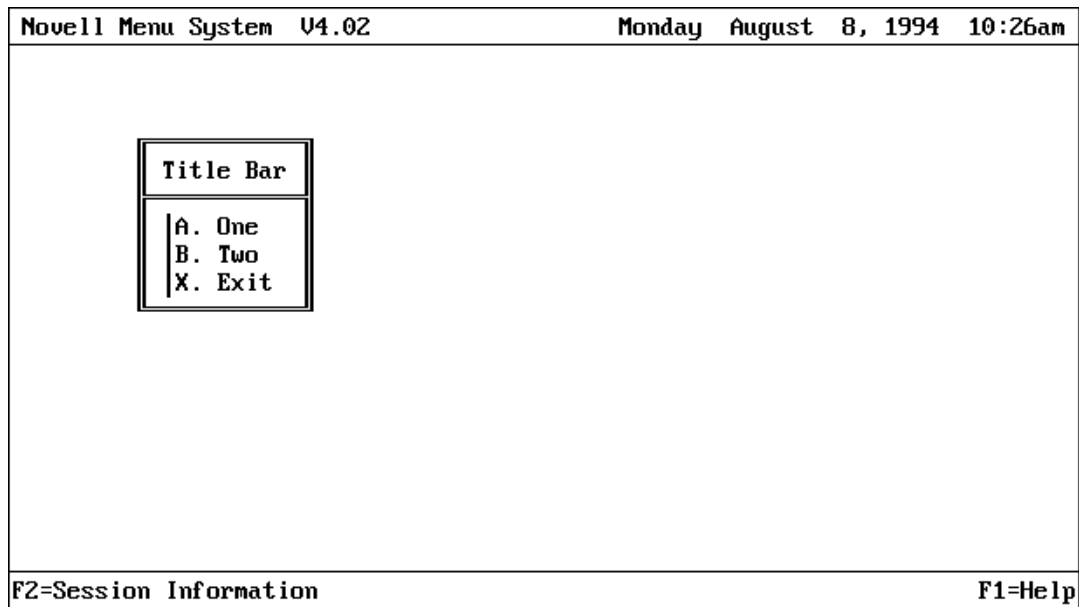
Figure 6-1   **A Single-Window Menu**

When you create menus with multiple windows, the windows cascade from left to right. Window sizing is automatically determined by the content of each window.

What Makes Menus Work

You create menu files with a text editor and save the file with an .SRC extension. Then you use the MENUMAKE program to compile the file. It is given a .DAT extension and, as a compiled file, is no longer editable. Any edits must be made to the .SRC file and then the .SRC file must be recompiled.

Elements of a Menu

There are three primary elements to every menu: MENU, ITEM, and EXEC. As these elements are expanded and repeated, controlled options are displayed within each window.

Figure 6-2 shows the .SRC file used to create the menu in Figure 6-1. This file shows how these three elements are used. Details about these elements and their options are covered later in the chapter.

```
Menu 1,Title Bar
    Item One {pause}
        Exec dir
    Item Two {show pause}
        Exec ver
    Item ^XExit
        Exec EXIT
```

Figure 6-2   **Primary Elements of a Menu**

- Element 1: MENU

  MENU specifies a window within the menu file. It includes a menu number and a menu name. The menu name is the title bar for the menu.

- Element 2: ITEM

  ITEM includes the text the user will see. It is given an indicator letter by default, or you can determine the character to precede it. Each option to be displayed in the window must be preceded by the word ITEM.

  Some options are available for the ITEM line; these options are discussed in "ITEM" in this chapter.

- Element 3: EXEC

  EXEC is the primary command for the third element. In the menu file shown in Figure 6-2, EXEC issues three separate commands: a directory listing, a display of the current version of DOS running, and a command to exit the menu.

Combining the Elements

Figure 6-3 illustrates a menu with 10 windows, created by including 10 MENU commands in the same file. Each window is automatically sized and cascaded across the screen.

```
┌────┬───┬────┬───┬───┬───┬───┬───┬───┬──────────────────┐
│ Qu │ Y │    │   │   │   │   │   │   │    Pop_up_6       │
├────┼───┼────┼───┼───┼───┼───┼───┼───┼──────────────────┤
│ A  │ A │ A  │ A │ A │ A │ A │ A │ A │ A. THAT'S ENOUGH  │
│ B  │ B │ B  │ B │   │   │   │   │   │                   │
│ C  │ C │ C  │   │   │   │   │   │   │                   │
│ D  │   │ D. 4. CHOICE 4 │? │
│ E. Wh                    │
│ F. What Next?            │
│ G. Is It Lunch Time Yet? │
│ H. When Do We Go Home?   │
│ I. How Do I Get Out?     │
│ J. Exit                  │
└──────────────────────────┘
```
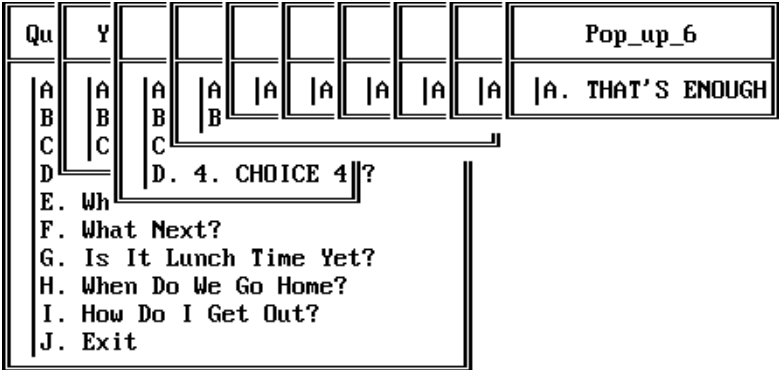
Figure 6-3   **A Multiple-Window Menu**

Menu Creation Steps

There are generally six steps to follow when considering a new menu. The relationship among steps is shown in Figure 6-4.
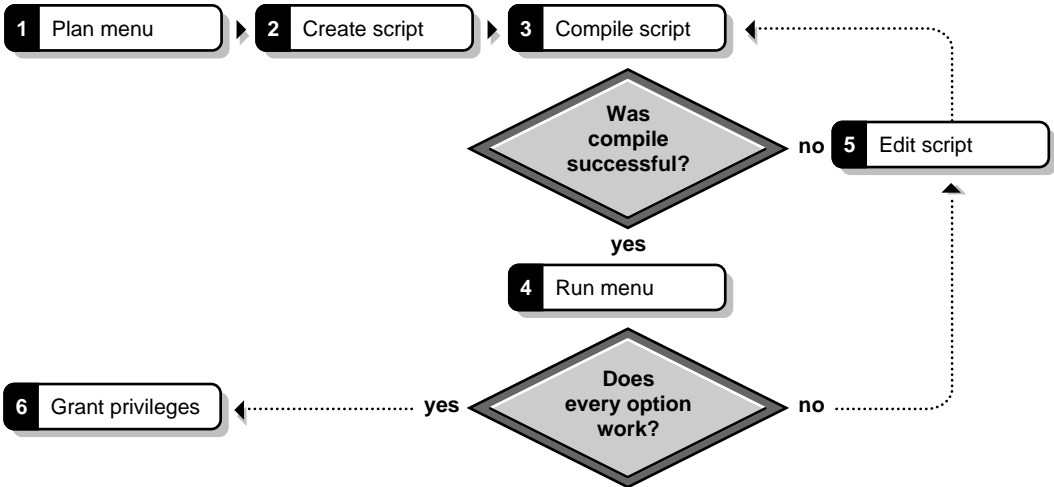
Figure 6-4   **Charting the Steps in Creating a Menu**

Procedure Each step in the flowchart is explained next.

1   Plan and design your menu. Before starting, answer the following questions:

- Who is it for?

- What do the users need access to?

- Should they have access to a NetWare prompt?

- Should they be forced to log out when exiting?

- How complex is the menu? Will it need to be in multiple files?

2   Use a text editor to create your menu file with an .SRC extension.

3   Compile the .SRC file with the MENUMAKE program. This will create a .DAT version of the file.

The results of any errors occurring during the compile process, including detailed error messages per line of script, are displayed on your screen. Fix the errors in the .SRC version of the file according to the error messages, and then recompile.

When you have eliminated all the errors, continue with Step 4.

4   Run NMENU filename.dat to verify that it does what you expect.

5   Change the program if needed, as described in Step 3, and then repeat Step 4. When Step 4 is successful, go on to Step 6.

6   Provide access to the intended users by placing the .DAT file in an appropriate directory and granting sufficient rights to the users.

Information on placement of files and required rights is in "Making Menus Work" in this chapter.

Following these six steps can help you learn how to use the scripting language and how to manage the menu files you create.

Use of the NMENU program is almost unlimited. When considering the uses for menus, remember that they can be as simple as presenting available application programs (see Figure 6-5).

```
┌────┬─────────────────────────────┐
│ Av ║ Available Word Processors   │
├────╫─────────────────────────────┤
│ │A│║ │A. WordPerfect 5.1         │
│ │B│║ │B. WordPerfect 6           │
│ │X│║ │C. Word                    │
└────╨─────────────────────────────┘
```

Figure 6-5   **Example of a Simple Menu**

Menus also can be more complex, such as guiding data entry for cataloging (see Figure 6-6).

```
┌──────────────────────────────────┐
│          Data Entry              │
├──────────────────────────────────┤
│ │A. Add Entry to Catalogue│      │
┌──────────────────────────────────────┐
│          User Input Requested        │
├──────────────────────────────────────┤
│ Enter Title                          │
│ Enter Author's Name                  │
│ Category: 1=Apps, 2=Prod, 3=Self     │
└──────────────────────────────────────┘
```

Figure 6-6   **Example of a More Complex Menu**

The text used to create the four menus shown in this section (Figure 6-1, Figure 6-3, Figure 6-5, and Figure 6-6) is included in "Example Menu Programs" in this chapter.

Before you look at how these menus were created, however, you should be familiar with the guidelines for planning menus and also with the scripting language rules.

Planning Your Menus

Several considerations are important when planning a menu. Details are
presented throughout this chapter, but some general rules include the
following:

- You must include an EXIT or LOGOUT command in the menu to be able to leave
  the menu. For security reasons, the <Esc> key doesn't work.

- The maximum number of windows per menu is 11 (1 main window and 10
  subwindows).

- The maximum number of menus you can define in a single file is 255.

- The maximum "MENU" name length (title bar) is 40 characters.

- The maximum number of "ITEM" lines per window is 12.

- The maximum width of each window "ITEM" is 40 characters.

- The maximum text file width is 78 characters.

- The main menu must be at the beginning of the .SRC file.

- Submenus defined in the same file are called with the SHOW command by menu
  number.

- Menus in separate files are called as submenus, by menu name, with the LOAD
  command.

- If a command wraps to another line, you should type a plus sign (+) at the end of
  the line and continue the command on the next line.

- Menu colors are determined by the settings in the COLORPAL utility. See"
  COLORPAL" in Utilities Reference.

Using the NMENU Commands

Menu programs use two types of commands: organizational and control. The following sections describe these commands and their options.

NMENU Organizational Commands and Options

Organizational commands establish the content and organization of the menus the user sees on the screen. Use these commands to determine what the menus look like.

Table 6-1 gives an overview of the organizational commands. Detailed information about each command follows the table.

Table 6-1   **NMENU Organizational Commands**

Command	Explanation
MENU	Marks the beginning of a new menu or submenu screen in the text.
ITEM	Identifies an item to be listed on the menu. Specifies execution parameters.

MENU

Indicates a new window definition within your menu file.

Command Format

```
MENU menu_number,menu_name
```

Replace menu_number with the number you want to assign to this menu. Menus are called and displayed by their number.

A menu number can be any number from 1 through 255. Each menu within a source file must be assigned a unique number, but the number sequence doesn't matter.

Replace menu_name with the title you want to appear at the top of the menu. Menu names can be a maximum of 40 characters long.

Using MENU

The first menu defined in the source file is always the first menu displayed, no matter what number is assigned to it. Subsequent menus are referenced by their numbers, no matter what order they appear in the .SRC file.

For example, if you have defined three menus and assigned them numbers 1, 2, and 5, and menu 5 is the first menu in the source file, menu 5 is displayed first. Menus 1 and 2 are referenced in control commands and displayed depending upon user selection.

Example

To define a main menu for a program to be used by accountants in your company, type a line similar to the following:

```
MENU 1,Accounting Main Menu
```

Since this is the first menu you want to appear, place it at the beginning of your menu program.

ITEM

Indicates an option in the menu.

Command Format
```
ITEM item_name {[option...]}
```

Replace item_name with the list item you want to appear in the menu. The maximum length for an item is 40 characters.

Replace option with one or more of the options shown in Table 22. Separate multiple options with a space. Enclose all options for a single ITEM within a single set of braces.

These options provide you with better control of menu execution. You determine how memory is used, which directory the user remains in, and what information is presented to those users.

Table 6-2   **ITEM Command Options**

ITEM option	Explanation
BATCH	Removes the menu program from memory before executing the item.
	Without this option, a portion of the memory stays resident, requiring approximately 32 KB of available memory, even though an application may be running.
	For example, if you type
	ITEM Word 5.0 {BATCH}
	the menu program is removed from memory when Word 5.0 is executed.
	Setting this option automatically sets the CHDIR option. Do not use this command with the EXEC DOS command; use EXEC CALL.
	For more information, see "EXEC" in this chapter.

Table 6-2   **ITEM Command Options**

ITEM option	Explanation
CHDIR	When the word-processing application is closed, the directory is changed to the original directory for the menu.
	Changes back to the drive and directory that were in effect before an ITEM was executed.
	For example, to change back to the drive and directory the user was in before executing a word- processing application in another directory, type
	ITEM Word 5.0 {CHDIR}.
PAUSE	Allows users to read messages associated with a command being executed from the menu by pausing the screen display.
	The message "Press any key to continue" is also displayed, and the screen does not change until a user presses a key.
	For example, to display a message when a user selects the item "DOS Copy" from the menu, include this line:
	ITEM DOS Copy {PAUSE}
	When the copy function is complete, the display waits at the "Press any key…" prompt for a key to be pressed before returning to the menu.
SHOW	Displays the command name, such as COPY or DIR, in the upper left corner of the screen.
	For example, if you type
	ITEM Copy Files {SHOW}
	the DOS command COPY is displayed when the item is executed.

Using ITEM

List items appear on the menu in the same order as they appear in the source file. They are not displayed in alphabetical order.

Each item is automatically assigned an alphabetic selection character.

If you want to assign a different character, place a carat (^) and the character you want in front of the item name (no spaces).

NOTE: Forcing the selection character shortens the maximum line length to 38 characters.

If you assign any selection letters, you should assign a letter to all menu list items. Otherwise an item may be automatically assigned a letter you assigned previously.

Example

For example, if the first menu item is "Word Processing" and you want to assign it the letter "W" instead of the automatic letter designation of "A," type

ITEM ^WWord Processing

NMENU Control Commands and Options

Control commands tell NMENU how to perform an action, such as displaying a submenu or user prompt, performing a DOS function, or starting an application. You also use these commands to tell the menu program how to process information and execute commands.

Table 6-3 gives an overview of the control commands. Detailed information about each command follows the table.

Table 6-3   **NMENU Control Commands**

Command	Explanation
EXEC	Executes a DOS or NetWare command following an ITEM statement.
SHOW	Displays a submenu from the same .DAT file.
LOAD	Calls and displays a menu as a submenu from a different .DAT file than the one you are running.

Table 6-3   **NMENU Control Commands**

Command	Explanation
GETO	Requests information from the user before a menu item is executed. User input is optional. (See "GETx (GETO, GETP, GETR)" in this chapter.)
GETP	Requests information from the user before a menu item is executed. User input is required for the program to proceed. Assigns a variable (%n) to the information so it can be used again. (See "GETx (GETO, GETP, GETR)" in this chapter.)
GETR	Requests information from the user before a menu item is executed. User input is required for the program to proceed. (See "GETx (GETO, GETP, GETR)" in this chapter.)

EXEC

Instructs NMENU to perform the command that follows EXEC.

Command Format

```
EXEC command
```

Replace command with the command required to execute the ITEM. This could be the name of an executable file, a DOS or NetWare command, or one of the options associated with EXEC. The EXEC options are described in Table 6-4.

Table 6-4   **EXEC Command Options**

EXEC option	Explanation
EXEC CALL	Runs a batch file and returns to NMENU. If you want to return to NMENU after a batch file executes, use this command to call batch files.
EXEC DOS	Runs the DOS command processor. If this command is used, the menu user must type "EXIT" when DOS processing is completed in order to return to NMENU.

Table 6-4   **EXEC Command Options**

EXEC option	Explanation
EXEC EXIT	Exits the user from NMENU, but leaves the user logged in to NetWare. For security reasons, users cannot access the NetWare prompt unless this command is included in the menu.
EXEC LOGOUT	Exits the user from NMENU and logs the user out of the network, leaving the user at the DOS prompt. (See "Setting Up the User Environment" in this chapter.)

Using EXEC

EXEC must follow the ITEM to which it applies. It must also follow other control commands needed by ITEM.

Example

To load Word®5.0 from a menu, include in the menu file the two following lines:

```
ITEM Word 5.0
  EXEC Word5
```

LOAD

Instructs NMENU to execute a separate menu file.

Command Format
```
LOAD filename
```

Replace filename with the name of another NMENU program.

If you have several menu programs created with the .DAT extension, use this command to call another menu program from the active menu program. LOAD always calls menus by their filename, not by number.

Using LOAD

Use this command when you have multiple menu programs defined. Although you can define up to 255 menus per source file, smaller separate files are easier to manage and update.

The NMENU file being loaded must be in the current directory, or you must have a search path to the file defined.

Example

If you are writing a menu program for Sales and you want to call up the Accounting menu program, type

```
MENU 1,Sales Main Menu
   ITEM Accounting Menu
   LOAD ACCOUNT
```

SHOW

Instructs NMENU to execute a submenu defined within the same file.

Command Format

```
SHOW menu_number
```

Replace menu_number with the number of the submenu to be displayed.

Using SHOW

Include SHOW commands to identify the submenu to be displayed when an item is selected from a menu.

SHOW commands always use menu numbers, not titles.

Example

If you have a menu with items listing categories of applications such as "Word Processing" and "Spreadsheets," each ITEM has the following SHOW commands to call up the appropriate submenus for those categories:

```
ITEM Word Processing
   SHOW 3
ITEM Spreadsheets
   SHOW 5
```

To continue this example, if menu "3,Word Processing" is a list of available word processing programs needed by both Sales and Accounting, and each group has its own menus defined, the programs can "share" that screen and the screen's calls to execute the applications.

6-18

GETx (GETO, GETP, GETR)

The GETx commands provide access to user input. You can request or require user input. You can even store user input for future use. Each variation of the GETx command uses the same parameters to control what the user sees and does. Pay close attention to the use of spaces, commas, and braces { }.

Command Format

```
GETx prompt {prepend} length,[prefill], {append}
```

Replace x with the letter "O," "R," or "P."

- If you want the user to decide whether to enter information, use GETO.

- If you want to require the user to enter information (such as a password), use GETR.

- If you want user input to be used by more than one EXEC command after it is entered, use GETP. The information is assigned a variable (such as %1, %2, etc.).

Replace prompt with the text (instructions) to be displayed to the user (40 characters maximum). For example: "Enter your Password."

Prepend is a value added to the beginning of the user response. A space is usually required in the first GETx command to separate it from the command issued in its associated EXEC command.

Replace length with the maximum number of characters the user can enter. This parameter is required. For example, if you use GETR for a phone number, limit the length to 11 characters to match the field length for the phone number. Or if you want a state or country abbreviation entered, limit the length to two characters.

Replace prefill with a default response displayed with the prompt. The user can accept the default, change the response by typing over the default, or cancel selection of the item. Prefill cannot be longer than the specified length.

The prefill parameter is optional. If you do not want to include a default response, enter the two commas together. (See the GETx examples on the following page.)

Append is the value added to the end of the user response. If no value is needed, enter braces with a blank space between them.

NOTE: Append does not work with GETP.

Using GETx Interactive Commands

Following are some general guidelines on the use of the GETx commands.

• You must define commands for each menu ITEM separately.

• Enter commands between the ITEM and the EXEC command(s) associated with the ITEM.

• Enter the commands in either uppercase or lowercase.

• Limit each prompt to one line.

GETx Command Examples

• Assume that you want to require users to enter a project code to keep track of work performed for that project. Type the following:

```
GETR Please enter the project code: { } 08,, { }
GETR Please enter your password: {} 08,, {}
GETO Load default macros? { } 01,, { }
```

• To get input for a program that calculates mortgages, using GETR, type

```
GETR Enter the loan amount: { } 7,,{ }
GETR Enter the interest rate: { } 5,8.5, { }
GETO Enter the period (/m=months or /y=years):+
{ } 7,/y=30, { }
EXEC mortgage
```

The input values are appended to the "EXEC mortgage" command before it is executed.

• To create the previous program using GETP in place of other GET commands, type

```
GETP Enter the loan amount: { } 7,,{ }
GETP Enter the interest rate: { } 5,8.5, { }
GETP Optional-Enter the period (/m=months or+
/y=years): { } 7,/y=30, { }
EXEC echo %1
EXEC echo %2
EXEC echo %3
```

6-20

```
EXEC mortgage %1 %2 %3
EXEC pause
```

Creating a Menu File

Prerequisites

- A workstation running DOS 3.30 or later
- The Read, File Scan, Write, Create, and Erase filesystem rights to the directory where you will create and edit the menu
- A DOS text editor

Example Menu Programs

Study the following examples by creating and trying them. By entering, executing, and debugging each example, you will gain understanding necessary to use the scripting language effectively.

NOTE: In the following examples, indents are used to help readability; they are not required.

The examples include those script files used for the menus in Figure 6-1, Figure 6-3, Figure 6-5, and Figure 6-6. Subsequent examples show other ways of using the NMENU scripting language.

Example 1: Single-Window Menu

The text in the following figure is used to create the menu in Figure 6-1.

```
Menu 1,Title Bar
   Item One {pause}
      Exec dir
   Item Two {show pause}
      Exec ver
   Item ^XExit
      Exec EXIT
```

Figure 6-7   **Single-Window Menu Script**

Example 2: A Simple Menu

Text from the .SRC file used for the menu in Figure 6-5 is shown in the following figure. This menu demonstrates how submenus can be used.

```
Menu 5,Available Applications
   Item Word Processors { }
      Show 10
   Item SpreadSheets { }
      Show 15
   Item ^XExit Menu { }
      Exec EXIT
Menu 10,Available Word Processors
   Item WordPerfect 5.1
      Exec wp51
   Item WordPerfect 6
      Exec wp6
   Item MSWord
      Exec Word
Menu 15,Available SpreadSheets
   Item Quattro Pro
      Exec Q
   Item Lotus 123
      Exec 123
```

Figure 6-8   **A Simple Menu Script**

Example 3: A More Complex Menu

The menu in Figure 6-6 was created from the text file in the following figure. This menu incorporates the GETR command with simple DOS functionality.

```
menu 22,Data Entry
   item ^AAdd Entry to Catalogue {show}
      getr Enter Tile { } 40,, {, }
      getr Enter Author's Name {} 40,, {, }
      getr Category: 1=Apps, 2=Prod, 3=Self {} 1,, {,}
      exec echo >>datalist.cat
   item ^View Catalogue {pause}
      exec sort <datalist.cat | more
   item ^Instructions {pause}
      exec type instruct.cat | more
   item ^XExit the menu
      exec EXIT
```

Figure 6-9   **A More Complex Menu Script**

As this menu script shows, by combining regular DOS commands with special NMENU conventions you have a simple means of organizing data. You don't need a database program just to catalog some information.

Example 4: Combining DOS and NetWare Commands

Users can accomplish more work when access to DOS and NetWare
functionality is combined in the same menu, as shown in Figure 6-10.

```
Menu 01,User Options
    Item Utilities
         Show 10
    Item DOS Prompt
         Exec DOS
    Item Log out of the network
         Exec Logout
Menu 10,Utilities
    Item ^1NetWare Menu Utilities
         Show 12
    Item ^2NetWare Command Line Utilities
         Show 14
Menu 12,NetWare Menu Utilities
    Item NETADMIN {Batch}
         Exec netadmin
    Item FILER {Batch}
         Exec filer
    Item NETUSER {Batch}
        Exec netuser
Menu 14,NetWare Command Line Utilities
    Item NLIST {show}
        Geto Class & Option: { } 25,user /a, {}
        Exec nlist
    Item COPY Files {pause}
        Getp Enter Source { } 25,, {}
        Getp Enter Destination { } 25,, {}
        Exec ncopy %1 %2
        Exec dir %2 /w
    Item Display a MAP listing {show pause}
         Exec map
```

Figure 6-10   **Combining Commands in a Script**

Making Menus Work

Now that you have working menus, you must make them available to your users. Following is a list of rules for usage.

- You must create a search drive to the directory where the menu files exist. Search mappings can be created in container, profile, or user login scripts.

- Users must have at least Read and File Scan rights to the directory where the menu files exist.

- NMENU uses temporary files. You must create a permanent drive mapping assignment to a directory where the temporary files will be used.

- Users must have at least Read, File Scan, Write, Create, and Erase rights to the directory where the temporary files will be stored.

You can simplify management of the menu system by keeping all menu files in one place, such as SYS:MENUS. Menus are even easier to manage if the temporary files are kept in one place, such as SYS:MENUS\TEMP.

Setting Up the User Environment

If you are storing users' temporary files in a network directory, place the following commands in the login script:

```
SET S_FILEDIR=
SET S_FILE=
```

For example, if you have created a subdirectory called TEMP under a MENUS directory, you would type

```
SET S_FILEDIR="Z:\\MENUS\\TEMP\\"
SET S_FILE="%STATION"
```

These commands point to the directory where temporary files are stored and create unique files in the temporary directory for each workstation ID number. The trailing backslash on the S_FILEDIR path is required.

NOTE: If you choose not to use the %STATION identifier variable, you must manually create a file with a maximum length of seven characters. The NMENU program automatically prepends the # symbol to the beginning of the S_FILE filename.

If the user will be using a menu with the logout option, set the S_FILEDIR environment variable to a path on the user's local drive. Set the S_FILE to "%STATION."

A copy of the MENU-X.BAT file needs to be in the SYS:LOGIN directory if the NMENU LOGOUT option is going to be used.

EXEC LOGOUT gives the message "Batch file not found" unless the temporary directory is on a local drive and MENU_X.BAT is in the LOGIN directory.

Starting NMENU from a Login Script

If you want the menu to execute from within a login script, add the EXIT login script command. For example, to execute the ACCOUNT menu from a user's login script, add the following line to the login script:

```
EXIT "NMENU ACCOUNT"
```

Converting Old Menu Files

Use this procedure to convert an existing MENU file (created with an earlier version of NetWare) to an NMENU file. These older menu programs usually have the extension .MNU.

Procedure

1 Create a directory for the new menu files and temporary files.

If you want to use the directories you already have set up for menu programs, you do not need to create new ones.

2 Change the old .MNU file to the new .SRC source file format with the MENUCNVT command. Complete the following steps.

a At the workstation command line, type

MENUCNVT menu_name.mnu

Replace menu_name with the name of the old menu you want to convert. If the menu is not in your current directory, enter the complete path to the menu name.

The program creates a new .SRC file, leaving the original .MNU file unchanged.

b Edit the new menu source file.

You will probably need to edit the new file to eliminate incorrect commands. For example, if your original MENU file used the SYSCON command, you must remove it from your new NMENU file and replace it with an appropriate NetWare 4 command (such as NETADMIN or NETUSER). NetWare 4 does not use SYSCON.

There can be substantial differences between the original .MNU file and the converted .SRC file. MENUCNVT resolves most differences, but not all of them. Some typical entries requiring manual changes include the following:

- Invalid commands such as SYSCON

- Preceding letters or numbers from the old menu

- Conversion of former @1, @2, etc., variables into the newer GETP variables

3 Follow the same six steps explained in "Menu Creation Steps" in this chapter.

Example

To help you see the differences between MENU and NMENU files, Figure 6-11 shows a part of the file for the menu in Figure 6-3.

The figure shows both the .MNU and the unedited .SRC file formats. They are shown side-by-side to help you make the comparison.

The "After Conversion (.SRC)" side has not yet been edited. Try to find changes to make the file execute properly and efficiently. Look for commands that are no longer supported in NetWare 4 and replace them with appropriate commands. One example is SLIST, which must be replaced with NLIST SERVER.

If you create your own file to test the .SRC file, remember to create some text file(s) to be displayed by the TYPE command.

Before Conversion (.MNU)

```
%Questions Questions Questions!,12,20,2
1. Who Am I?
     whoami
     pause
2. Where Am I?
     type where.txt
     pause
3. Am I Alone?
     userlist
     pause
4. What Am I Doing Here?
     type what.txt
     pause
5. What Can I Do?
     %Your Choice
6. What Next?
     %What Next
```

After Conversion (.SRC)

```
MENU 01,Questions Questions Questions!
    ITEM Who Am I? { }
        EXEC whoami
        EXEC pause
    ITEM Where Am I? { }
        EXEC type where.txt
        EXEC pause
    ITEM Am I Alone? { }
        EXEC userlist
        EXEC pause
    ITEM What Am I Doing Here? { }
        EXEC type what.txt
        EXEC pause
    ITEM What Can I Do? { }
        SHOW 02
    ITEM What Next? { }
        SHOW 03
```

Figure 6-11   **Conversion Scripts**

(continued)
Before Conversion (.MNU)

After Conversion (.SRC)

```
%Your Choice,5,50,4            MENU 02,Your Choice
A. Quit                           ITEM Quit { }
     leave.bat                       EXEC leave.bat
B. Try Again                      ITEM Try Again { }
     %Utilities                      SHOW 06
C. Experiment                     ITEM Experiment { }
     %Demo                           SHOW 07

%Demo,12,40,1                 MENU 07,Demo
1. CHOICE 1                       ITEM CHOICE 1 { }
     %Utility                        SHOW 08
2. CHOICE 2                       ITEM CHOICE 2 { }
     %Variety                        SHOW 09
3. CHOICE 3                       ITEM CHOICE 3 { }
     %TalkToMe                       SHOW 10
4. CHOICE 4                       ITEM CHOICE 4 { }
     %Beyond                         SHOW 11

%Beyond,20,75,5               MENU 11,BEYOND
MOVE ABOUT                        ITEM MOVE ABOUT { }
     %Pop_up_1                       SHOW 12
THE OUTSIDE WORLD                 ITEM THE OUTSIDE WORLD { }
     slist                           EXEC SLIST
     pause                           EXEC PAUSE

%Pop_up_1,24,10,6             MENU 12,Pop_up_1
MOVE ABOUT                        ITEM MOVE ABOUT { }
     %Pop_up_2                       SHOW 13

%Pop_up_2,19,30,1             MENU 13,Pop_up_2
MOVE ABOUT                        ITEM MOVE ABOUT { }
     %Pop_up_3                       SHOW 14

%Pop_up_3,1,1,2               MENU 14,Pop_up_3
MOVE ABOUT                        ITEM MOVE ABOUT { }
     %Pop_up_4                       SHOW 15

%Pop_up_4,8,60,3             MENU 15,Pop_up_4
MOVE ABOUT                        ITEM MOVE ABOUT { }
     %Pop_up_5                       SHOW 16

%Pop_up_5,12,4,4             MENU 16,Pop_up_5
MOVE ABOUT                        ITEM MOVE ABOUT { }
     %Pop_up_6                       SHOW 13

%Pop_up_6,12,78,5            MENU 12,Pop_up_6
MOVE ABOUT                        ITEM MOVE ABOUT { }
     type theend.txt                 EXEC TYPE THEEND.TXT
     pause                           EXEC PAUSE
```

6-29

7

Maintaining the NetWare Server

Introduction

NetWare® 4.1/9000 Services is an implementation of NetWare 4®. Because NetWare Services resides on a HP-UX server, it becomes many processes of UNIX®.

This chapter describes specific features of NetWare Services, as well as tasks you can perform in the NetWare® 4.1/9000 environment, and includes the following:

- How to set up and manage NetWare volumes

- How to monitor NetWare server errors using the server error log file

- How to manage a NetWare server: starting and stopping the server, enabling logins, and configuring your LAN driver

- How to set up and configure IPX™ and SPX™

- How to keep the network secure

- How to manage server time synchronization

Managing NetWare Volumes

This section describes volumes in the NetWare® 4.1/9000 environment and how NetWare imposes the concept of volumes on NetWare® HP 9000 server. It also describes how to set up and manage NetWare volumes within the NDS tree.

NetWare® 4.1/9000 supports multiple filesystem types (FSTypes such as vxfs, ufs, s5, and so on). NetWare Services provides these interface types:

• Standard allows NetWare volumes to be configured on top of virtually any NetWare® 4.1/9000 file system that supports long filenames.

• CD-ROM allows CD-ROMs to be accessed as NetWare volumes.

• NFS-mounted volumes allow NFS filesystems to be mounted as NetWare volumes.

Common characteristics of implementations described in this section.

The primary tools you use in NetWare Services for filesystem management are located in the SAM utility accessible from the server console.

Standard Volumes

A Standard volume uses a control directory that contains a NetWare usinodes file to store NetWare and client-specific information. It also contains a per-volume database to store NetWare trustee assignments. The NetWare® 4.1/9000 file system stores the actual data files.

The Standard file system must synchronize information in the NetWare usinodes file with that in the NetWare® 4.1/9000 filesystem. Changes made by HP 9000 users are reflected in the usinodes file by synchronization operations.

Standard volumes have the following features:

• The volume mount point specified by a path into the NetWare® 4.1/9000file

system.

- They use a NetWare usinodes file to maintain NetWare information.

- They use an extended names file for the following:

    - Names longer than 27 characters

    - OS/2* names longer than 100 characters

    - Directory paths longer than 92 characters

- They use a NetWare database to maintain trustee assignments and modifications to Inherited Rights Filters (IRF).

- NFS*-accessible files can be included.

- They support symbolic links, although these links are not recommended.

- Synchronization with the HP 9000 file system is controlled by volume variables.

CD-ROM Volumes

A CD-ROM volume uses a NetWare usinodes file to store NetWare and client-specific information. These volumes can be created by using SAM on the server console. You can read files that exist on a CD-ROM volume, but you cannot write to it.

CD-ROM volumes have the following features:

- The files are set to Read-Only.

- "UNIX File Access Control" mode is also set. Trustees cannot be established in this mode.

- The NetWare trustee rights are always Read and File Scan. The attributes Delete Inhibit, Read-Only, and Rename Inhibit are also established.

- You can change to another CD-ROM while the server is running. To do this, however, you must unmount your CD-ROM. This can be done with umount on the HP 9000 command line (see "Mounting and Unmounting NetWare Volumes" in the System Owner Handbook). You can also select "Disks-etc" to mount the new CD-ROM. When a new CD-ROM is replaced, the information is also replaced.

NOTE: When changing CD-ROM disks, ensure that you have followed the proper HP-UX rules for unmounting and remounting a disk. (See "mount" in the Command Reference for more information.)

NFS-Mounted Volumes

An NFS-mounted volume gives you access to NFS file systems.

To mount a NetWare Services volume (B) using NFS, a user on the NetWare server (B) cannot write to the base volume (A) unless

- NFS is set up so that nwroot on the NetWare server (B) can write to the base directory on the original server (A), or

- hybrid_setuid_enabled is set to ON (see "Setting Up a Hybrid User" in chapter 3). This allows hybrid users on the NetWare server (B) to write to files or directories in the base volume (A) so that it appears that a hybrid user is accessing the base volume (A) and not the NetWare server which runs as nwroot.

Interdependencies between Partitions and NetWare Volumes

HP-UX is a hierarchical file system; as with NetWare the top of the tree is called the root node and labeled as /. A file system is mounted at a particular NetWare® 4.1/9000 directory at or below root and appears as directories to the users.

NetWare uses a modified hierarchical file system, with multiple root nodes called volumes. Each volume has its own tree structure, and users must switch volumes to access the volume's resources. Figure 7-1 illustrates the topological differences between the NetWare and HP-UX file systems.

For security reasons, files that control operation of theHP-UX system should not be included in a NetWare volume.
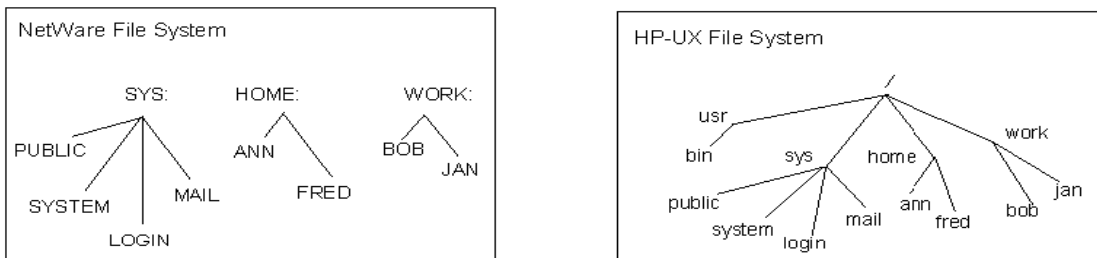
Figure 7-1   **NetWare Volumes Compared with the HP-UX File System**

Because HP-UX has no concept of a "volume," NetWare volumes become paths to a particular point in the HP-UX file system. In Figure 7-1, root directories /sys, /home, and /work become NetWare volumes by specifying the path in the NetWare Services voltab file through SAM.

NetWare supports a maximum of 64 volumes, and NetWare Services allows the 64 volumes.

Volume Statistics and Partitions

Because NetWare Services volumes are paths into the HP-UX file system (/), they are dependent upon the HP-UX file system for partition statistics.

In the example in Figure 7-1, the HP-UX file system has only one file system but three NetWare volumes. Each volume reports the same amount of disk space for the HP-UX partition.

This is quite different from native NetWare. The native NetWare file system allows the NetWare partition to be segmented (SYS:, HOME:, and WORK:), and these segments are then assigned to volumes. Volume statistics reflect the actual disk space that has been assigned exclusively to the volume.

NetWare Services can mimic this behavior if the HP-UX file system is configured to accommodate NetWare. Figure 7-2 illustrates one method for configuring the file system.

- Mount points for partitions and HP-UX file systems
X Paths to NetWare Services volumes
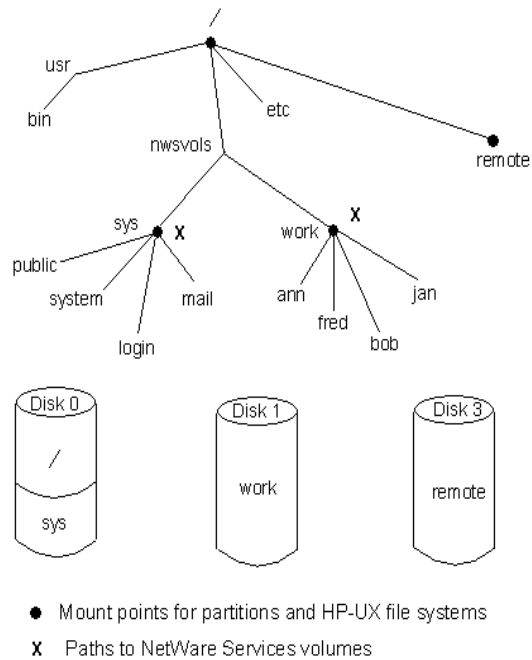
Figure 7-2   **Possible Volume Configuration**

If the HP-UX file system is configured so that file system mount points coincide with paths to NetWare Services volumes, NetWare volume statistics will be accurate.

In Figure 7-2, volume SYS: corresponds to the mount point for Disk 0, Partition 2. Volume WORK: corresponds to the mount point for Disk 1 (which has one partition).

Disk 3 is a remote disk and is mounted at the root. It is not a NetWare volume, but it can become one if a path is specified in the NetWare Services voltab file. It also can become part of a NetWare volume if it is mounted in a volume subdirectory, for example under /nwuvols/work/bob.

If Disk 3 is mounted at bob, NetWare users can expect the following behavior:

- The volume statistics for volume WORK: will not include any information about

the remote partition.

- As NetWare users access directories below bob, directory statistics will reflect the statistics for Disk 3.

Volume Configuration Parameters

NetWare volumes use some variables in SAM that are global to the server—for example, the maximum number of volumes. The NetWare configuration files also support variables that are generic to all volume types, as well as variables that are specific to a particular volume type.

The following variables apply to all volume types:

- Number specifies a number from 0 to 63. Volume SYS: is always 0. The nwvm library assigns the first available number.

- Name specifies the name that NetWare clients use to access the volume. The first volume must be named SYS:. System administrators must supply a name for all other volumes which may be the same as or different from the HP-UX directory name.

  Names must be from 2 to 15 characters long; NetWare 4 conventions prepend the server name to the volume name.

- Type specifies whether the volume is a Standard or CD-ROM volume.

- Mount point specifies the path, from root, to the directory where the volume begins.

- Control path specifies the location of the volume's trustee database files. For Standard, the control path specifies the location of the volume's usinodes file, the extended names file, and the last mount log.

- Name spaces specifies the client types the volume will support. System administrators configure each volume for additional name spaces (OS/2). DOS and UNIX name spaces are always supported.

- Option strings contain read-only file systems, maximum open files, file access control, and volume options.

Volume Utilities

You can use the System Administration Manager (SAM) to specify a volume's mount point, control point, attributes, and security mode. You can also add, delete, and modify volumes using SAM.

Managing Server Hard Disks

This section describes how to determine available disk space and how to add a hard disk to a NetWare server.

Checking Available Disk Space

You should monitor available disk space regularly and keep a log to track disk usage over time. This information helps you make the best use of your disk-space management options, such as adding a new hard disk.

On HP-UX, you can type df at the command line in a "Terminal" window. You can perform this task from your DOS client using the FILER text utility. See your Window documentation for information on how to check disk space on your Windows workstations. Note the information discussed earlier on how NetWare reports disk space.

Adding a Hard Disk to a NetWare Server

Additional hard disks can be added to your machineon HP-UX. See your HP-UX documentation for more information. To add a volume to your server, use the System Administrator Manager (SAM) at the server console. See "Maintaining Volumes"above in this chapter.

About NetWare Networking Protocols

The following information provides an overview of IPX and NetWare protocols. If you are familiar with IPX and you now want to configure IPX from the server console, skip to chapter 1 in the *NetWare 4.1/9000 Installation and Administration Guide*.

NetWare Protocol Overview

The IPX protocol is the main protocol used to transfer data from your HP-UX system to a NetWare server.

This section provides a description of the protocols that make client-server communications possible on NetWare networks. It explains packet structures defined by each protocol. It also describes how workstations, routers, and file servers transmit or receive packets.

If you plan to configure NetWare at the HP-UX server console, you need a basic understanding of the NetWare protocols.

Most computer networks require information that is transferred between two nodes (workstations or servers) to be broken up into blocks, called packets. Sending information with packets makes a transfer between nodes and any intermediate nodes (bridges or routers) more manageable. In addition, each packet contains control information used for error checking, addressing, and other purposes. The protocols used on the network define the content of this control information.

In most cases, multiple protocols exist within a packet; each protocol defines a different portion of the control information for the packet, and the control information for each protocol serves a different purpose. When multiple protocols are used, the control information for the highest level protocol is first placed around the data, then the control information for each subsequent protocol in the protocol stack is added to the beginning or end of the packet. This is called enveloping.

To standardize the definition of protocols, several standards organizations were formed by governments and corporations. One of these groups, the International Standards Organization (ISO), has developed a model called

the Open Systems Interconnection (OSI) model. This model specifies how protocols should be defined in the future. The OSI model separates the functions required for effective computer communications (such as error checking and addressing) into the following seven catagories or layers. These layers are Application, Presentation, Session, Transport, Network, Datalink, and Physical.

The protocols used by NetWare do not all correspond exactly to the OSI model definitions. NetWare uses a variety of protocols. Some were developed specifically for NetWare; some are used throughout the networking industry. The protocols required for communications between NetWare workstations and file servers are as follows:

- Medium-access Protocols (MAC) provide bit-level (0,1) error checking.

- IPX provides the best connectionless transport.

- SPXII provides a guaranteed delivery, session-oriented transport.

- Routing Information Protocol (RIP) maintains routing information and provides routing services to IPX.

- Service Advertising Protocol (SAP) provides dynamic service advertising on the network.

- NetWare Core Protocol™ (NCP™) defines connection control and service request encoding for client/server interaction.

Medium-Access Protocols (MAC)

MAC protocols (such as 802.5 Token-Ring or 802.3 Ethernet) provide bit-level error checking through cyclic redundancy checking (CRC). This CRC which is added to every transmitted packet, assures that 99.9999 percent of the packets received are corruption free.

MAC protocols define the addressing for each node on a NetWare network. This addressing is provided by each network interface card.

Internetwork Packet eXchange (IPX)

The IPX protocol is a datagram, connectionless protocol that does not require an acknowledgement for each packet sent. Other NetWare protocols such as SPXII, SAP, RIP, and NCP are built on top of IPX.

The IPX protocol provides both IPX services and RIP services. As LAN drivers deliver packets to IPX, the IPX driver uses RIP to determine the route for packets outbound to other networks. Packets addressed to a local host are routed by IPX to the applications.

When setting up NetWare from the HP-UX server console, you will need to configure your IPX internal LAN address and maximum hops, plus other information. See "Managing NetWare Protocols" and "Managing the Server" later in this chapter or the *Command Reference* for more information.

IPX Addressing IPX delivers packets using a 12-byte network address, which consists of three address components:

- Network address (4 bytes). Identifies a specific logical network or LAN on an IPX internetwork; all NetWare servers, routers and clients cabled to this segment with a common frame type must use the same network address.

- Node address (6 bytes). Identifies the individual nodes on the network. The factory-defined IX number on the NIC usually defines node addresses for client workstations. Server machines can have a logical node address.

- Socket address (2 bytes). Identifies processes or functions within a node. The destination for a packet is the socket address.

The following example illustrates an IPX address (it is usually represented in hex bytes). The address 01010393.0123456789ab.0451 represents the net, node, and socket as in the following:

01010393.	0123456789ab.	0451
Net	Node	Socket

Sequenced Packet eXchange (SPXII)

The SPXII is a connection-oriented, reliable, sequenced transport protocol. This protocol provides message-level service (for reliability) rather than packet-level service.

SPXII also provides flow control which regulates the speed with which packets are sent and received by both sending and receiving processes.

As a message service, SPXII provides enhanced throughput. This protocol reduces the amount of traffic on the wire by negotiating for large packets and reducing the number of acknowledgements.

Applications using SPXII do not need to determine packet size. The SPXII driver handles packet size for the application.

When setting up NetWare, you may want to turn on SPXII and enter other information such as the maximum number of SPXII connections and sockets for your network. See "Managing NetWare Protocols" later in this chapter.

NetWare Virtual Terminal Service (NVT2) The NVT2 service establishes terminal connections between DOS workstations and UNIX systems over SPXII.

NVT2 servers advertise remote login service and listen for SPX connection requests on the advertised socket. The NVT client then sends connection requests to the advertised socket.

Since NVT2 uses SPXII and each NVT2 connection requires a server SPXII connection, the maximum allowed SPXII connections which you specify in the "SAM" window should be at least 100.

With HP-UX, the NVT2 server uses the Service Access Facility (SAF-configured) listener to handle connect requests and the SAP daemon to handle advertising. When NVT2 is turned on in the "SAM" window, a script registers the SAF listener process on the NVT2 socket and NetWare Protocol Stack Daemon (NPSD) informs the SAP daemon to advertise NVT2. See "Managing NetWare Protocols" later in this chapter or the nwcm utility in the *Command Reference* for more information on NVT2.

If SPXII should go down normally, NVT2 will go down and come back up when SPXII comes back up.

If SPXII goes down abnormally (such as a crash), NVT2 will go down and come back up, but the service will remain registered with SAF and will be invalid. In this case, the protocol stacks must be brought back up manually.

Routing Information Protocol (RIP)

The RIP allows routing information exchange on a NetWare internetwork. The single packet structure defined by the RIP allows the following exchanges of information:

- Workstations locate the fastest route to a network number by broadcasting a route request.

- Routers request routing information from other routers to update their own internal tables by broadcasting a route request.

- Routers respond to route requests from workstations and other routers.

- Routers perform periodic broadcasts to make sure that all other routers are aware of the internetwork configuration.

- Routers perform broadcasts whenever they detect a change in the internetwork configuration.

Service Advertising Protocol (SAP)

The SAP allows service-providing nodesæsuch as file servers, print servers, gateway servers, and client workstationsæto advertise services and addresses. The SAP makes adding and removing services on an internetwork dynamic. As servers are booted, they advertise services to other nodes through the SAP; when they are brought down, they use the SAP to indicate that services are no longer available.

Through the SAP, clients on the network can determine what services are available on the network, and obtain the internetwork address of the nodes where they can access those services. This is an important function, since a workstation cannot initiate a session with a file server without the server address.

A gateway server, for instance, will broadcast a SAP packet periodically (usually every 60 seconds, the period defined for all servers advertising with the SAP) onto the network segment to which it is connected. The SAP agent in each router on that segment copies the information contained in the SAP packet into an internal table called the Server Information table. Because the SAP agent in each router keeps up-to-date information on available servers, a client wanting to locate the gateway server can access a nearby router for the correct internetwork address.

When setting up NetWare, you will need to turn SAP on and enter the number of services you will be advertising to use this feature. See "Managing NetWare Protocols" in this chapter for more information.

NetWare Core Protocol (NCP)

The NCP makes interaction between clients and file servers possible by defining connection control and service request reply/encoding.

The NCP provides its own session control and packet-level error checking instead of relying on other protocols for these functions. Consequently, the modularity of the protocol stack is reduced, but runs more efficiently.

Each NCP request packet submitted on a given connection must be assigned a sequence number by the client. The first request is assigned the number 1; that number is incremented by 1 for each subsequent request. When a file server finishes processing a request, it places the sequence number for that request in the response packet. The client can then make sure it is receiving the correct responses for the requests submitted.

For more information on IPX, SPXII, RIP, SAP, or NCP, see the *Utilities Reference*.

IPX Auto-Discovery

If a NIC was already installed in your system when you installed HP-UX, the auto-discovery feature automatically detected the IPX network number, frame type, and network device name for the network(s) connected to your node. This option is activated at installation so IPX configuration is automatic unless you install additional network boards later or need to change your IPX configuration.

Each time you boot HP-UX or shut down to move your system to another physical location, IPX reconfiguration is unnecessary because auto-discovery takes care of that for you.

If you did not have a network board installed when you installed NetWare® 4.1/9000, or if you want to add more network boards, only then is it necessary to reconfigure IPX using SAM.

Occasionally, NetWare® 4.1/9000 may detect a frame type other than the one you need because it checks for frame types in a specific order.

Managing the Server

This section describes basic setup and configuration of your NetWare server so that it will run efficiently. It explains how to do the following:

- Start and stop your server

- Enable logins and server console messages

- Start your NCP engines and enable packet burst

- Access reports on clients

- Set specialized server-wide security variables

- Configure startup variables

- Enable IPX auto-discovery and IPX diagnostics

- Configure your IPX and SPX service advertising

Starting NetWare after Booting Your System

You can configure NetWare to come up automatically when you boot the server. If you configure it this way, you can use the *nwserverstatus* command to check that NetWare really did come up after the reboot.

The system parameter that controls the server starting at boot is nws_start_at_boot. If you cannot start NetWare, you could check nwcm at the HP-UX serverc console command line by typing:

```
nwcm -v nws_start_at_boot
```

This tells you if the parameter is set to On or Off. If it is off, type:

```
nwcm -s nws_start_at_boot=on
```

to turn it on again.

Bringing Down and Restarting NetWare

Use this procedure to start and stop your NetWare server.

Make sure all of your users are logged out of the server if you shut it down.

Prerequisites

- Access to the server console

- Superuser permission to shut down a NetWare server

Procedure

1 Start the NetWare transport using the command:

`startnps`

Start NetWare services using the command:

`startnw`

In order to start the NetWare server process, the IPX protocol stack must be active.

There are several ways to check at the HP-UX server console command line whether the stack is active:

- Type ps -ef | grep IPX. If the transport is UP , it should display the two stack daemons npsd (IPX Protocol Stack Daemon) and sapd (IPX Sap Daemon).

- Type ipxinfo. A Resource temporarily unavailable message may appear. This indicates that the stack is not active.

- Type nwsapinfo or statnps. nwsapinfo may display an "unable to attach to shared memory" message if the transport is down.

- statnps -i will display UP or DOWN to indicate the status of the transport.

To start the stack again, type startnps at the command line.

Additional Information

For more information about	Refer to
Starting or stopping the server	"nwcm" in the *Command Reference*

Tuning Your Server

This section discusses how to limit or increase the HP-UX resources available for NetWare Services. It also describes how to manage engines, configure shared memory size, limit error log file size, and set packet burst limits.

Managing Engines at the Desktop

NetWare Services servers refer to certain processes as NCP engines. NCP engines are often considered the workhorses of NetWare Services servers and are responsible for initial processing of all client requests.

NetWare Services requires a minimum of two engines running at all times. The more work you require of your system, the more engines you will need to start.

Adding too many engines, however, may decrease performance. So generally you need two engines per CPU.

Running more engines requires more RAM. (See "Hardware Requirements" on page vii in "How to Use This Manual.") After the NetWare server has booted, engines can be increased or decreased using the nwengine utility. The number should be increased if the nxinfo utility reports an excessive number of packets dropped because of server activity.

To prevent NetWare from using too many resources, you can limit the number of engines that can be started after boot time.

You can specify the number of NCP engines to start by using "Number of NCP Engines to Start" and "Maximum Number of NCP Engines" at the NetWare® 4.1/9000 server console. To specify how many engines to start automatically when the NetWare server process is started, see "Tuning Your Server at the Desktop" in this chapter.

Configuring Shared Memory

If you don't configure any shared memory or if the default size of 4 Mg (or 4194304 bytes) is configured, NetWare will automatically determine the required shared memory size. The actual size used will be displayed on the console at startup.

Adjusting the Size of Your Error Log

Any errors your server experiences are saved to the error log file, SYS$LOG.ERR. You can change the size of this log depending upon how many messages you want to store in this file. Make sure you monitor this file because if messages come in and the file is full, messages are saved to a backup (SYS$LOG.OLD) and a new file, SYS$LOG.ERR, is created. Only one SYS$LOG.ERR.OLD is maintained.

See "Error Log File Size" in "Tuning Your Server" in this chapter to change the size of your error log file.

Configuring Packet Burst

Packet Burst is a protocol built on top of IPX that speeds multiple-packet NCP reads and writes of files.

This protocol speeds the transfer of NCP data between a workstation and a NetWare server by eliminating the need to sequence and acknowledge each packet.

Packet Burst protocol is more efficient than the one-request/one-response protocol in earlier NetWare versions. With this protocol, the server or workstation can send a whole set (burst) of packets before it requires an acknowledgement.

By allowing multiple packets to be acknowledged, Packet Burst reduces network traffic.

It also monitors dropped packets and retransmits only the missing packets.

A client must negotiate the use of Packet Burst with a server before using it.

See "Enable Packet Burst?" and "Packet Burst Buffer Size" in "Tuning Your Server at the Desktop" in this chapter to configure Packet Burst.

Packet burst can only be configured via the nwcm utility. The parameters are:

burst_mode_buffer_size: size of packt burst packets, default = 24576
burst_mode_clients: maximum number of burst_mode clients that can be supported at the same time.
burst_mode_protocol: Enable/disables packet burst

Managing Engines at the Command Line

You can use the nwengine utility at the server console command line to start and stop engines while NetWare Services is running. To change the number of engines, type

```
nwengine number <Enter>
```

Replace number with the new number of NCP engines you want running. The nwengine command determines the difference between the total number of NCP engines requested and those already running.

For example, if you have four NCP engines already running and you want to add three more engines, type the following command:

```
nwengine 7 <Enter>
```

Three more NCP engines will be started.

NOTE: This number can be increased only to the maximum number of engines specified by the "Maximum Number of NCP Engines" variable.

To reduce the number of NCP engines from seven to five (thus stopping two NCP engines), type

```
nwengine 5 <Enter>
```

You cannot decrease the number of engines below two. This is the minimum number of engines required to run NetWare Services.

Additional Information

For more information about	Refer to
NCP engines	"nwengine" in *Utilities Reference*
	"NCP_engine" in *Concepts*

Checking Client Connections Using nxinfo

Use the nxinfo command at the server console command line to get a report on client connections. The report provides two pieces of information important to managing the number of engines you want active:

• The maximum number of clients ever active at one time. (If this number matches the number of licensed connections, you may need to buy more licenses.)

• The clients now active.

By checking these two figures while your server is performing an average work load, you can determine the number of NCP engines to best manage your workload.

If a large number of packets is dropped because a server message indicates that the server is busy, you may need to add another engine. Adding too many engines, however, may decrease performance.

For more information, see "nxinfo" in *Utilities Reference*.

Checking Client Activity

Use this procedure at the HP-UX server console to configure the NetWare watchdog (a connection-monitoring feature).

The watchdog sends packets to inactive connections and eventually logs out connections that remain unresponsive. Use the watchdog variables to configure how much watchdog information is recorded or displayed and how long an inactive connection can remain unresponsive before it is logged out.

Watchdogs can only be configured with the nwcm command. The parameters watchdog are listed below.

console_display_watchdog_logouts. This variable controls messages sent to the server's display device when the watchdog logs out a connection. "Yes" means messages are sent to the console. "No" means no messages are sent.

If connections are unexpectedly losing their connection to the NetWare server, set this variable to "Yes" until the problem has been corrected. The default is No.

number_of_watchdog_packets. This variable specifies the number of unanswered watchdog packets the NetWare server sends to a client before it disconnects. Valid values are 5 to 100. The default is 10.

log_watchdog_logouts. This variable controls the creation of log entries when a client is logged out by watchdog. "Yes" means the entry is logged into SYS$LOG.ERR. "No" means the entry is not logged into SYS$LOG.ERR or any other error file. The default is Yes.

delay_before_first_watchdog_packet. Delay before First Watchdog Packet. This variable determines the time (in seconds) the server waits without receiving a request from the workstation before sending out the first watchdog packet to that workstation. The default is 296.

delay_between_watchdog_packets. This variable determines the time (in seconds) between watchdog packets. After the server sends out the first watchdog packet, it waits a specified time before sending out succeeding packets if there is no reply. The default is 60.

For more information on Watchdog, see "Watchdog" in *Concepts*.

Network Security Features

NetWare Services includes security and fault tolerance features to protect network data from intruders and system failures. This section describes how to prevent network data disaster and recover from failures.

Preventing Packet Forgery

NetWare Services includes a security feature, NCP packet signature, that protects servers and clients using the NetWare Core Protocol.

NCP packet signature prevents packet forgery by requiring the server and the client to "sign" each NCP packet. The packet signature changes with every packet.

NCP packets with incorrect signatures are discarded without breaking the client's connection with the server. However, an alert message about the invalid packet is sent to the error log, the affected client, and the message monitor. The alert message contains the login name and the station address of the affected client.

NCP Packet Signature Options

Because the packet signature process consumes CPU resources and slows performance, both for the client and the NetWare server, NCP packet signature is optional.

Several signature options are available, ranging from never signing NCP packets to always signing NCP packets. NetWare servers and clients both have four settable signature levels.

The signature options for servers and clients combine to determine the level of NCP packet signature on the network.

Some combinations of server and client packet signature levels may slow performance. However, systems with low CPU-demand may not show any performance degradation. Network supervisors can choose the packet signature level that meets both their performance needs and their security requirements.

When to Use NCP Packet Signature

NCP packet signature is not required for every installation. Some network supervisors may choose not to use NCP packet signature because they can tolerate security risks in the following types of situations:

- Only executable programs reside on the server.

- All network users are known and trusted by the supervisor.

- Data on the NetWare server is not sensitive; loss or corruption of this data would not affect operations.

NCP packet signature is recommended for security risks such as the following:

- An untrustworthy user at a workstation on the network

- Easy physical access to the network cabling system

- An unattended, publicly accessible workstation

Server Security

Security is a major concern for administrators and users when working with files and directories on the network. Several types of security exist in NetWare Services:

- File system (see "Making the File System Secure and Accessible" in chapter 3).

- NetWare Directory Services (see "Managing the NetWare Directory Services Tree" in chapter 4).

- Login restrictions (see "Managing the Server" in this chapter).

- Server restrictions (see this section).

Use this procedure to prevent packet forgery, enforce password encryption, and prevent job servers from creating a window for security breach.

Packet signature is configured with the nwcm utility. The parameters are listed below.

ncp_packet_signature_option. This variable determines the signature levels for NCP packets. Valid values are Disabled, Enabled, Preferred, and Required (see Table 7-1). The default is Disabled.

allow_unencrypted_passwords. This variable controls unencrypted passwords. "Yes" means unencrypted passwords are allowed. "No" means passwords must be encrypted and clients who use software that sends clear text passwords cannot log in. The default is No.

allow_change_to_client_rights. This variable controls the ability of a Print or Job server to assume rights of a queue job's submitter as it services a queue job. "Yes" means submitter's rights are allowed to be assumed. "No" means submitter's rights are not allowed to be assumed. On a system that needs tight security, set this to No. The default is Yes.

Server Signature Levels

Use "NCP Packet Signature Option" in the previous procedure to assign server packet signature levels.

Client Signature Levels

Client signature levels are assigned in the NET.CFG file at the client workstation as follows:

```
signature level = number
```

To replace the existing number with Disabled (0), Enabled (1), Preferred (2), or Required (3), use NetWare Settings for NUC; use a text editor for DOS, Windows clients. The default is Enabled (1). The levels are explained in Table 7-1.

Table 7-1   **Client Signature Levels**

Number	Explanation
Disabled (0)	Client does not sign packets.
Enabled (1)	Client signs packets only if the server requests it (server option is 2 or higher).
Preferred (2)	Client signs packets if the server is capable of signing (server option is 1 or higher).
Required (3)	Client signs packets and requires the server to sign packets (or logging in will fail).

Effective Packet Signature

The packet signature levels for the server and the client interact to create the "effective packet signature" for the network. Some combinations of server and client levels do not allow logging in.

Figure 7-3 shows the interactive relationship between the server packet signature levels and the client signature levels.

If	Server = 0	Server = 1	Server = 2	Server = 3
Client = 0	○	○	○	⊘
Client = 1	○	○	●	●
Client = 2	○	●	●	●
Client = 3	⊘	●	●	●

● Packet signature
○ No packet signature
⊘ No logging in

Figure 7-3   **Effective Packet Signature of Server and Client**

Examples of Signature Levels in Different Situations

The default NCP packet signature level is Enabled (1) for clients and Preferred (2) for servers. In general, this setting provides the most flexibility while still offering protection from forged packets.

Below are some examples of using different signature levels.

All Information on the Server is Sensitive If an intruder gains access to any information on the NetWare server, it could damage the company. The network supervisor sets the server to level 3 (Required) and all clients to level 3 (Required) for maximum protection.

Sensitive and Nonsensitive Information Reside on the Same Server The NetWare server has a directory for executable programs and a separate directory for corporate finances (such as Accounts Receivable). The network supervisor sets the server to level 2 (Preferred) and the clients that need access to Accounts Receivable to level 3 (Required). All other clients remain at the default, level 1 (Enabled).

Users Often Change Locations and Workstations The network supervisor is uncertain which employees will be using which workstations, and the NetWare server contains some sensitive data. The network supervisor sets the server to Required (3). Clients remain at the default Enabled (1).

A Workstation is Publicly Accessible An unattended workstation is set up for public access to nonsensitive information, but another server on the network contains sensitive information. The network supervisor sets the sensitive server to Required (3) and the unattended client to Disabled (0).

Assigning the Server Packet Signature Option

The default server packet signature option is Preferred (2). To change the option, use the "NCP Packet Signature Option" in NetWare SAM. See "Server Signature Levels" in this chapter.

Assigning the DOS or Windows Workstation Packet Signature Level

The default client packet signature level is Enabled (1). To change the level, add the following parameter to the NET.CFG file of each DOS or Windows workstation:

```
signature level = number
```

Replace number with 0 (Disabled), 1 (Enabled), 2 (Preferred), or 3 (Required).

Assigning the NUC Workstation Packet Signature Level

This signature level applies to all NUC clients unless it is set in a user-specific NET.CFG file or in NetWare Setting

The default packet signature level is Enabled. To change the level, see "Setting Packet Security Levels" in the System Owner Handbook. These settings are in NetWare_SAM, NUC Setup.

Additional Information

For more information about	Refer to
Packets	"Packet" in *Concepts*
Packet signatures	"Server Security"
NET.CFG file	"NET.CFG" in *Concepts*
NCP packets	"NCP Packet Signature" in *Concepts*

Common Management Tasks

This section describes other network administrator tasks and ways you can change the server environment after installation of NetWare Services.

Viewing the Server Error Log File

The server error log is a text file called SYS$LOG.ERR in the server's SYS:SYSTEM directory. All system messages and alerts that appear on the server display device are recorded in the SYS$LOG.ERR file. View this file periodically to see what kinds of errors are occurring on your server.

You can view the server error log from a DOS or Windows workstation using a text editor. You can also view or clear the server error log with the NETADMIN or FILER text utility in DOS.

NetWare security violations are also recorded in the SYS$LOG.ERR file. Check this file daily if you are concerned about security at your site.

NOTE: You should regularly clear the SYS$LOG.ERR file to keep it from using too much server disk space or limit its SHMMAX size as discussed earlier in this chapter.

Prerequisites

- A workstation running DOS 3.30 or later and NETADMIN
- A minimum of 512 KB of memory available on the workstation
- Supervisor or equivalent directory right to SYS:SYSTEM

Procedure

1 At the DOS prompt, type

   `NETADMIN <Enter>`

2 From the "NetAdmin Options" screen, choose "Manage Objects."

3 From the browser, select the Server object that contains the error file you want to view and press <F10>.

4 Choose "View or Edit Properties of This Object."

5 Choose "View Server Error Log File."

The server error log appears.

6   To delete or exit the server error log, press <Esc>.

A prompt to clear the error log file appears.

7   To clear the error log file, choose "Yes."

To exit NETADMIN, press <Alt> + <F10>.

Managing Error Log Files

NetWare creates and maintains these server, advertising, and volume error log files:

*   SYS$LOG.ERR for server errors.

*   SAP error log file for advertising errors. This is located in /var/netware4. It tells you what the local SAP is advertising.

*   LastMountLog in the nwcontrol directory for volume errors (see "Maintaining Volumes" on in this chapter). This is used from a NetWare® 4.1/9000 client.

To keep server error log files from using too much disk space, NetWare Services includes the "Error Log File Size" variable. See "Tuning Your Server."

Controlling Resource Allocation

This section describes how to use accounting to control the number of resources a NetWare client can use. The following are items to consider when installing and using the accounting procedures.

- Install the accounting program

- Decide on the services you will charge for

- Calculate the rates

- Set up accounting balances for the users

- View the balances

If you want to use the NetWare® 4.1/9000 accounting commands (see System Administration) rather than NetWare utilities to control resources used by NetWare clients, make all of your NetWare clients hybrid users (see "Managing the NetWare Services File System" in chapter 3).

Setting Up Accounting

Use this procedure from a Windows workstation to monitor NetWare server usage and charge users for server resources. You can do this by either using NetWare Administrator or NETADMIN and ATOTAL.

Setting Up Accounting Using NetWare Administrator

Prerequisites

- A 386 or later workstation and NetWare Administrator

- The Supervisor right to the parent directory

Procedure

1   From the Windows Program Manager, click on the "NetWare Administrator" icon or run the nwadmin.exe. from the "File Manager."

2   Select the Server object you want to set up accounting for.

3   From the "NetWare Administrator" menu bar, choose "Object."

4   From the "Object" pull-down menu, choose "Details."

5 Choose "Accounting" from the bottom of the dialog box.

6 Confirm that you want to install accounting on this server.

Accounting page buttons appear on the right side of the dialog box with the other page buttons.

7 Use the accounting buttons to edit the accounting pages.

8 Choose "OK."

Setting Up Accounting Using NETADMIN

Prerequisites

• A workstation running DOS 3.30 or later and NETADMIN

• A minimum of 512 KB of memory available on the workstation

• The Supervisor right to the parent directory

Procedure

1 Run the nwadmin.exe from the "File Manaager" or at the DOS prompt, type

```
NETADMIN <Enter>
```

2 From the "NetAdmin Options" menu, select "Manage Objects."

3 Select the Server object for which you want to set up accounting for and press <F10>.

4 From the "Actions for NetWare Server" menu, select "View or Edit Properties of this Object" and press <Enter>.

5 From the "View or Edit Server" menu, select "Accounting" and press <Enter>.

6 From the "Install Accounting?" prompt, select "Yes" and press <Enter>.

7 From the "Accounting Options" screen, select "Accounting Servers" and press <Enter>.

8 Press <Insert>.

9 Select "NetWare Server" from the list of possible servers and press <Enter>.

10 Enter the name of the server or press <Insert> and select a server from the list.

11 Press <Esc> to return to the "Accounting Options" menu.

12 Choose the options you want to set up.

Press <F1> if you need help with any of the options.

13 To exit NETADMIN, press <Alt>+<F10>.

Calculating Charge Rates for Accounting

Charge rates for using server resources are specified as multipliers and divisors. To set the charge amount to "No Charge," enter 0 as the multiplier. Use the following formula to calculate a charge rate:

$$\frac{\textbf{CHARGE}\ \text{(charge rate multiplier)}}{\textbf{ESTIMATED USAGE}\ \text{(charge rate divider)}} = \textbf{CHARGE RATE}$$

For example, if you want to charge $200 per month for server disk storage, and there are usually 100,000 blocks used each month on your hard drive

- 20,000 would be the multiplier ($200 in cents)

- 100,000 would be the divisor (disk block usage per month)

  Therefore, users would be charged two-tenths of one cent per disk block used.

$$\frac{\textbf{20,000}\ \text{cents}}{\textbf{100,000}\ \text{blocks read}} = \textbf{1}\ \text{cent}\ \textbf{/ 5}\ \text{blocks read}$$

Viewing Accounting Totals

The ATOTAL utility provides a total for the accounting services used on your network. ATOTAL compiles information from the system accounting records and lists the following:

- Total connect time in minutes

- Total service requests

- Total blocks read

- Total blocks written

- Total disk storage in blocks per day

Procedure

1 Change to the SYS:SYSTEM directory.

2   To view daily and weekly totals for accounting services, type

```
ATOTAL <Enter>
```

3   To redirect ATOTAL data to a file, type

```
ATOTAL > filename <Enter>
```

Managing Network Time Synchronization

Time synchronization ensures that all servers in a Directory tree report the same time and order NetWare Directory Services events correctly.

To establish time synchronization, a time server must first be assigned a time server type. Then the time server must know which servers to contact for time information, how often to contact them, and how much a server's time can differ from network time and still be considered synchronized.

The following sections describe these processes and indicate which variables control the configuration.

Changing the Default Time Server Type

The installation default for time synchronization designates the first server in a new Directory tree as a Single Reference time server and all others as Secondary time servers. In most circumstances, you do not need to change the default time server type.

However, you may need to change the default time server type if you are using a custom time source configuration. You can do this using the System Administration Manager (SAM).

For information on time server types, see "Time Servers" in Chapter 4 of *Introduction to NetWare Directory Services* and "Time synchronization" in *Concepts*.

Time Sources

To synchronize, time servers poll at least one other time source:

• Single Reference servers are always synchronized and therefore do not poll time sources.

• Reference servers must poll another time source, preferably a Primary server, although it can be another Reference server. Although Reference servers do not adjust their time, they must be able to contact another time source before they can

claim to be synchronized.

- Primary servers must poll either another Primary server or a Reference server.

- Secondary servers must poll a Reference, Primary, or Single Reference server to obtain the correct time.

During each polling interval, a time server contacts one, and only one, valid time source. While polling, a server has to find a time source of the right type which matches the server's selection criteria for valid time sources. Although you can allow all time servers of the right type to be valid time sources (any primary server to be a valid time source for any other primary or reference server), you can designate which sources the server synchronizes with.

You can configure a server to recognize any of the following as valid time sources:

- The first server in a list that responds to a time synchronization query. The server contacts the time sources in the order listed until one responds. This method works well on a large internetwork because it allows you to turn off the advertising of time services. However, this method requires additional configuration when servers are added or deleted from the internetwork.

- The first server in a list that responds to a time synchronization query or, if no server in the list responds, the first server that responds to a general time synchronization query to the network. This method allows you to have preferred servers for time synchronization, and it also allows you to use advertising when all the servers in the list are unavailable. You can restrict the server's contacts with advertising servers to a particular Directory tree or allow any server on the network, regardless of tree, to be a valid time source.

- The first server that responds to a time synchronization query to the network. This method does not use a list and relies entirely on the advertising of time services to find a valid time source. This is the quickest and easiest method to set up and allows new servers automatically to fit into the time synchronization configuration. You can restrict the server's contacts to a particular Directory tree or allow any source on the network, regardless of tree, to be a valid time source.

In most circumstances, you can rely on the time synchronization advertising, and you do not need to create a list of sources. However, in the following situations, you may need a custom configuration:

- You have more than one Reference or more than one Primary time server on your

network and your server is not synchronizing within its Directory tree.

- You want to control the sources your server uses for time synchronization.

- You want to reduce SAP traffic by turning off time service advertising.

For more information on restricting valid time sources, see the following variables in SAM:

- Enable Time Service Advertising?

- Use Only Configured Sources?

- Time Sources

- Directory Tree Mode

See "Creating a Custom Time Source Configuration" below in this chapter for more information.

Polling Intervals

During a polling interval, time servers exchange a configurable number of packets which they use to compare their current time with the responding server's time. The default is to send three packets, enough to adjust for network fluctuations but not so many as to flood the network with time synchronization packets.

A server does not always poll at the same interval. When a server is not synchronized with the network, the server polls according to the short interval value (the default is 10 seconds) until its time is synchronized with the network. Once time synchronization is established, the server gradually increases its polling interval until it matches the polling interval value (the default is 10 minutes).

For more information on configuring polling and its intervals, see the following variables in SAM:

- Polling Count

- Short Interval

- Polling Interval

Synchronization Limits

Since clocks in computers vary, synchronizing all servers in a network to the same precise time is almost impossible. By default, time synchronization is set up to allow for a two-second time variance between network time and a server's time. Servers that come within that two-second variance are considered synchronized. You can adjust this value, called a synchronization radius, to fit your applications and network configuration:

• Increase this value if the server is losing synchronization because the server has a heavy load, there are multiple routers between the server and the time sources, or your system is connected to a network with heavy traffic.

• Decrease this value if you have an application that requires a finer synchronization to order events correctly and your network configuration will support it.

Synchronized servers (Secondary and Primary) continue to make small adjustments in an attempt to bring their time within the limits set by a tolerance value (one millisecond default). Once the server's time is within the range allowed by the tolerance value, the server stops making time adjustments. You can adjust the tolerance value (called a correction floor) to fit your network configuration and hardware.

For more information on configuring synchronization limits, see the following variables in SAM:

• Correction Floor

• Synchronization Radius

Creating a Custom Time Source Configuration

NetWare allows you to control what type of time services a NetWare server provides, which time servers a NetWare server contacts for time synchronization, how frequently the server must contact or poll the sources, and how the time adjustments are made.

Use the following procedure to adjust these variables:

Prerequisites

• Access to the server console

• Superuser permission to use SAM

Procedure

1 HP recommends that you use SAM to set the bindery context and most time synchronization parameters. Use the nwcm command to set the other parameters. The nwcm command is described in the *Utilities Reference*.

2 Set the following variables as appropriate.

Basic. This category shows the most commonly changed time synchronization variables.

Time Server Type. This variable specifies how the server synchronizes time (set by *dsinstall*): Single, Reference, Primary, or Secondary.

Enable Time Service Advertising? This variable controls time source advertising. "Yes" means Single Reference, Reference, and Primary time servers advertise; Secondary time servers do not advertise. "No" means time servers do not advertise. If it is a time source for other servers, you must add its time to those servers' lists of time sources. The default is Yes.

We recommend that all servers be configured the same ("Yes" or "No") for this variable to be effective.

Directory Tree Mode? This variable controls whether the server synchronizes time with services in its tree and with all servers on the network.

This variable has no effect if the "Use Only Configured Sources" variable is set to "Yes."

When "Use Only Configured Sources" is set to "No," this variable works as follows:

- "Yes" means the server synchronizes only with services in the Directory tree.

- "No" means the server attempts to synchronize with any time source on the network. With this configuration, make sure any nonproduction servers do not advertise time services.

Time Sources. This variable contains the list of time sources this server contacts to determine network time. When the first time source is contacted, the search stops.

Use Only Configured Sources? This variable determines which time sources the server listens to. "Yes" means servers only listen to the sources in the configured sources list ("Time Sources"). "No" means the server first attempts to contact a server listed in the configured sources list; if

unsuccessful or the list is empty, the server attempts to contact an advertising time source. The default is No.

Advanced. The Advanced category shows and allows you to change less commonly used time synchronization variables.

Polling Count. This variable determines the number of time packets to exchange while polling.

Polling Interval. This variable determines how often the server checks to see if it is still synchronized with network time. All servers in the Directory tree should use the same value. The interval is specified in seconds, and the maximum is 31 days. The default is 600.

Short Interval. When a server discovers it is not synchronized with network time, it starts time synchronization polling at the interval specified by this variable. After synchronization, the polling interval increases until the server is using the value specified by the "Polling Interval" variable. The default is 10 seconds.

Synchronization Radius. This variable controls the maximum time difference (in milliseconds) a server can differ from network time and still be considered synchronized. Increasing the time allows a greater time difference between servers. Decreasing the time increases the chance of losing server synchronization. When the server is polled, if the time difference is greater, the server is not synchronized. If the time difference is less, the server is synchronized.

Correction Floor. This variable determines how closely servers attempt to synchronize their clocks (in milliseconds). This value cannot exceed the "Synchronization Radius" or synchronization may not be achieved.

Time Adjustment. This variable determines a single time adjustment in size, date, and time. The format is (+ or -) *<hour>*:*<minute>*:*<second>* at *<month>*/*<day>*/*<year>* *<hour>*:*<minute>*:*<second>* (A.M. or P.M.). If the date and time are not specified, time sources default to six polling intervals or one hour from the current time, whichever is longer. All time sources synchronizing together adjust their clocks by the specified time at the specified date and time.

Use this variable sparingly to correct network time-wide errors. Misuse of the variable can corrupt time synchronization and the order of events on your network. You cannot use this variable on a second time server. A Reference Time server ignores the adjustments from primary time servers.

Example of Synchronizing Two Directory Trees

Suppose you have two Directory trees on your network and you want all the servers in both trees to synchronize to the same time.

You used the default installation, so the Root servers of the trees (ROOT1 and ROOT2) are Single Reference servers, Tree Mode is set to "Yes," and Service Advertising is set to "Yes."

Each Directory tree is synchronized within itself, but time between the Directory trees differs by a few minutes.

To synchronize both trees, stop the NetWare server process on both servers, then set the following variables, and restart the servers.

• Server ROOT1:

  Set "Time Server Type" to "reference."

  Set "Time Sources" to "root2"

• Server ROOT2:

  Set "Time Server Type" to "primary"

  Set "Time Sources" to "root2"

The Root servers of both Directory trees synchronize; this synchronizes all the other servers in both trees.

Since the Roots are now both time providers, it is necessary to change "Time Server Type" from "Single" to "Reference" on Server ROOT1 and "Primary" on Server ROOT2.

Server ROOT1 is a Reference server so that there will be a central point for controlling time on the network.

When you synchronize two Directory trees, you double the size of the time synchronization network. You should examine the physical layout of the network and add other Primary servers, or consider hand-configuring the time sources and eliminating the use of SAP.

Additional Information

For more information about	Refer to
Time server types	"Time Servers" in Chapter 4 of *Introduction to NetWare Directory Services*
Time synchronization	"Time synchronization" in *Concepts*
SAP	"Service Advertising Protocol (SAP)" in *Concepts*

Index

Index

Index

Index

Index

Index

Index

Index

Index

Index

Index

Index

mounting CD-ROM, 7-4
mounting NFS, 7-5
mounting Standard, 7-3
NetWare, interdependencies with UnixWare partitions, 7-5
number supported, 7-6

W
Watchdog
  logging watchdog logouts, 7-22
  setting delay time, 7-22
  setting number of packets, 7-22
Windows
  files needed to run NetWare, 3-33
  guidelines for running in NetWare, 3-34
  icon for NetWare Administrator, creating, 18
  installing on the network, 3-33
  loading, 3-31
  mapping search drive in login scripts, 5-41
  network installation methods, explained, 3-33
  running on the network, 3-34
  setting up, 3-35
Windows workstation. See also Workstation
  installing Windows workstation software, 17
  making client installation diskettes from CD-ROM, 15
Workstation, specifying in login scripts
  clearing screen, 5-22
  connection number, 5-60
  machine name, 5-37
  network address, 5-60
  node address, 5-60
  PCCOMPATIBLE command, 5-28
  time, synchronizing with server, 5-51
Workstation. See also DOS workstation; OS/2 workstation; Windows workstation
  network address, specifying in login scripts, 5-60
  packet signature, assigning, 7-36
WRITE login script command, using, 5-55
Write property right, explained 2-6. See also Rights, property

Y
YEAR identifier variable, explained, 5-59